OUT OF LIGHT CAME DARKNESS:
BIOARCHAEOLOGY OF MORTUARY RITUAL, HEALTH, AND ETHNOGENESIS
IN THE LAMBAYEQUE VALLEY COMPLEX, NORTH COAST OF PERU
(AD 900-1750)

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree

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By

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* * * * *

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ABSTRACT

The last 10,000 years have witnessed a handful of major adaptive transitions experienced by the human species – the most recent, rapid, and violent of which was contact between Native Americans and Europeans beginning in the fifteenth century A.D. Humanity was irrevocably altered on a global scale as part of a “total biocultural phenomenon.” This dissertation presents the first study of the human skeletal remains from a Central Andean historic population in the Lambayeque Valley Complex, north coast of Peru. Synthesizing archaeological, ethnohistoric, and bioarchaeological data, this work tests six linked hypotheses that the indigenous Mochica ethnic group experienced negative social and biological stress but dynamically adapted to the strains of Spanish colonialism through a culturally adaptive response. These hypotheses are tested using multiple lines of archaeological and skeletal biological datasets including 1,041 skeletons from the late pre-Hispanic period and the Colonial-era Chapel of San Pedro de Mórrope.

Examination of postcontact mortuary behaviors at Mórrope reveal their burials reflect ritual patterns that encoded syncretic interplays between the colonial order, Mochica agency and identity, cosmological roles of the dead, and resistance. Skeletal biological evidence at Mórrope illustrates an unprecedented increase in systemic biological stress, a shift to a more strenuous lifestyle, and a decline in oral health. Paleodemographic analyses suggest postcontact biological stress led to lowered female
fertility. Elevated rates of periosteal infection, porotic hyperostosis, and decreased oral
health correlate to increased population density and a shift to a greater consumption of
dietary carbohydrates. Elevated prevalence of degenerative joint disease likely stems
from Spanish labor extraction. Lowered prevalence of enamel hypoplasias and
unchanged terminal adult stature point to surprising nutritional consequences that are
only beginning to be understood but may point to a synergism between epidemic disease
and biological adaptation.

Population genetic analyses reveal a major loss of Mochica genetic diversity in
the postcontact era, but this was not likely driven by demographic collapse. Instead,
changing boundaries and widened definitions of Mochica identity were components of
the ethnogenesis of a Colonial Mochica culture, and it occurred in two phases: biological
hybridization during the Early/Middle Colonial period, which was followed by cultural
hybridization as inferred from syncretic Euro-Andean mortuary patterns observed in the
Middle/Late Colonial mortuary sequence.

Ultimately, these findings aim to provide a preliminary, though detailed
examination of the outcomes of contact in Peru. It underscores how colonial Spanish
socioeconomic policies shaped the cultures, health, and microevolutionary trajectories of
Native Americans in the Central Andes and the Americas as a whole. Methodologically,
the dissertation highlights a new, integrative, and holistic configuration of method and
theory between mortuary analysis and bioarchaeology to perceive of and decode the
extent of meaning, symbolism, and significance of burials and their biological contents.
Dedicated to:

- The people of Mórrope, Peru – past, present, and future
- My mother and father, Brenda and Gunther Klaus
ACKNOWLEDGMENTS

This dissertation is a product of a personal and professional journey that commenced ten years ago but still only just beginning. None of what I present here could have been possible without the help, assistance, and guidance of a great many people who I have become indebted to along the way.

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I am also deeply grateful to Izumi Shimada, who served as my MA advisor at Southern Illinois University and has been an invaluable consultant in this work. His
continued intellectual challenges, stimulation, and inspiration are forever appreciated. I will always be a student of Izumi and his work, and I am deeply honored to have been under his tutelage. His comments have also greatly improved this dissertation.

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The genesis of the work at the Chapel of San Pedro de Mórrope began in 2003, when after giving a lecture at the Universidad de San Pedro Ruiz Gallo in Lambayeque, Cesar Maguiña of ICAM approached me to discuss his project in Mórrope. On the restoration side-of-the-house, Maguiña’s support for the archaeological project will always be remembered. However, none of this could have come to fruition without my colleague and friend, Manuel Eduardo Tam. Manuel co-directed the 2004 and 2005 field seasons and Mórrope. From the largest detail to the smallest, he helped show me the ropes of directing and managing a large field project incorporating a diverse group of students. I thank him for his flexibility, sense of humor, and above all patience with me. I cannot wait to work with him in future historical archaeology projects in the north coast of Peru. The tireless help, friendship, and ingenuity of Raul Saavedra, the project
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INTRODUCTION: PROBLEM CONTEXTS AND RESEARCH HYPOTHESES

*Chaupi punzhapi tuayarca* – “out of daylight, came darkness” – was a historically known saying among Quechua speakers of the South American Andean highlands. This statement reflects their perception of contact: the historically unprecedented biological and cultural encounters between Native Americans and Europeans beginning in the late fifteenth century A.D. For many indigenous peoples of the New World, the consequences of contact were disastrous. When Francisco Pizarro attacked the Inka in 1532, a profoundly complex set of historic, biological, cultural, and socioeconomic processes began to unfold across the continent over the span of several centuries. The peoples of the Andes were transformed by European contact in ways that could never have been anticipated by their pre-Hispanic ancestors and are just beginning to be understood by modern scientific study. Contact was a process that changed both the New and the Old World and can be understood by anthropologists in terms of a “total biocultural phenomenon” which cross-cut all domains human of experience.

The goal of this doctoral dissertation is to attempt an initial bioarchaeological characterization of contact in the Central Andes from the excavation and analysis of the human burials from the Colonial Chapel of San Pedro de Mórrope, located in the
Lambayeque Valley Complex, north coast of Peru. This analysis of the burial patterns and skeletal remains of over 1,000 individuals spanning 850 years (ca. A.D. 900-1750) examines the consequences of contact on indigenous culture, ritual, health, lifestyles, diet, population structures, and ethnogenesis. To achieve this goal, four primary lines of information are synthesized: (1) environmental and archaeological contexts, (2) mortuary patterns; (3) skeletal biological markers of systemic biological stress, activity, and diet, and; (4) biological distance studies of population genetic variation, gene flow, and kinship analysis.

PROBLEM CONTEXT

Extensive inquiry and debate has characterized investigations of the phenomena known as contact spanning fields as diverse as history, epidemiology, and anthropology. While empirical anthropological studies of the postcontact world have emerged from North and Central America, the archaeology and bioarchaeology of Colonial Latin America is almost completely unwritten (Cummins 2002: 199). Despite calls for historic archaeology (e.g., Schaedel 1992) and the development of a social archaeology paradigm in Latin America (e.g., Benavides 2001; Patterson 1994) most energy, time, and money is devoted to the pre-Columbian archaeology of Latin American nation-states. Comparatively, far greater attention has been given to colonial North and Central American regions; major historic literature reviews begin in the North American Spanish Borderlands and literally finish in the Yucatán (e.g., Graham 1998). Empirical perspectives have not been applied to some of the most significant questions that can be
asked: how did the most profound process of culture contact and culture change in the history of South America transform human societies in terms of their social structure, identity, demography, economy, health, diet, physical activity, and genetic patterns? Due to recent advancement and maturation in the fields of human osteology and bioarchaeology since the late 1970s, previously inaccessible perspectives on the human experiences of contact can be opened.

Historically, a kind of conceptual stagnation surrounded notions of European contact and colonization of the New World. Contact and its aftermath were long perceived by historians, demographers, and epidemiologists as a relatively simplistic, however powerful, process. Dobyns (1983) defines contact simply as the indigenous acquisition of European pathogens. In doing so, he cast contact as a one-dimensional biological event. A dichotomous vision was held between colonizer and the colonized, and between natives who accepted acculturation and those rejected it. The overall outcome of contact was thought universally distributed throughout the Western Hemisphere: indigenous societies either collapsed or were replaced by European culture via assimilation or involuntary coercion. Depopulation was driven by European diseases. All native populations were equally susceptible to fatal infection, all were severely affected in the same way with depopulation ratios approaching 95 percent or higher, and all native groups failed to rebound demographically until the mid- to late twentieth century (Baker and Kealhoffer 1996a:4). Such a focus limits questions surrounding contact to the documentation of demographic collapse. This conceptual stagnation began to break down as broader issues were addressed by bioarchaeological research programs
coinciding with a renewed wave of interest in contact as the five hundredth anniversary of the voyage of Columbus neared in the early 1990s.

While settlement patterns, iconography, and ceramic sherds are critical components to reconstructions of past populations, a holistic approach requires the remains of the people themselves as well. The information encoded in the human skeleton and dentition make bones and teeth probably the most informative and data-rich category of archaeological material (Gowland and Knüsel 2006). Human biology and health is a product of genes, human variation, and natural selection, but is more fundamentally a cultural construction, profoundly influenced and structured by behavior, ideology, social organization, historical trajectories, and human-environment dynamism.

The bioarchaeological model of contact emerged surrounding the Columbian quincentenary (Baker and Kealhoffer 1996b; Larsen, 1994, 2001a, b; Larsen and Milner 1994; Verano and Ubelaker 1992) holds first contact was often initiated by a multiplicity of European pathogens that devastated most indigenous peoples – but native morality was the tip of a profoundly more complex phenomena. The survivors of depopulation and their descendants existed in states of dynamic biocultural flux. An unavoidable consequence of European interaction was a decline in indigenous health. Native Americans were not passive residents of the postcontact New World, and extensive evidence shows they adapted both culturally and biologically. Most significantly, the specific patterns and outcomes of contact differed everywhere bioarchaeologists looked. One of the weaknesses to these studies is they are geographically skewed to a large extent to the southeast and southwest United States.
Thanks to this first generation of bioarchaeological contact studies, several large, ‘basic science’ issues about contact have been addressed. First light was shed on other questions while other key issues were unresolved or debated, among which Baker and Kealhofffer (1996a) and Milner (1996) ask:

1. Was European disease really the principle cause of depopulation?
2. Are disease, morbidity, and depopulation even related?
3. How varied was the range of Native American biocultural adaptations?
4. How were Old World and New World pathogens exchanged and modified in the transatlantic exchange?
5. What biological or ecological conditions promoted superior health outcomes and survival among some indigenous groups versus the literal extinction of others?
6. How did postcontact human-environment interplay influence health outcomes?

One of the defining characteristics of the initial bioarchaeology of contact is the very strong orientation towards biological patterns often to the exclusion of complementary archaeological, ethnohistorical, and cultural information. Contact is a “total biocultural phenomenon,” and a wide range of cultural components of the biocultural patterns remain completely open for detailed examination, including:

1. How did different Native American groups socially, economically, and politically adapt to post-conquest existence?
2. In what manner did cultural transformations predispose successful biological adaptations and interaction with epidemic disease and visa versa?
3. To what degree did indigenous societies collapse or become assimilated?
4. What active role did Native Americans play in shaping postcontact cultures?

5. How did contact shape native agency and identities, both on the level of the self and the collective group (sensu Hill 1996)?

6. What role did precontact sociopolitical configurations play in forming postcontact outcomes?

7. Were local historical contingencies and deeply embedded patterns in the longue durée overwhelmed by contact creating discontinuous postcontact cultural conditions?

Aside from Allison’s (1984) brief comments on Colonial period patterns of health in Southern Peru and Chile, Ubelaker and colleagues’ in-depth and stimulating work on Colonial-era human remains from Quito, Ecuador represent the only large-scale study of Colonial Andean bioarchaeology. These dimensions of historic experiences of indigenous Andean peoples remain to be known.

This study initiates bioarchaeological investigation of the postcontact Central Andes on the north coast of Peru, addressing three principle and interlinked issues. First, what were the effects of European contact in Peru on indigenous culture? Specifically, archaeological evidence including indigenous mortuary behaviors are examined as a reflection of cultural reality, ritual, social organization, and belief systems that are highly sensitive to manipulation and social change. These can include proxies and practices that embody identity, agency, resistance, and ethnogenesis that are encoded in the physical remains of funerary rituals.
Second, in what manner were health outcomes structured in Colonial Peru? Did health status and well-being decline as in most other regions of the Americas, or did indigenous systems adapt to buffer biological consequences of conquest? Did lifestyle and physical activity change in a manner comparable to other regions under Spanish colonial control? Did indigenous diets become less diverse and promote worse oral health? Were such changes linked to Spanish economic policies and human-environment interplays as the Andean environments were transformed to suit the colonizers’ plans? How did cultural changes interact with patterns of indigenous biology and health?

Third, what effects did Spanish contact and colonialism have on population structures including genetic diversity? This question is tethered to notions of catastrophic postcontact depopulation and demographic collapse. In the Andes, postcontact population collapse has long been inferred from a variety of sources but never empirically tested. Did epidemic disease severely attenuate pre-Hispanic genetic diversity? How did the confluence of Spanish social engineering and indigenous agency alter local social organization and perceptions of identity and ethnicity? Can population genetic information reveal aspects of ethnogenesis as well?

To address these questions, we turn to the burials and skeletal remains of 1,048 individuals from the late pre-Hispanic and Colonial period Lambayeque Valley Complex on the northern north coast of Peru. The Lambayeque Valley Complex is the largest coastal valley system in all of Peru, and for at least 2,000 years before contact, it was one of two principle centers of dominant complex cultural development on the north coast. The peoples of the Lambayeque region experienced unparalleled and creative developments in political systems, economy, technology, urbanization, and empire by the
time the Spanish arrived. This remarkably dynamic history saw the rise and fall of chiefdoms such as the Cupisnique (1500-650 B.C.), early states including the powerful northern Moche polity (A.D. 100-750), theocracy and techno-economic innovation by the Sicán (A.D. 900-1350), and in its terminal phases, foreign dominion by the Chimú and then the Inka (A.D. 1350-1532) Underneath the surface of all these political, economic, and ideological changes a local ethnic population was present. Material signature of their existence crystallizes most clearly during the Moche period and following the Moche political collapse. Called Muchik or Mochica, their biological and cultural heritage probably extends into times well before the first millennium A.D.

In this work, interrelated questions surrounding cultural, biological, and genetic transformations of the Mochica following the arrival of the Spanish. This effort is made possible by the excavation of the one of the first Spanish churches constructed on the north coast: the Chapel of San Pedro de Mórrope on the northwest edge of the Lambayeque Valley Complex. Established bioarchaeological methods are applied to over 100 independent archaeological and skeletal biological data sets.

HYPOTHESES

This dissertation tests six linked hypotheses based on the preceding discussion and outline of the problem contexts. These hypotheses are tested within the framework of an integrated burial analysis, which incorporates multiple lines of independent evidence from mortuary archaeology, skeletal biological indicators of systemic stress, activity, diet, and dentally-derived measures of biological distances.
Hypothesis I: The mortuary archaeology of the Chapel of San Pedro de Mórrope will not reflect passive ethnocide, but syncretic burial rituals, blending Andean and European customs and cosmologies. An eschatological perspective that perceives Native Americans as passive witnesses to their own cultural genocide is not only naïve but truncates an investigator’s perceptive and interpretive possibilities. Specifically in Andean South America, analyses of ethnohistory (e.g., Andrien 2001; Griffin 1996; Rostworowski 1990) and initial archaeological study (Wernke 2003) define multiple, complex configurations of religious syncretism, hybrid idioms, and religious-cultural fusions that emerged throughout colonial Peru often driven by the agency of indigenous populations themselves. It is hypothesized that instead of a straightforward process of religious conversion and ethnocide at Mórrope, a complex interplay between colonizer and colonized left tangible traces of syncretic ritual in funerary patterns.

Hypothesis II: Compared to the Lambayeque region’s late pre-Hispanic population, statistically significant elevation of systemic biological stress will be observed in the Colonial Mórrope population, measurable through comparative prevalence of adult female fertility, linear enamel hypoplasias, porotic hyperostosis, osteological evidence of childcare practices, terminal adult stature, and periosteal infection. Conditions of political and economic marginalization, the costs of repeated waves of epidemic disease, lack of access to resources and control over the means of production, inadequate nutrition, and high population density synergistically contributed to greater morbidity in the colonial Mórrope Mochica population. In many ways, the postcontact biological milieu of La Florida can be used as a comparative model of indigenous biological stress in coastal Peru (e.g., Larsen et al. 2001). Here, childhood
stress is examined using several biological features. It is hypothesized elevated morbidity will be evidenced in terms of (1) demographic stress in the form of depressed female fertility, a variable depressed by female experiences of increased physical activity and morbidity. A greater prevalence of relatively acute childhood stress will be gauged acute stress by (2) dental enamel hypoplasias along with more chronic stress measured by (3) porotic hyperostosis lesions. Further, metabolic stress and inadequate nutrition stunted (4) terminal adult stature resulting in shorter adult males and females in Mórrope. Elevated morbidity will also be observed among adults in the form of (5) greater prevalence of chronic periosteal infection.

Hypothesis III: Postcontact economic and labor transformation led to a more strenuous and hazardous Mochica lifestyle in postcontact Mórrope, and when compared to the late pre-Hispanic population of the Lambayeque region, a statistically significant increased prevalence of degenerative joint disease and traumatic injury will be documented. Regional ethnohistoric portrayals and bioarchaeological data from Spanish Florida indicate colonial economies under the direction of Spain were fundamentally built on the extraction of human labor from its indigenous subjects to an excessive degree. These lifestyles were quite discontinuous with the intensity and duration of pre-Hispanic physical activity. Therefore, elevated prevalence of degenerative joint disease (DJD) and accidental trauma will be manifested in the adults in Mórrope. Particularly, draft labor systems targeted men who will exhibit a higher prevalence of DJD and injuries than women. As a corollary to Hypothesis III, it is anticipated that elevated female prevalence of DJD will also correlate to depressed female fertility.
Hypothesis IV: In comparison to the late pre-Hispanic population, oral health in Colonial Mórrope, as measured prevalence of dental caries, antemortem tooth loss, and alveolar abscesses, will show statistically significant increases as changes to indigenous subsistence economies led to a less nutritious and more cariogenic diet. This outcome stems from several processes widely experienced in colonial economies, first of which included landscape transformation and degradation. Less land and water was available for food production as haciendas produced generally non-comestible exports like sugarcane, and much of the food that was produced by Mochica farmers was siphoned off as tribute especially in the early colonial phase. More readily available sources of food, such as starchy carbohydrates, probably filled in the shortfall as traditional staples including camelid meat became unavailable. Biological consequences of this shift will be reflected by worse oral health in Mórrope, specifically, by an elevated prevalence in dental caries, antemortem tooth loss, and apical abscesses.

Hypothesis V: In comparison to late pre-Hispanic population structure, consequences of demographic decline and Spanish colonial policies resulted in a genetically homogenous local population in the wake of conquest. Again, given the scope of the impacts of contact, indigenous genetic structures were inevitably transformed. Evidence for such transformation exists in the dental anthropology of Spanish Florida, where a major shift in indigenous population genetic variance and patterns of gene flow were associated with changes in tooth size (a product of genetic drift) and biocultural hybridization and identity transformation (Stojanowski 2004; 2005a). Here, this model is tested in Colonial Peru, and it is hypothesized that similar experiences of epidemic disease and application of Spanish economic and social policy
resulted in lowered population genetic variance due to interbreeding and loss of alleles
due to depopulation while gene flow increased.

**Hypothesis VI: Indigenous social collectives in the Mórrope community**

buried related members of kin groups in spatially distinct patterns as a reflection of
traditional identity conservation and social group cohesion during a time of
unprecedented biocultural stress. Indigenous society in historic Peru was not
egalitarian in nature, and it is likely that biologically related social collectives, linked by
traditional principles of mate exchange, can be identified via similarities via inherited
dental traits. During a time when traditional culture endured unprecedented biological
stress and was under open assault by Spanish authorities, Mochica kin groups attempted
to maintain this traditional funerary practice that would have also in its practice, helped
maintain and reproduce Mochica perceptions of the social cosmos and power relations.

**ORGANIZATION OF THE DISSERTATION**

To properly test the preceding six hypotheses, bioarchaeological study of the
postcontact Lambayeque Valley Complex requires several layers of deep
contextualization. The first seven chapters develop this framework and establish detailed
parameters by which to understand the nature of postcontact biocultural transformation in
Colonial Mórrope, Peru. As burials and human remains are jointly the driving force
behind this work, Chapter 2 introduces the scope and conceptual and theoretical bases of
anthropological research surrounding mortuary behaviors, identity, and bioarchaeology.
Theoretical and methodological features of processual and postprocessual mortuary
archaeologies are examined and critiqued. Then, an overview bioarchaeology defines its spectrum of methods and expands on its theoretical potential – in particular, biosocial interpretations of health and well-being. The theoretical underpinnings of biological distance studies are then examined. The concluding section of this chapter proposes a model of a holistic, integrative bioarchaeology that synthesizes burial analysis – a new configuration of method and theory pursued by this dissertation which integrates processual and postprocessual mortuary archaeology and bioarchaeology to achieve biocultural understandings of past biological patterns, societies, and historical events.

Chapter 3 examines elements of historical and physical elements of the basic human-environment interplay on the north coast of Peru which provides a crucial baseline for bioarchaeological explanation. While seemingly monolithic, the coastal desert valleys of the Lambayeque Complex contain features that pervade all elements of human existence, including a variety of microenvironments that arise due to the complex interactions of people, the Pacific Ocean, the Andes Mountains, and latitude. Central Andean civilizations represent the culmination of complex and continuous creative dynamism between natural and cultural factors that are unparalleled, and such terms are required to understand the configurations of cultures both in the past and present.

The pre-Hispanic cultures the north coast of Peru were the products of some 10,000 years of social, environmental, and historical interplays contingent on both autogenous cultural developments and external influences. They are not just important to understand in their own right but any attempt to comprehend post-conquest Peru would be meaningless and void without such context.
Chapter 4 explores these factors and provides a detailed contextual grounding of the cultural history of the north coast of Peru and the Lambayeque Valley Complex in particular. Specific attention is given to developments during the Moche, Sicán, Chimú, and Inka periods, the significance of which fundamentally contributed to the specific effects of Spanish colonialism in northern Peru. Various organizational and historical features of these societies are examined which have critical bearing on bioarchaeological interpretations but are often loosely integrated or incompletely understood in other studies of human remains. Special attention is devoted to the Moche and Sicán cultures and the emergence and characteristics, and questions surrounding the nature of the Mochica ethnic phenomenon in the late pre-Hispanic Lambayeque region.

The Central Andean mortuary record is one of the most rich and complex of human history. Chapter 5 first examines the history, current orientations, and future of mortuary theory in Andean mortuary studies. Second, a diachronic and regional characterization of north coast burial patterns is undertaken – which is particularly important as many north coast mortuary studies lack adequate integration of regional or historical contexts. The third section summarizes the emerging understanding of physical and ritual interaction between the living and the dead on the north coast of Peru.

A bioarchaeological study of postcontact Peru simultaneously intersects an immediate regional bioarchaeological context of the pre-Hispanic north coast and the hemisphere-wide biocultural phenomenon of European conquest and colonialism. The first half of Chapter 6 summarizes the development, themes, and major findings to date on the bioarchaeology and population biology of the north coast of Peru. Pragmatically, establishing the precontact biohistory is necessary for even the most basic pre- versus
postcontact biological comparisons, but moreover, is essential to interpret contact impacts on local and diachronic patterns of health, microevolution, and environmental change. The second half of the chapter moves to discuss in detail the current synthesis regarding the bioanthropology of European contact in the Americas. Contact is underscored as an adaptive transition of such significance that only the shift from foraging to farming may have played a greater role in shaping modern human biological diversity and cultures.

Chapter 7 completes the contextual framework: the ethnohistory of contact in Peru. A broad overview of colonial Peruvian history, society, and religion establishes the setting for this chapter. Then, available ethnohistoric accounts help reconstruct various cultural and organizational aspects of Colonial Lambayeque. The fascinating yet incomplete colonial history of Mórrope itself concludes this chapter, highlighting long-term and unique demographic, sociopolitical, and religious consequences of European contact in the northwest corner of the Lambayeque Valley Complex.

Chapter 8 presents materials and methods by which Hypotheses I thru VI are tested. These include a diverse set of materials stemming from the Chapel of San Pedro and 11 other regional late pre-Hispanic sites. This is followed by a detailed review of the methods used to test the research hypotheses and include discussion of mortuary sampling strategies, data collection from mortuary contexts, and means by which a relative intrasite chronology is established at the Chapel of San Pedro de Mórrope. Then, the concept of systemic biological stress is defined, followed by a description of the skeletal phenomena examined in this study and the statistical methods used to measure their reflections of biological stress, lifestyle, and dietary change. Specifically, these variables include female fertility, linear enamel hypoplasia, porotic hyperostosis, chronic
skeletal infection, skeletal correlates of childcare practices (artificial cranial deformation), terminal adult stature, degenerative joint disease, and oral health. Chapter 8 concludes with the specific theoretical and mathematic bases of R matrix analysis to estimate population genetic structures and Euclidean distance-based kinship analysis using dentally inherited traits.

The results of the dissertation are divided between two chapters. Chapter 9 presents the results of archaeological study of the Chapel of San Pedro de Mórrope and Colonial Mochica mortuary patterns. Chapter 10 first describes the results of the statistical analyses of systemic biological stress, activity patterns, and diet. Results include various temporal and sex-based comparisons. This is followed by findings of the R matrix analysis and the study of the spatial organization of kinship patterning within the Chapel of San Pedro.

Mortuary behaviors, skeletal biology, and biodistance patterns are synthesized in Chapter 11. The results of the dissertation are discussed first in an attempt to infer the possible meanings of mortuary behaviors in Colonial Mórrope which draws on archaeological and ethnohistoric analogies. Then, the dynamic nature of the Colonial order itself is explored, examining the dialectical nature of cultural synergisms, resistance, and ideological conflict in terms of restructured native Mochica conceptual universe. Health outcomes in Mórrope are discussed in comparison to local and regional historic and ethnohistoric patterns. These patterns are further interpreted in terms of institutionalized forms of invisible structural violence endured by the Colonial Mochica. The chapter concludes with interpretations of postcontact ethnogenesis in the Lambayeque Valley based on mortuary patterns, biological stress, and population genetic
variance and differential gene flow. Chapter 12 provides concluding statements for the
dissertation, considers the bioarchaeology of Colonial Mórrope in a hemispheric
perspective to elucidate commonalities shared by indigenous peoples under the Spanish
experience of colonialism. In closing, a set of recommendations and unanswered
questions are offered in the bioarchaeological study of the north coast of Peru along with
a call to operationalize integrated burial analyses in anthropology.

CONCLUSION

This dissertation serves as the first bioarchaeological characterization of Spanish
colonialism on the north coast of Peru and in the Central Andes as a whole. It integrates
multiple windows on biological health and population structures with a deeply
contextualized and particularistic archaeological and ethnohistoric examination of the
material and nonmaterial dimensions of mortuary patterns. Contact outcomes are
addressed in terms of multiple causes interacting with local factors embedded in a
strongly developed biocultural framework (Palkovich 1996). Application of an integrated
burial analysis involving bioarchaeological, mortuary, and genetic data aims to maximize
the quality and quantity of biosocial inferences that can be gleaned from burials and
bones to result in dynamic, humanized, and holistic explanations.

Ultimately, this work seeks to realize a preliminary vision of a total biocultural
phenomenon by illustrating how a profound turning point in global history impacted the
Central Andes of Peru. These impacts have gone long unstudied, but now can begin to
receive the attention they merit.
CHAPTER 2

BURIALS AND BONES: THEORETICAL BASES OF MORTUARY ARCHAEOLOGY, BIOARCHAEOLOGY, AND A MODEL OF INTEGRATED BURIAL ANALYSIS

Human burials are the driving force of this study of European contact in Peru as they and their contents allow an anthropologist to transcend the limits of textual, iconographic, or documentary evidence of the past. Human burials – especially the skeletal remains they contain – may well be the single most information-dense type of archaeological deposit. Characterized by a plethora of tangible and intangible dimensions spanning biological and material domains, burials are remarkably informative sources of information regarding social structure, economy, politics, ritual, ideology, and cosmology in a variety of ways. The structure of this dissertation brings together three major investigative enterprises in the study of contact: mortuary archaeology, bioarchaeology, and biological distance. Often these approaches are carried out in relative isolation from each other, but when synthesized, can provide a far more complete and holistic understanding of the past.
As theory represents the crucial epistemological framework that perceives, organizes, and interprets data, this chapter concerns theoretical bases of this work. First, critical overview of the historical development of the theories of mortuary archaeology pertinent to this dissertation, including the major theme of identity, is discussed. Second, an overview of bioarchaeology is presented, reviewing its spectrum of methods and expands on its theoretical potential – in particular, biological significance of health on the level of the individual and population. These perspectives are then coupled with social interpretations of human well-being. Third, discussion moves to the study biological distance in terms of its theoretical concepts, limits, and limitations in the study of population structures and history. The fourth and final section synthesizes the above elements and proposes a model of a holistic, integrative bioarchaeology which attempts bring together mortuary analysis, bioarchaeology, and biodistance as parts of a single investigative enterprise to achieve a more complete, humanized, dynamic, and contextualized understanding of biocultural phenomena.

**THEORETICAL APPROACHES IN MORTUARY ARCHAEOLOGY**

The study of burial patterns represents the first component of this study. The current debate surrounding mortuary archaeology involves the antagonism between the processual and postprocessual schools of thought. Despite intense and sometimes productive periods of debate and theory building, a synthesis has yet to emerge. Two largely polarized approaches emerged by the end of the 20th century, often conceived of
as diametrically opposed and irreconcilable in the minds of many anthropologists. However, elements of both theoretical modes are necessary for holistic investigations of ancient burials.

The Processual-Postprocessual Debate in Archaeology

For most of the history of anthropology, funerary rituals were studied sporadically to analyze social organization, and economic relationships, and religion (Durkheim 1954, van Gennep 1960 [1908], Hertz 1960 [1909], Tylor 1871, 1878; also Bartel 1982). Lasting influences of Kroeber’s (1927) classic study of burial patterns in California and various ‘culture areas’ of South America led archaeologists to envision funerary practices as detached and uncorrelated to social structure and were instead contingent on the vagaries of emotion and fashion. A scholarly tradition developed where the purpose of burial excavations was chronology building and stylistic analysis of grave goods. By the 1960s, a renewed interest in burial customs developed with ethnographers (Bloch 1971; Freedman 1966; Goody 1962) which influenced archaeologists as the materialistic, deductive, statistical, and nomological “new” or processual American archaeology emerged (Trigger 1999). The focus of processual archaeology rested on cultural ecology, settlement patterns, and political organization through a systems conception of culture.

This thinking culminated in a paradigm shift, embodied in a doctoral dissertation by Saxe’s (1970) and the writings of Binford (1964, 1971). Saxe aimed to develop a testable body of theory that integrated cross-cultural ethnographic study with eight hypotheses testing surrounding formal analysis, role theory, and indices of social
complexity relatable to archaeological data. Similarly Binford conducted a cross-cultural study using Human Relations Area Files (HRAF) data allowing him to argue sociopolitical complexity and an individual’s “social persona” correlated to mortuary complexity. The propositions of Saxe and Binford comprised the processual “bible” of mortuary archaeology and are often referred to as the “representationalist approach.”

Not long after the introduction of the Saxe-Binford approach critiques began to accumulate. The representationalist model was a middle-range theory intended to support the larger positivist argument of social evolution. Such models have not withstood scrutiny (Flannery 1973; Parker Pearson 2000: 31-32; Salmon 1978). Saxe and Binford failed to consider the role of belief, ritual, and historical contingencies influencing burial. The accuracy, quality, and comparability of the different sources of ethnographic data involve snapshots of a culture, not the dynamic interactions between people, ideologies, environment, and historical processes (Morris 1987).

Brown (1981) continued to develop constructive critiques of the processual position, and states archaeologically identifiable rank can exist within societies lacking centralized leadership, and considered alternative explanations of ‘rich’ child burials often used as evidence for ascribed rank (Brown 1981: 30). An overuse of statistical methods (such seen with the markedly problematic study of Moundville burials by Peebles and Kus [1977]) tried to quantify largely qualitative values relating to ritual and ideology. Many uses of statistics were conceptually and methodologically simplistic. Goldstein (1976), Kan (1989), and Trinkhaus (1984) articulate an even greater limitation: the physical remains of the dead are not the exclusive locus of social representation or
display. Archaeologically invisible features, such as feasting, elaborate ritual displays, and the presence of highly ranked individuals in attendance of a funeral, may hold far greater import to rank or status than the material remnants of the funeral itself. Ucko (1969) provided ethnographic counterexamples involving grave goods or offerings that are displayed only to be removed, destroyed, or consumed before interment.

By the late twentieth century, continuous revisions by Brown (1995a, b), Charles and Buikstra (1983), Goldstein (1976, 1980), Morris (1991), and Saxe and Gall (1977) among others have restudied, elaborated, and modified many of the details in light of their shortcomings and critiques. Saxe’s Hypothesis 8 (which holds that corporate groups maintain formal disposal areas for their dead, and by doing so, legitimize their rights over resources through lineal descent from their ancestors [Saxe 1970: 119]) has been revisited by several scholars including Goldstein (1981), Morris (1991) and Shimada et al. (2004) showing the basic premise to be sound among complex societies. When the processual model of burial is reversed and nested within specific arguments, it is a very powerful tool to understand social structures (Brown 1995a: 10). The scale of mortuary analysis has also shifted from an intra-site to a regional level (Beck 1990, 1995a; Charles 1995, 2005; Dillehay 1995a; Milner 1984). Inherent in a regional conceptualization of mortuary variability is: (1) a broader understanding and use of carefully developed archaeological and historic context; and (2) attention to diachronic variation, especially in terms of Braudel’s (1972) concept of historical contingency (Charles 2005; Rakita and Buikstra 2005a). Mitchell and Brunson-Hadly (2001) and Jensen and Nielson (1997) illustrate a distinct maturation in the use of multivariate burial data, employing statistical tools more
as heuristic devices aiding in interpretation rather than a reflexive attempt at quantified
description as the ultimate goal of the work. Today, an increasing number of Americanist
scholars are exploring the physical treatment of the dead and the symbolic significance of
such activities as it relates to the role of ancestors (see papers in Rakita et al. [2005])
further extending to veneration and violation (Duncan 2005; Weiss-Kreji 2005) and the
semiotic study of the messages and symbolic language encoded in mortuary customs by
and for the living (McAnany et al. 1999; Shimada et al. 2004).

Postprocessual archaeology specifically addressed the excesses and shortcomings
of “new” archaeology. Varied postprocessual works assert burial rituals are frequently
used by the living to negotiate, mask, transform, appropriate, and re-appropriate social
structure and power (Rakita and Buikstra 2005a: 7). In this view, human beings are
knowledgeable social agents who are constantly altering social structure. Agency can
likewise be directed to maintain prevailing practices as well (Cowgill 2000:57). Given
agency and that people often believe one thing and do another, thought and actions form
a complicated duality. The identities and symbolisms present in mortuary patterns are the
result of many different forces acting not just on the dead but on the living as well
(Parker Pearson 2000: 33).

Hodder (1980, 1982a, b, c, 1986) has been a leading postprocessual proponent. He argues that to retrieve social information from burials, ideological elements must be
understood and emphasized rather than the a priori treatment of mortuary patterns as
fossils of social organization. Mortuary patterns are malleable constructions that can hide,
invert, or manipulate social relationships. He illustrates these concepts in ethnographic
study of the Sudanese Nuba where burials also fail to mirror economic or social change. Ideology rather than social organization held primacy in structuring mortuary patterns. Bloch (1971) brings to light similarly discontinuities between ideal social structure, practiced social structure, and mortuary patterns. Shanks and Tilley’s (1982) archaeological analysis of bone sorting in Neolithic European barrows suggests remains were arranged to disguise the inegalitarian reality of these cultures. Burial rituals were an inversion, a not reflection of social structure, and helped maintain it instead.

Considering grave goods as possessions of the dead is probably quite naïve in most situations, but instead may originate as gifts from mourners, tokens of respect or affection, reflections of the political motives of the living including displays of power, and the maintenance of prestige (Kan 1989; Parker Pearson 2000:85). Related visions have begun to emerge with the work of Kus (1992), Meskell (2000) and Tarlow (1999) that emphasize an emotive archaeology of death, including sensory involvement with the dead and emotional experiences of mourning and loss.

Status is viewed as formed from three composite elements: (1) political, kinship and gender entitlements; (2) lifestyle, which includes the sum of practices such as dress, speech, bodily disposition, and other aspects of social perception; and (3) an individual’s control and ownership over the means of production (Parker Pearson 2000:83). Postprocessual mortuary theory gives attention to horizontal differentiation such as within-class competition and cultural constructions of age and gender, or other smaller interest groups (Hodder 1990; O’Shea 1984). Age is a complex structure in all societies, a fluid category articulating with social structure and ideology (McHugh 1999: 28-29) and
social information encoded in long-marginalized child burials is now beginning to be recognized (Scott 1999, 2001). Gender is viewed as “a social and cultural construct comprising the roles given to, and the identities perceived by, men and women in a particular society” (Gibbs 1987: 80). Symbolisms of gender may be frequently encoded in grave good selection, burial treatment, or spatial relationships that may be mistaken for vertical variation (Arnold and Wicker 2001; Cannon 2005; Gräslund 1980: 77). Postprocessual approaches may also permit recognition of additional or intermediate genders otherwise not perceived.

The search for “meaning” in burial has long been associated with establishing analogies with ostensibly comparable ethnographic or ethnohistoric contexts. Yet, postprocessual approaches to analogy generally start out from a perspective where “we need to be aware of the quasi-universals and general themes that provide a framework for cultural variation but alone and taken from their cultural contexts tell only a small part of the story” (Parker Pearson 2000: 33). Analogy liberates ethnographic description from some of its earlier limitations and its use is a key tool in mortuary analysis (see Hodder 1982d and Wylie 1985, 1988 for strong discussions about analogy in archaeology).

Postprocessual paradigms have been likewise critiqued. Given its postmodern orientation, there are few clear guidelines as to how an argument’s plausibility may be evaluated. It is also unclear as to how to distinguish what represents ideological manipulation from other natural or cultural processes that can leave similar traces (McHugh 1999: 16). McHugh (1999:16) notes perhaps the main difficulty remains how to perceive of and identify purposefully encoded ideological dimensions and
manipulation of burials. Some of the most successful postprocessual analyses have been carried out in Historical England thanks to well-documented social contexts (e.g., Cannon 1989, 2005; Parker Pearson 1982).

Despite its criticisms of the processual school, some evidence strongly suggests elements of social structure are often represented in burial. In her examination of apparently egalitarian Late Neolithic burial patterns, Trinkhaus (1995) uses non-mortuary archaeological data to test the model that specialized production of utilitarian stone tools would provide clear and independent signs of hierarchical social organization. In the absence of such evidence, Trinkhaus (1995) concludes Late Neolithic burial patterns do generally reflect relatively egalitarian social structures. Hidden ideological manipulation does not necessarily underlie every burial; ideology can serve to maintain class distinctions or ranking in mortuary patterning.

Ironically, postprocessual mortuary theory must eventually tread on the same ground as processual mortuary theory. Ideological and symbolic interpretations of burial manipulation that are based in identifying the social structure of a culture – egalitarian or hierarchical – must demonstrate that burial data was intended to symbolize one type of structure or another, which in turn requires definitions of egalitarian and hierarchical social structures.

Identity and Funerary Practice

As a form of sociocultural study using funerary remains, mortuary archaeology investigations into social structure has included questions ranging from the nature of
social structure to ideological manipulation, but of central interest in this dissertation is the study of ethnic identity as reflected in burial ritual.

The anthropological study of ethnic identity has a long and complex history (Jones 1997), but most often is concerned with definition and maintenance of boundaries between discrete groups of peoples. Most archaeological approaches toward identity revolves around the concept of “style,” be it artistic, ceramic, architectural, or funerary. Beginning with a series of papers by Binford (1962, 1965, 1972), functionalist interpretations of stylistic variations were envisioned as the result of ethnic differences. So-called subjectivist views on ethnic identity were also promoted by Barth (1969: 10-11), who identified four criteria to identity ethnic group boundaries: biological self-perpetuation, shared core cultural values, shared field of communication and interaction, membership within the group that is both self-identifying and perceived by others.

Wallman (1977: 532) defined ethnicity as the perceived contrast between ‘us’ and ‘them.’ Instructive to the current examination of multiethnic late pre-Hispanic and colonial Peru, Yinger (1983: ix) defined ethnic groups as a segment of a larger society whose members share a perceived or real common origin and participate within the larger, common culture at large. Barth (1969) and Schaedel (1985) also consider adaptations to socio-environmental niches as contributing to ethnic group boundaries. Cohen (1974: xiii) argues ethnic groups represent a collective strategy designed to protect economic and political interests. Sackett (1977, 1982, 1985, 1986, 1991) critiqued the processual formulation, in that form and function are not separate but overlapping categories embedded within one another. Stylistic variation to Sackett (1977) was a
product of “isochrestic” variation derived from normative and passive cultural patterns. Low degrees of isochrestic variation resulted from common experiences of acculturation and high degrees of ethnic similarity.

It was soon pointed out that ethnicity is a far more fluid and complex. Jones (1997: 76-79) reasons subjectivist reductionist thinking tended to neglect perceptions of ethnicity used as a creative tool or vehicle for communication and political negotiation, the historically contingent nature of ethnicity, and even psychological dimensions of group membership. A major step forward came with Wiessner’s (1983, 1984) ethnoarchaeologically-inspired schema of the active symbolic role of material culture in mediating social relationships. Thusly, “emblemic” variation represents formal stylistic variation and “has a distinct referent and transmits a clear message to a defined target population about conscious affiliation and identity” whereas parallel “assertive” variation “is formal variation in material culture which is personally based and which carries information supporting individual identity” (Weissner 1983: 257-8).

Hodder (1979: 452) elaborates and defines ethnicity as “the mechanism by which interest groups use culture to symbolize their within-group organization in opposition and competition with other interest groups.” Perhaps the most significant contribution to the archaeology of ethnicity come jointly from Bentley (1987) and Jones (1997) who extend Bourdieu’s (1977) concept of habitus. They emerge with a practice theory of ethnicity. “The construction of ethnicity, and the objectification of cultural differences that this entails, is a product of the intersection between people’s habitual dispositions with concrete social conditions characterizing any given social situation” (Jones 1997:120).
While there are rarely one-to-one correlations between ethnic representations and the full range of embodied cultural practices, symbols and material cultures do not vary randomly or without meaning.

Jones’ working definition of ethnic groups involves culturally ascribed groups based on the expression of cultural traits (real or assumed) and common descent expressed via the objectification of cultural, linguistic, religious, historical or physical characteristics; yet, as a practice, ethnicity involves a consciousness of difference that contributes to intentional dynamic reproduction or transformation of the classificatory distinctions between groups of people (Jones 1997:84). In other words, ethnic identity is a dynamic, context-bound phenomenon in which symbols, objects, and people are enacted and manipulated on unconscious and conscious levels in dialectical relationship involving *habitus*, agency, and historical trajectories.

In mortuary archaeology, Stanish (1989) and Beck (1995b) state artifact- and style-based interpretations of material culture (such as grave goods) alone may be wholly inadequate to identify ethnic boundaries and the social interactions therein. Significant interpretive strength however can be gained by combining style with other lines of evidence, especially drawn from ritual behaviors. Ritual, as Beck (1995b) argues, is “a communal celebration to acknowledge a specific event of significance to the community… [which] serves to reconfirm ties of the participants to one another and their communal traditions” (also see Bloch 1987).

As Beck (1995b: 171-172), Bloch (1987), Metcalf (1982) and Turner (1978) signify, mortuary ritual is an ideal locus for the examination of identity: it is a “total
social phenomenon” – a symbolically dense and full integration of religion, social organization, economics, material culture, ideology, symbolism, and other components of belief and action that are constrained and shaped by ethnic group membership.

Some may disagree and state that burial may be either too prone to uninformative cultural conservatism or misleading ideological manipulation, yet it has been forcefully argued by Bawden (2001, 2005) and others that funerary ritual is an excellent domain for the study of identity precisely because it is susceptible to manipulation. Weaknesses inherent in artifact-based approaches, such as item mobility related to trade or colonization are avoided as death rituals are far less mobile. Most importantly, the appropriate selection of symbols used in a funeral and they manner in which they are encoded into burial will not be consistently reproduced outside the boundaries of an ethnic group (Beck 1995b:172) making for a perceptible set of variables that can be considered.

Theory-Method Crossover in Mortuary Archaeology

A short, though critical overview of methods in mortuary archaeology is introduced here since methods are implicitly linked to theory and the perceptions of what constitutes data. Detailed methodological considerations are associated with the processual school and its concern for consistency and comparability of empirical data in terms of hypotheses testing. The field has seen a dizzying number of schemes to classify or code burial data. Beginning in the late nineteenth century, anthropologists engaged in
the study of death began to craft a wide range of descriptive systems to portray their findings, some of which were highly discordant and confusing (Sprague 2005: 13-25).

Many of the systems invented in the 1970s with the ‘new’ archaeology were based on identifying status-linked features of a burial. Manifest physical remains of burial ritual, be it corpse positioning, flexion of appendages, spatial organization of items and bodies inside of a grave, spatial structuring, or most commonly, typological hierarchies of accompanying grave goods were considered as sociocultural determinants. Despite the contributions of postprocessual thinking, general methodological guidelines have never been formulated beyond the scale of particularistic, individual case studies. A direct consequence is that postprocessual studies of mortuary practices in non-literate cultures of precontact North and South America are placed at a distinct disadvantage. Once again, one must engage processual precepts.

Beyond these static categories, there tends to be a lack of commonly-held consensus on the range and quality of in situ data that could or should be collected during field excavation. Willhems’ (1978:88) call for documentation of “all possibly significant variables” is heuristically important but of little practical use. Standardization of descriptive terminology was woefully inadequate (Sprague 2005). In other examples, a varying fidelity or general lack of documentary information represented another major fault; one may recall drawings of graves or cemeteries populated by stick-figures (skeletons) and circles (ceramic wares).

Contributing to the quandary is the remarkably cross-cultural complexity of burial rituals that often required recording schema specific to the context and a general
resistance on behalf of many fieldworkers to replace their own terminological systems. Procedures for excavating burials described in many studies followed the various guidelines established by physical anthropologists who may be far less attuned to nuanced recognition and recovery of material culture. In perhaps the most widely referenced human osteology manual, Bass (1995) addresses recovery of only the skeletal remains in a grave. Ubelaker (1999) presents a more comprehensive set of guidelines, but grave goods are accorded two sentences. Fortunately, mapping, photography, body orientation, and “non-cultural items” receive more attention.

An attempt towards standardization was made by Sprague (2005) with a terminological guide to produce standardized descriptions of burial remains. While there is much value in this effort, Sprague’s stated goal was to “with no apology... standardize the terms used in the Western scientific world (etic) when describing the physical aspects of burial and other forms of body disposal” (2005:8). Emic or non-material forms, he bluntly states, are simply beyond recovery and can only be studied by modern ethnographers or ethnohistorians. This closed approach artificially cripples categories and perceptions of mortuary data and misses a chance to stimulate reflexive thinking on how etic data can inform attempts at emic approximations and visa versa.

In general, a concerted and inclusive effort to standardize mortuary data collection, analogous to Buikstra and Ubelaker’s (1994) widely used bioarchaeological standards, is long-overdue. Such an effort is critical to aiding regional and diachronic qualitative and quantitative comparisons through time, space often only attainable through the work of multiple researchers. Sprague’s (2005) effort can be seen as a first
step in that direction. Particular emphasis should be placed upon the need for and
standardized documentation of burial taphonomy and horizontal and vertical stratigraphy – key physical evidence that opens up multiple windows on cultural activities including postdepositional alteration or manipulation of human and material remains (Klaus and Shimada 2003). The taphonomic considerations of Duday (2006) and Andrews and Bello (2006) have much to their recommendation for widespread use. Burial drawings are a form of data collection, purveyors of information, and demonstrate an investigator’s observational acuity and analysis as represented graphically. Stick-figure style drawings are virtually worthless. Instead, realistic renderings such as those presented by Duday (2006) and Shimada (1990; 1995; Shimada et al. 2000) should be emulated as standard practice. Exact anatomical identification of individual skeletal elements, skeletal pathological conditions, quality of preservation, detailed characteristics of grave goods, and interpretation of horizontal stratigraphic features should be accessible through burial drawings. Integration of a professional artist into a field project may be necessary.

**THE BONES IN THE BURIAL: BIOARCHAEOLOGY**

The study of the health and biology encoded in the human remains present in a burial represents the second component of this research. Development of osteology and bioarchaeology has paralleled mortuary archaeology for decades, but the human remains in a burial have received comparatively little attention compared to grave goods and other items thought to encode social information. Larsen (1997:1-3) articulates both physical
anthropologists and archaeologists alike have remained unaware of the potentials and limitations of skeletal evidence to contribute to debates surrounding social organization, identity, ethnicity, ideology, ritual, and technology. This paradox is beginning to change today as mortuary archaeology and bioarchaeology are approaching a crossroads where both fields have an opportunity to transform each other.

Human osteology and bioarchaeology have emerged from the early days of physical anthropology involving typological and descriptive studies of decontextualized specimens (Cook 2006; Gould 1996) to emphasize problem-oriented research rooted in multidisciplinary studies that synthesize multiple lines of evidence (Buikstra 2006a: 8). Parallel interest in pathological conditions of human remains evolved from a doctor’s hobby to an ecological and epidemiological approach as the modern study of paleopathology was born, spurred on by developments in processual archaeology, ecological thinking, and questions surrounding the health and adaptations of past populations vis-à-vis agricultural intensification and population growth (Brothwell 1967; Kerley and Bass 1967).

Modern bioarchaeology was first cast by Buikstra (1977) in a paper that defined a multidisciplinary research program integrating osteologists with other scholars in the study of: (1) burial patterns and social organization; (2) daily activities and the division of labor; (3) paleodemography; (4) population movement and genetic relationships; and (5) diet and disease. Eschewed were long-lived paradigms of description and the case study in favor of population-level anthropological problem solving. Simplistic notions of a mortuary population reflecting the biological experience of the living were critiqued.
Bioarchaeology bloomed in the 1980s when conceptual developments were paired with technological advances. CT scanning, electron microscopy, bone chemistry, and desktop computers capable of statistical analyses allowed far greater analytical depth and flexibility. Methods continue to be invented and refined and interpretation of lesions further advanced (Ortner and Aufderheide 1991). Publication of *Paleopathology at the Origins of Agriculture* by Cohen and Armelagos (1984) was a landmark development as the first to attempt to provide comparative quantitative data on a specific question using similar datasets and collection techniques. Bioarchaeological research as come to currently focus on three principle themes: (1) health outcomes and subsistence economies among prehistoric foragers versus agriculturalists (e.g., Cohen and Armelagos 1984; Cohen and Crane-Kramer 2007a; Larsen 1983, 1987; Larsen et al. 2007); (2) impacts of social complexity on human health (e.g., Lambert and Walker 1991; Powell 1988, 1991, 1992), and; (3) biological consequences of European contact in the Americas (e.g., Larsen 1994). Now in its fourth decade of existence, bioarchaeology today centers on *why* and *how* aspects of human health are components of broader biological outcomes embedded in an ecological and biocultural approach that places behavior, status, social organization, and evolution at the vanguard (Larsen 1997).

Bioarchaeology is fundamentally a comparative endeavor on the level of populations. Bioarchaeology has matured rapidly and constructively to include a core set of variables and methods. The field is also marked by ever-increasing sophistication and development of new techniques (Larsen 1997, 2002, 2006). Central conceptual emphasis is placed on the use of multiple variables – which function simultaneously as independent
but complementary sources of information. Bioarchaeology at its core has become interdisciplinary in nature not just by its overlap with physical anthropology archaeology, human biology, chemistry, geology, and engineering, but by its associated range of requisite technical specializations.

Theory Building in Bioarchaeology

The strength in bioarchaeological methods is however accompanied by a weakness in theorizing what bioarchaeological data “means.” As an example, Part I of Katzenberg and Saunder’s volume Bioanthropology of the Human Skeleton (2000) was entitled “Theory and Application in the Studies of Past Peoples.” Two valuable chapters were contained therein, one focusing on bioarchaeological ethics (Walker 2000), and the other discussing methodological considerations in forensic anthropology (Ubelaker 2000). These chapters neither relate to theoretical issues per se nor articulate a developed or coherent unifying bioanthropological interpretative framework to understand the skeleton. Compared to mortuary archaeology, bioarchaeology might appear analytically commanding but intrinsically a-theoretical with reflexive and mechanistic explanation based in functionalist notions. Gowland and Knüsel (2006a: ix-x) perceptively note that human skeletal analysis has been carried out as a purely scientific endeavor not connected to social theory because of the “insidious belief” that the skeleton is a universal, fixed biological artifact. A dialectical relationship between the physical world and the physical body can be considered instead, as it is through your body that the world “touches you” and visa versa (Sims 2003:4) The development of two cultures in
anthropology consisting of empirical objectivists versus relativistic subjectivists furthered this science/theory divide (Jones 2002), and a false dichotomy has resulted.

Beckett and Robb (2006) affirm that osteologists have long been guilty of failing to engage with the broader theoretical and social meanings of their data. Gowland (2004:136) astutely observed paleopathological conditions risk becoming objectified and divorced from historically determined conditions of human identity and thus become irrelevant to interpretations of cultural context and burial. The broader issue is what Goodman and Leatherman (1998a) describe as the ever-widening chasm between biological anthropologists and cultural anthropology. Many biological anthropologists are left relatively unengaged with dialogues of theory, unaware of and apprehensive about cultural theory. “Jokes about postmodernism have become standard fair at physical anthropology gatherings…[such comments contain] a sense of disdain along with fear and apprehension…[and] sound like ethnic jokes” (Goodman and Leatherman 1998a:8).

It would be incorrect, though, to state bioarchaeology is a-theoretical. Over the years, valuable constructs have guided bioarchaeological explanations, and one of the most direct and serious attempts has been undertaken by Sofaer (2006). Some could be considered functionalist or middle-range while others theorize the existential nature of human health itself. The problem is that a larger body of theory has not yet been synthesized from them. The premise here is that there are biological, functional, and interpretive ways in which to describe and theorize the phenomenology of health and health outcomes. Each level of interpretation is not mutually exclusive of each other but are components of the larger construction of human health. First, health can be described
and understood on the level of the individual, in the way that biological, environmental and evolutionary interactions canalize development and health outcomes. This mechanism is then expanded to the level of the population, group behavior, and systemic stress. Then, discussion follows on the interpretation of the biocultural phenomenology of a population’s health, shaped by aggregates of individuals’ canalized health outcomes, ideology, history, and social interaction patterns.

**Canalization and Developmental Pathways**

In Waddington’s (1957) systems theory conception, the whole course of the human developmental process is seen as following the most “favoured path” to reach the adult condition. If at some point in development a variable is introduced that diverts an organism from its canalized path it will attempt to compensate and return to the normal path; in other words, highly canalized traits are under strong genetic control and often cancels out disturbance by earlier interference (Waddington 1957: 19, 23). On the other hand, epigenetic inputs into an organism represent a completely open system, and can promote various developmental pathways. Waddington (1957: 28-30; Figures 4 and 5) illustrates this idea by considering an undulating surface, tiled downward such that lower points on the surface represent later stages of development that culminate in an end state of development (Figure 2.1). The end state is notionally highly canalized and invariant. Introduction of vastly complex epigenetic signals (such as stress) and developmental “noise” can push and pull the ball into different valleys of this epigenetic landscape and ultimately culminating in potentially divergent end states.
Figure 2.1: Abstract representation of an epigenetic landscape, depicting the phenotype (ball) and various developmental pathways (channels) that it may be pulled or pushed into. Adapted from Waddington (1957: 29, Figure 4).

By extending this model of development into biocultural and life history thinking, it is possible to envision health outcomes in a similar fashion. If the ball in this case represents a particular phenotype or health state traversing this undulating landscape, the ball may favor one developmental pathway over another depending on the epigenetic signals that shape the shallowness or depth of the valleys. The further down a developmental pathway, the steeper the slope and the greater momentum exists which will favor one outcome increasingly over all others. In this way, developmental pathways themselves may be considered to canalize in a similar way to particular phenotypic outcomes leading to fewer and fewer possible biological end states or adult health outcomes. Thus, the concept of canalization can be more flexible and extended to various
processes and stages in human life history involving multiple outcomes, not just those seeking genetic homeostasis in development.

This model of developmental pathways can account for much of Goodman’s (1993) hypotheses concerning why some individuals in a population consistently display greater degrees of skeletal stress than others. Canalization of health outcomes can be synthesized with the biological damage hypothesis, which holds that prenatal and childhood stress can have far-reaching effects on later growth, the capacity to resist disease, and lifespan.

A wide body of literature including experimental and clinical data illustrates the pathological effects of stress on the development of the nervous system, brain, and especially immunological functions that cumulatively magnify over one’s life history (Eveleth and Tanner 1990; Power and Matthews 1998). In this way, the “seeds” of chronic adult disease and morbidity are sewn (or canalized) during development. Disruption of the growth of the vertebral neural canal can result in permanently impaired neural and thymolymphatic growth and function including accelerated loss of T-cells, autoimmune diseases, disordered neuroendocrine function, and decreased lifespan (Clark et al. 1986). A combination of undernutrition and infection during fetal and childhood periods may “program” physiological systems such that exposure to stress later in life will be particularly detrimental (Pollard 1997). Eveleth and Tanner (1990) review a wide range of growth studies that link poor childhood growth with increased adult health stress and morbidity. It is also possible canalization of health outcomes may begin not with
neither childhood experience nor the unfertilized egg in the maternal environmental but in the grand-maternal environment where the mother’s oocytes first form.

“Variation in individual genetic frailty” (Goodman 1993: 284) relating to susceptibility to physiological disruption may be in large part a canalized epigenetic phenomenon expressed in the phenotype. As individuals who are more susceptible to stress as adults appear more susceptible to stress as adolescents and children, early stress would have been fundamental to shaping this particular canalized pathway. Conversely, individuals buffered from early stress followed a different pathway, and would have experienced a greater chance to experience “normal” end states including optimal health.

In sum, individual health outcomes result from the complex interplay between genetic, epigenetic, and developmental factors. Adult health and well-being is fundamentally shaped into specific developmental pathways by the experience of stress or lack thereof in fetal and subadult life history events. Poor adult health outcomes can be interpreted in part as a mirror of compromised developmental health.

Stress and Health Outcomes among Populations

Second, a functional understanding of health emerged from the search for a precise etiological understanding of what causes specific skeletal lesions. Goodman and colleagues (1984) first developed a model that provides a mechanism to systematically define the causes and consequences of biological stress (with latest revisions presented in Goodman and Martin [2002]) (Figure 2.2). In many ways, this model is fully complementary to canalization of individual developmental pathways – it explains what
Figure 2.2: A functional and adaptive model of biocultural stress measured by bioarchaeological variables, modified from Goodman and Martin (2002) and Thomas (1998).

factors shape the valleys of the epigenetic landscape, why the “ball” may favor one path over another, and brings into focus all-important biocultural and adaptive processes that shape developmental pathways in a population. This model also underlines the fact that stress cannot be directly measured in a skeletal sample, but a variety of skeletal changes can be observed in concert to infer stress, its impact, and resultant adaptive responses.

The stress model begins with environmental constraints to adaptation: food, water, shelter, climatic variables, parasites, and predators that can impact resistance to disease and longevity. The environment is both the wellspring of resources necessary for survival and a locus of multiple stressors. Cultural systems, such as shelter, clothing, and
economic strategies creatively serve to buffer individuals and populations against stressors (Goodman and Martin 2002:17). Cultural systems can also be a paradoxically a parallel source of stressors in an almost maladaptive fashion (Schell 1997). Examples of cultural stressors include sedentary agricultural lifeways, unequal access to resources, poverty, violence, pollution, or inefficient environmental buffering strategies.

If environmental and cultural constraints are insufficiently buffered, stress is passed along to the individual members of a society. Mediation of stress then depends on levels of host resistance (a construct of developmental pathways). In settings where stress is endemic, genetic adaptations appear (e.g., sickle cell anemia or the Duffy-Null allele in response to malaria). In most contexts, stressors ebb and flow in intensity and duration as a developmental or physiological reaction play out mostly on the level of the phenotype. When the threshold of resistance is breached, physiological stress responses occur which manifest in relatively permanent skeletal changes. Long underappreciated in biomedicine and impossible to measure bioarchaeologically, the impacts of psychological stress, mediated by the putative the mind-body connection, however represents a profoundly important variable for health outcomes (Barr et al. 1994).

The stress model also considers population-level consequences. Nutritional stress, for instance, can negatively impact work capacity, cognitive functions, fertility, and mobility, which feeds morbidity and mortality that is disruptive to socioeconomic and political institutions and stability. In turn, population-level changes and the biological adaptation and behavioral changes feed back into environmental conditions, cultural
systems, and host susceptibility in a reciprocal, dialectical relationship (Goodman and Martin 2002; Goodman and Thomas 1998a).

Most importantly, the stress model encourages explanation of biocultural patterns in terms of adaptation and evolution. Evolutionary theory is the paradigm of biological anthropology but has not widely been integrated into bioarchaeology as descriptive thinking styles persist. Diachronic bioarchaeologies must consider the full spectrum of potential variables that represent selective pressures, the cultural responses to these pressures, and the dialectical synthesis which results in measurable expressions of human health. Bioarchaeology, in this sense, can strive to be evolutionary in a fundamental way.

Health Theory and Interpretations of the Human Skeleton

The third and final vista that can contribute to a theory of bioarchaeology is found in health theory, much of it derived from studies of contemporary human health and social inequality. The argument here is that the human skeleton is a living canvas shaped, created, and recreated by the embodiment of health and society.

Positive correlations between poverty and health is well established, such as with the McKeowen thesis (Wagstaff 2002). Virtually universal links are found between indicators such as mortality, ill health, poor growth, social stratification, income, and education (Macintyre 1998). It is also critical to consider the interplay of physiological and psychological stress and the sources of variability in health outcomes, the inter-relatedness of risk factors and linkages therein (Haggerty and Sherrod 1996). However, the most vital, overarching, and significant component shaping human health is social
structuring. Particularly, the relationship between health and social hierarchies requires specific attention.

Relationships of socioeconomic patterns and health should be seen as a particularistic phenomenon – specific patterns are best understood within a society than across time or cross-culturally (Wilkinson 1998). However, useful generalized models of health and poverty have been offered by Crooks (1995), which are based on poverty, health, growth, and achievement. These components can be further divided into more specific risk factors involving buffering, diet, health care, ethnicity, urban versus rural, parental factors, and so forth. The distribution of stress indicators in hierarchical societies is fundamentally contingent on status and resource-availability (Goodman 1994).

Corresponding models of accumulation of health risks reveal: (1) cumulative impacts of stress throughout human life history; and (2) health gradients consistently correlate to social structure and class regardless of which indicators are used to measure inequality (e.g., Power et al. 1998).

How can we to understand inequality and health beyond functional notions? Nguyen and Peschard’s (2003) consideration of what the phenomenology of health actually represents in among ranked social systems. Simply put, social inequality manifests in the body. As a product of complex psychobiological pathways and cumulative biosocial dynamics, health cannot be explained in biological terms alone. Considering the prism of embodiment, the human body is a deeply historicized and socialized object fashioned by cultural, political, and historical processes. Such an understanding enables a cross-cultural framework to understand how social relations
pattern diseases and states of individual and collective affliction (Nguyen and Peschard 2003: 448).

Cultures of inequality foster a pathogenic biosocial spiral of socioeconomic exclusion and poor health for some or most of its members. The mechanisms by which poverty causes disease is well understood including compromised immunity, developmental damage, and poor living conditions. Unstable social support networks play a profound role as well. Recent epidemiological research cited by Nguyen and Peschard (2003: 449-450) indicates the effects of social inequality on health are not just limited to discrete groups of poor, but is spread across an entire population in a variety of ways, such that hierarchical social organization may be inherently unhealthy. Poor health in ranked societies exacerbates the very inequalities that create it, and spirals into an “illness poverty trap” (Whitehead et al. 2001) such that hierarchical social organization may be maladaptive.

How inequality translates into poor health is debated, but has crystallized into three hypotheses. First, dissimilar expressions and functions of systems of social cohesion and social capital have been invoked as a basal cause. Clearly of heuristic value, the notion of social capital however is somewhat tautological and difficult to empirically assess. Second, the relationships between psychosocial experiences of stress which trigger particular developmental pathways that become canalized (as discussed earlier) have also been implicated in the deleterious effects of inequality. Effects of stress early in life may manifest later in life through complex conduits that entangle biology, culture, and environment. Third, material factors are offered as the link between inequality and
illness by neomaterialist thinkers: fewer investments are made in social services and infrastructure and material deprivation in childhood has been shown to perpetuate unhealthy behavior later in life even if upward social mobility is possible (Nguyen and Peschard 2003: 450-452).

Anthropological perspectives weighing in on the biology of inequality have argued biology is more flexible than widely thought and extraordinarily permeable to social realities (Lewontin 2000). Cause and effect must not be confused: biological differences between populations may not be the cause of social differences but rather, their effect. Ideas including social determinants of health may oversimplify entanglements between culture, diet, environment, and history (Nguyen and Peschard 2003: 452). Life-course approaches are thus advocated which reveal how history itself is embodied, and fuses historic, geopolitical, environmental and bio-physiological contexts into a broader, holistic understanding. Power’s (1998) conception of a political anthropology of health also includes historical and cultural processes, and is a particularly valuable stepping stone to compare embodied inequalities in cross-cultural and diachronic settings such as in bioarchaeology.

The embodiment of inequality itself can be further theorized, according to Nguyen and Peschard (2003: 455) regarding how social relationships invest and express the human body including our bones in terms of inscription, experience, and practice following Bordieu’s (1977) notion of *habitus*. A political economy of the body may be readable (Goodman and Leatherman 1998a) just as the body may express resistance to dominant social forms (Comaroff 1985).
Quantitative data can help provide some windows on embodiment, but must be accompanied by complementary qualitative knowledge: understandings of how actors deploy or modify their bodies and create, comprehend, enact, and respond to inequalities (Nguyen and Peschard 2003: 456). Also, the body should not be seen as a passively inscribed artifact, but one that enacts and negotiates with hierarchy in a perpetually dynamic social reality. The body directly, and the human skeleton more indirectly, can reflect active forms of resistant to dominant social inscriptions, such as those exercised by patriarchy, the state, or colonialism (Moore and Vaughn 1994; White 2000; also see Nguyen and Peschard [2003: 456] for further discussion).

The phenomenology of inequality and disease can be seen in terms of violence, as an incarnation of social hierarchies, is a form of invisible, imbedded, structural violence embedded within and enacted by cultures, institutions, and rationalizations (Farmer 1997, 2004; Nguyen and Peschard 2003: 448). Disparities in health outcomes within a complex society can and should be seen as a result of inequality structured by asymmetrical social relations. Bioarchaeology, which typically measures violence in terms of traumatic skeletal injury, can incorporate notions of health and structural violence to reveal another highly pertinent side of the character, patternning, and implications of inequality and social organization. It can be first argued that patterned, differential states of well-being represent a far more insidious form of violence than broken bones. Second, the prevalence of violence is far more prevalent in complex cultures than what traumatic injury along suggest.
Application of these ideas of health theory based on modern peoples to past populations requires some consideration. First and foremost, Foucaultian thinking would see modern bodies as fundamentally different artifacts from “premodern” bodies. Moderns are envisioned as choosing to modify their bodies in creating a social identity, whereas premoderns alter the body in ritual, such as scarification or cranial modification, which would not translate into increased morbidity or mortality along premodern social hierarchies (Fassin 1996). Modern socioeconomic disparity is transcribed into the biology of the body, whereas premoderns inscribed ritual onto the body (Geller 2006). Modern spaces of therapy involve the mediation of “risk” by techniques of governance and policy, whereas premodern notions involve shamanism or spirit possession (Nguyen and Peschard 2003: 448).

However, the Foucaultian notion of health in premodern societies can be critiqued: in fact, it may be a false dichotomy. This kind of rigid constructionism, arguing that only modern bodies are culturally transcribed, would perceive that only contemporary cultures embody differential health outcomes. So are premodern people locked into a deterministic mode of affliction and embodiment based on a broad, static typology focused on the concept of modernity? Can it be that in premodern cases that embodiment is purely assigned to a person? How are we to theorize experiences of unequal health in complex societies since the origins of agriculture (Cohen 1998)? Is bioarchaeological evidence of biologically embodied social inequality (e.g., Cohen 1998; Farnum 2002; Goodman 1998; Larsen 1997) an aberration or are examples showing the Foucaultian vision is too narrow? It is probably more useful and productive to steer clear
of premodern versus modern distinctions, and instead focus on the phenomenology of health outcomes in hierarchical societies in terms of a spectrum of social complexity among egalitarian, ranked, and stratified societies (Cohen 1998) understood via local historical and political contexts.

If such an approach is employed, the Foucaultian concept of inequality, health, and the sublimation of violence can transcend this dichotomous trap. While universal and quasi-universal principles must be considered with great thoughtfulness and care, it can be hypothesized that cross-culturally and diachronically, most, if not virtually all human cultures have the potential to create differential health outcomes among its members due to variable access to resources including health capital (i.e., clean water, higher quality food, and better living conditions). Even so-called egalitarian cultures can and do embody socioeconomic inequality, though a main difference with stratified societies is that one class permanently owns or exerts rights over natural resources and production (Cohen 1998: 252). Where such cultures of inequality exist, a pathogenic, biosocial spiral of socioeconomic exclusion and differential well-being is likely to be present as well. The effects of such inequalities are indeed transcribed into soft and skeletal tissues of any human being, measurable in terms of morbidity and mortality – though the intensity and the forms such embodiment takes may vary widely between cultures. Strongest manifestations may exist among modern capitalist nation-states.

Methodologically, extension of these elements of health theory to bioarchaeological contexts requires examination of multiple lines of data on the population level. Unless very particularistic conditions are understood to be present, it is
more than reasonable to infer that stress would have been channeled into multiple skeletal and dental forms today just as in the past. In this manner, stressors and their effects on childhood health, later life history, achieved social status, and well-being can be approximated. Carefully developed analogies with modern clinical or ethnographic data may be achieved by contextualizing bioarchaeological case studies that allow for secure comparisons.

In sum, the preceding discussion has attempted to develop a theory of health in bioarchaeology on three levels linking: (1) canalized developmental pathways; (2) the interplay of environmental, cultural, biological, and evolutionary factors that structure health and changing health patterns; and (3) an interpretative framework in which to interpret the nature of health experiences. Regarding the latter, an example of embodiment and structural violence was invoked since it is applicable to this work. A world of contextually appropriate frameworks may however be applied. For instance, Fay (2006) elegantly applies the concept of illness as a conceptual structure in antiquity in her examination of “disease culture” in Late Medieval and Tudor-era England.

THEORETICAL BASES OF BIODISTANCE RESEARCH

As one of the specific tools within bioarchaeology, biological distance (or simply, biodistance) analysis of microevolution and inheritance patterns among archaeological human populations represents a powerful tool in which to investigate questions of
biology, identity, history, and evolution in a unified framework. Biodistance represents the third and final conceptual and theoretical focus of this work.

Foundations of Biodistance Research

Biodistance is relatively theoretically well-developed in terms of methods. The underlying theoretical basis of biodistance research is simple: as populations exchange mates (and therefore genes), they become more phenotypically homogenous over time while those that do not become more dissimilar at a rate determined by their effective population sizes (Stojanowski and Schillaci 2006: 51-52). Various techniques have been devised to identify microevolutionary changes including population genetic structures, differential gene flow, ethnic boundaries and kin groups, post-marital residence patterns, age effects on phenotypic variation, migration, and other forms of biological interactions among different human groups on intracemetery, regional, and global scales (Buikstra et al.1990; Konigsberg 2006; Larsen 1997; Scott and Turner 1997; Stojanowski and Schillaci 2006).

Stojanowski and Schillaci (2006:51) state any analysis of biodistance must make five basic assumptions. First, if mutation rates and selection effects are constant, gene flow and genetic drift similarly affect allele frequencies within and between geographically and environmentally proximate populations. Second, skeletal samples are not true biological populations but are archaeologically representative temporal aggregates or lineages. Third, changes in allele frequencies result in measurable via changes of phenotypic skeletal traits which can be expressed mathematically. Fourth,
environmental influence of the expression of a phenotype is either marginal or randomly distributed among the samples under examination. Fifth, inheritance of phenotypic variation is additive, each of the multiple contributing genes has individually small effect on phenotype, and resemblance among related individuals is strong.

    Biodistance analyses are based on metric and non-metric traits of the dentition of skeleton. These phenotypes are considered acceptable proxies for the underlying genotypes. Metric traits are polygenic continuous variables derived from linear measurements such as lengths or widths that represent the size and shape of a tooth or bone. Non-metric traits are discontinuous or quasi-continuous polygenic features that can be recorded either as present or absent or on a semi-continuous scale. However, neither metric nor non-metric traits bear direct correspondence with an individual’s genome (Larsen 1997: 303).

    As with any trait, the interplay of environmental, genetic, epigenetic forces can lead to a phenotypic expression different from the genotype. While the heritability ($h^2$) of various traits has been estimated by Goose (1971), Saunders (1989), Sjøvold (1984), and Townsend (1992) among others, the heritability of many polygenic traits is in generally imprecisely understood. Although considerable variation in phenotypic heritabilities has been documented, most anthropometric traits however do cluster around $h^2=0.55$ (Stojanowski and Schillaci 2006: 52).

    Recent advances in population genetic modeling, methods, and theoretical developments (Relethford 2003; Relethford and Blangero 1990; Stojanowski 2005b) have successfully moved beyond descriptive or taxonomic beginnings. Armelagos and
Van Gerven (2003) who persist in a characterizing contemporary biodistance studies as racial typological reversions to a descriptive past, is puzzling and inaccurate (Stojanowski and Buikstra 2004).

Metric and non-metric traits can be derived from both the skeleton and the dentition. The postcranial skeleton is most likely to be affected and shaped by epigenetic and environmental conditions vis-à-vis biomechanical loading. In other words, the phenotypic expression of the humeral septal aperture, for instance, is highly associated with robusticity (function) rather than underlying genotype. Cranial and craniofacial variables have been used far more extensively in biodistance studies. However, the cranium and craniofacial complex are also functionally loaded. Carlson and Van Gerven’s (1977) germinal study serves as a warning: changes in Nubian craniofacial anatomy thought to be evidence of a population replacement appears to have resulted from reduction of activity of the muscles of mastication as subsistence economies changed to include a softer diet.

Teeth, on the other hand, appear to be the most reliable source of phenotypic information. Teeth are part of a strongly integrated and highly canalized genetic system. A long history of scholarship into the ontogeny and development of teeth has revealed that in general, environmental variation plays very a limited role in the expression of dental traits. Most lines of evidence (studies of monozygotic twins, familial correlations, population variation) reveal dental traits are under strong genetic control (Scott and Turner 1997: 162). Some modern dental traits can be traced back to 20 to 30 million year-old hominoids which underline the remarkable evolutionarily conservative nature of
dental morphology. Teeth are also the most resistant body tissue to taphonomic
degradation allowing information and sample sizes to be maximized. Environmental
variation channeled into forms such as odontogentic stress may result in phenomenon of
fluctuating asymmetry where a tooth’s antemere presents a significantly different size or
trait expression. In such cases, the tooth not showing diminished expression probably
maintains the strongest reflection of genotype.

*Historical and Modern Theoretical Orientations*

In general, biodistance studies of human skeletons in the American
anthropological tradition emerged from a “varietal” or “racial” classificatory approach.
Novel perceptions and questions arose in physical anthropology and archaeology
motivated by the advent of the “New Archaeology” of the 1960s and the technological
means to apply multivariate mathematics. Some of the earliest questions involved
defining whether archaeological or historic populations came into existence by *in situ*
development or external migration (Konigsberg 2006: 267). Lane (1977) and Lane and
Sublett (1972) opened a new era of biodistance research in their use of skeletal traits to
examine residence and mating patterns. By the 1980s, developments in population
genetics within and outside of bioarchaeology led to an increasing popularity of
biodistance, which included “model-free” approaches and questions on the role of natural
selection and genetic drift to explain diachronic variation in a skeletal series.

Today, five major themes dominate biodistance research in bioarchaeology:
kinship analysis and cemetery structure, postmarital residence and sex-specific migration
patterns, comparisons of phenotypic variance patterns, age-structured phenotypic variation, and temporal microchronology (see review in Stojanowski and Schillaci 2006).

Kinship studies can be realized from the interregional and regional analyses of small numbers of graves, spatially structured cemeteries, and uniformly distributed cemeteries using a variety of different methods. Postmarital residence patterns can inform much about how individuals are integrated into social systems and mating network composition. This approach is based on relative degrees of observed heterogeneity among males and females evinced using a variety of quantitative methods (Konigsberg 1987, 2006; Konigsberg and Buikstra 2003; Stefan 1999).

Comparisons of phenotypic variance aim to characterize the degree of heterogeneity in a cemetery and extrapolate that to the population at large. Social organization, endogamy, effective population size, short- and long-term migration patterns, ontogenetic variation, and environmental factors all contribute to heterogeneity such that multivariate methods are required (Stojanowski and Schillaci 2006: 73). Recent approaches that involve Relethford and Blangero’s (1990) R matrix (Nystrom 2006; Scherer 2007; Steadman 2001; Stojanowski 2004; Tatareck and Scuilli 2000) and matrix decomposition (Stojanowski 2003) to varying degrees of effectiveness illuminate differential patterns of gene flow and overall heterozygosity in relation to a variety of historical and regional questions. What makes these studies particularly exciting is the potential deep engagement with cultural behaviors and biological interaction patterns. Here, the R matrix deployed as a major tool in the study of postcontact genetic transformation and ethnogenesis.
Research that attempts to examine temporal microchronology targets synchronic social groupings in the analysis of short-term microevolutionary trends. Microchronology studies are powerful but are rarely attempted as most archaeological sites cannot be easily divided into units corresponding to individual biological generations. Konisgberg (1987, 1990) set the theoretic and methodological foundation in this area, though Owsley and Jantz’s (1978, 1982) work demonstrated the effects of postcontact epidemics on Native American patterns of admixture and microevolution among the Arikara at the Sully and Mobridge sites in South Dakota.

Investigations of age-structured phenotypic variation are also rare. As one of the first entradas into this developing area, Stojanowski et al. (2007) find that at the Spanish mission of San Luis de Apalachee, subadults possessed smaller average tooth sizes than adults, especially in the non-polar mandibular dentition. This size deficit is interpreted as reflection of elevated ontogenetic stress and increased risk of mortality and early death. One exciting implication is that age-structured phenotypic variation in tooth size may be a more sensitive indicator of systemic stress than dental enamel hypoplasias. On the other hand, it may also provide evidence of natural selection (see Konigsberg 2006: 270-271).

The future of biodistance research is very promising. Many approaches are theoretically and methodologically mature and have much to offer bioarchaeological reconstructions of social organization, historical developments, ethnic and linguistic group boundaries, and other questions. Despite the increasing accessibility of ancient DNA analyses, biodistance studies offer information paleomolecules cannot – particularly in that teeth represent a full reflection of both maternal and paternal genetic
signals. While analysis of skeletal traits and aDNA are currently very complementary, biodistance as practiced today will not last forever; future advancements in paleogenetics and three-dimensional morphometrics will one day make our current methods obsolescent.

A MODEL OF INTEGRATIVE BURIAL ANALYSIS: SYNTHESIZING MORTUARY ARCHAEOLOGY AND BIOARCHAEOLOGY

Mortuary analysis and bioarchaeology are today at a crossroads. Developments in these two fields, long operating in isolation from one another, have reached a climax where the next necessary step is their marriage of goals, theory, and methods. Here, a potential formal synthesis of mortuary archaeology and bioarchaeology is presented.

Reconciling the Social Significance of Burials

First, mortuary theory must account for the elaborate relationships of the complex factors that form burials, which neither processualism nor postprocessualism can sufficiently address alone. The dichotomy between processual and processual positions is unproductive, a product of different scientific traditions and attitudes in North America and Western Europe and modernist/postmodernist tensions. While the two schools of thought do call attention to each other’s shortcomings, this dichotomy in the minds of most archaeologists seems to have blocked attempts at a systematic synthesis and perceptions of how these two bodies of theory can be highly complementary.
Common ground can be seen in today’s processual and postprocessual positions having helped dispel naïve notions of straightforward social reconstructions using burial data. Both lead to a similarly sophisticated understanding of multiple synergistic factors underlying burials including symbolism and agency. As Shimada and colleagues (2004:370-371) elaborate, the two schools of thought each drive home the point that mortuary practices can embody a wide range of coded discourses – some more concrete than others – which are left by the living regarding the dead and their society. These discourses or messages are largely results from the interplay between the living, the dead, social configurations, and historical trajectories.

The first and most basic component to a synthetic or holistic approach to mortuary archaeology is therefore the meticulous and rigorous establishment of local and regional contexts and patterning. As several authors including Goldstein (2006:377) note, context is the cipher to decode these messages. “Deep contextualization,” that is, the totality of ethnographic, historic, ethnohistoric, and archaeological evidence available, is required to evaluate, the likelihood of social representation in burial rituals or under what kinds of circumstances that ideological manipulation is present. “The concern of the archaeologist...should be with [burial] patterns, and their potential meanings. It is only when archaeologists understand what is being symbolized in burial...that judgments can be made as to reality or otherwise of these patterns in terms of social structure” (McHugh 1999: 18).

Deep contextualization can also have the effect of offsetting negative effects of small or skewed mortuary samples that are so common (Shimada et al. 2004:371).
Another level of context must be established from associated mortuary rituals and the broader contexts of death including religious facilities, settlement patterns, and associated cemeteries on a regional scale. Burial samples must also be evaluated as to how diagenesis and natural and anthropogenic taphonomy may contribute to a recovered assemblage. Samples should be however diverse enough to approximate the biosocial variability within a synchronous regional population. Some may argue that biological characteristics of the deceased should be treated as another line of subordinate contextual data, but as argued here, bioarchaeological information is as critical as burial pattern data.

As an example, a processual or representationalist vision appears largely applicable to north coast complex societies. Specific lines of independent evidence documented in iconography and socioeconomic organizational features indicate Moche, Sicán, and Chimú cultures involved relatively rigid, institutionalized social, economic, and political inequality. Under such conditions, social status and identity seem to be encoded in burial throughout the social spectrum. This pattern would most clearly manifest among upper classes in the attempt to preserve the status quo of their inherited rights by constructing discontinuous and conspicuous displays of mortuary ‘wealth,’ monumental tombs symbolizing their power, and planned cemeteries containing socially and biologically cohesive corporate groups (vis-à-vis Saxe’s Hypothesis 8) (Brown 1995b: 393-395).

Simultaneously, the same burials encode a parallel wealth of information on ethnic group membership, agency, and other very specific emic messages about the dead and their society (Bawden 2005; Klaus 2003; Shimada et al. 2004). Thus, analysis should
not stop with attempts to define differential status but also explore the symbolic levels of meaning, which is possible due through deep contextualization. In other words, processualism and postprocessualism give us the tools to comprehensively access both concrete and the metaphorical meanings in death. Postprocessual thinking is vital to unlock the ‘meanings’ contained within a burial. The ‘new’ archaeology’s functionalist notion of humans as passive social beings has aged very poorly; concepts of structuration, agency, and ritual can and should be taken as very serious approaches to examine compelling social phenomena operating at a socio-historical nexus.

Explicit interweaving of postprocessual ideas are vital in many cases to expand burial investigations to consider political or cosmological influences on burial patterning or inclusion of particular grave goods, and the role of gender (not sex) and age, identity and ethnicity in mortuary patterns. Horizontal differentiation and competition within social classes is a rich topic eagerly awaiting further exploration. Empirical taphonomic and bioarchaeological studies of living rituals and mortuary programs can be married to the study of the meanings or experiences they embody (Duncan 2005; Geller 2006).

The physical remains of pre- and post-interment rituals inside or adjacent to a burial may be perhaps the least conceptualized area of study of all. As some have begun to show us, taphonomy is critical to the broader behaviors we seek to understand (Duday 2006; Shimada et al. in press). Also, quantitative formal analysis is not mutually exclusive of symbolic interpretations. Each can be a key element of the other; multivariate analysis are critical to lend more precise understandings of burial patterns in the search for meanings (McHugh 1999; Morris 1991).
The guiding ideas outlined above are not the only avenue in which to explore new directions in mortuary analysis. Realistically, the questions that an investigator can pose are often contingent upon context and much of the above may not be applicable in all settings. Impediments to widely-practiced synthetic or holistic mortuary archaeology involve the aforementioned decades of conceptual divide and rather intransigent empirical/symbolic dualistic tensions in archaeological thought.

In sum, the first component of a holistic program of burial analysis is a mortuary archaeology that considers the totality of the dynamic physical, temporal, and cultural setting as well as the concrete symbolisms and less intangible metaphors and meanings including horizontal and vertical social status, identity, and gender encoded in burial and the interplay therein.

The Role of Bioarchaeology

Given Gowland and Knüsel’s (2006a: ix) statement that “the human skeleton is… a unique repository for social information concerning the lifestyles and lifeways of past peoples…[and] must rank as one of the (if not the) most information-rich sources of archaeological evidence,” it may seem incomprehensible that the human skeleton has long been marginalized by those who dig up burials.

One way this state of affairs has developed is the development of bioarchaeology as a laboratory-or museum collections-based endeavor over the last 20 years (Goldstein 2006). In this framework, some bioarchaeologists have come to work more amongst themselves or with other allied specialists. Bioarchaeology and archaeology may have
partially helped marginalize each other due to increasing degrees of specialization which is perceived to siphon off time and energy from working with archaeological data – data that are often “messy” and require more interpretation than quantification – and are subsequently perceived as “hard” to interweave into empirical skeletal analyses (Goldstein 2006: 377). In other words, there is an approach that focuses on bones and tends to sideline history, archaeology, and context.

Goldstein (2006: 378) further asserts that biocultural and bioarchaeological work requires close collaboration and sharing of ideas along with research problems and theoretical debates with archaeologists. In what is possibly the worst outcome, some bioarchaeologists who do work with archaeological theory or data may do so simplistically or superficially. Skeletal correlates of social status, for example, should neither be linked to one-to-one relationships with grave wealth and status, nor can leaps between sex and gender be made easily. The technically finest empirical study of human remains, if incompletely or erroneously articulated with archaeological, cultural, and environmental contexts, will be fatally crippled by problematic research questions and misleading or inaccurate explanations.

One-half of the solution to this current quandary was proposed by Buikstra (1977). Her vision of a regional and interdisciplinary program involved the active participation of archaeologists and physical anthropologists in all phases of research design, implementation, and analysis. The human burial, or more widely, the cemetery, can and should be the unit of authentic biocultural analysis. Mortuary structures and the nature and functioning of associated sites must equally be understood. Mortuary data
provides a large corpus of potential information on social organization, ritual, and belief that is largely independent of but highly overlapping with the information that can be gleaned from the human skeleton. Mortuary patterns also represent the most immediate and crucial contextual data for the interpretation of skeletal data. Mortuary data cannot ever be tangential but instead directly engaged by the bioarchaeologist.

The other half of the solution is presented by Larsen (2001, 2002) and colleagues (2002, 2007). In their research on the Georgia Bight, they assembled a comprehensive and articulated suite of skeletal variables by which to attain the most complete, state-of-the-art bioarchaeological study. These variables include those more commonly used as part of the standard visual-observed battery of features (enamel hypoplasias, porotic hyperostosis, non-specific skeletal infection, degenerative joint disease, and so forth). They are coupled with more sophisticated lines of data, such as cross-sectional geometric properties of long bone, estimations of subadult growth velocity, stable isotope variation, histology, dental microwear, microscopic Wilson bands in tooth enamel, paleodemographic estimations of female fertility, and multiple kinds of biodistance analysis. The unification of these lines of evidence ultimately provide the strongest and most complete diachronic reconstructions of diet, nutrition, biological stress, activity, lifestyle, historical processes, adaptation, and microevolution as is possible.

Burials and bones together gauge the degree to which biological and social representation in a burial sample as well as provide the bases for interpretation of paleopathological indicators of health, paleodemographic reconstructions, biodistance patterns, dietary markers, and so forth. What many bioarchaeologists might consider
parallel contextual data are equally significant components of the complex matrix that interacts with biology to create patterns in a skeletal series. Mortuary and bioarchaeological data moreover feed back and inform each and wider social and evolutionary processes.

Process and interpretation in an integrative burial analysis must fundamentally be a long-term and regional endeavor. If Gowland and Knüsel’s (2006: xii) idea of the human skeleton as an archaeological datum point can be expanded, the human skeleton itself can be envisioned as a datum point of cultural reality and experience. From this perspective, biological manifestations can be effectively related and evaluated, linking to the funerary, archaeological, environmental, and historic, and biological-evolutionary records in an authentic hermeneutic circle.

Operationalizing Integrated Burial Analyses

Integrated burial analysis or holistic bioarchaeology is a multi-component, layered process that has both practical and theoretical aims (Figure 2.3). It presents several challenges, but need not be impractical or difficult as Goldstein (2006: 383) predicts. The most fundamental practical element of this endeavor is mutual collaboration between archaeologists and physical anthropologists beginning with definition of the problem context, proceeding to grant writing, excavation, data collection, conservation, analysis, interpretation, publishing, and the formulation of new problems and hypotheses.
Figure 2.3: A model depicting the components and implementation of an integrated burial analysis. This scheme is largely a descendant of Buikstra’s (1977:71, Figure 1) vision of an interdisciplinary research strategy for mortuary sites and human osteology joined to the conceptions of skeletal data defined by Larsen (1997, 2002) and operationalized by Larsen and colleagues (2002, 2007).
Physical anthropologists or bioarchaeologists must be fully integrated into a joint archaeological excavation program, which logically must involve survey to identify the nature and distribution of mortuary and non-mortuary sites. Excavation begins at a location(s) where representative burial samples may be generated. While Sprague (2005:33) advocates integrating a physical anthropologist in burial excavation simply to document demographic features of a skeleton *in situ*, physical anthropologists in the field can bridge the disciplines, creatively fostering complementary and synergistic creative cross-disciplinary collaboration.

A physical anthropologist, working side-by-side with an archaeologist during excavation, can make unique contributions on the identification of sex, age, pathological conditions, taphonomy, and recovery of the skeleton. The archaeologist can in turn impart mapping skills, observations on taphonomy, how to ‘read’ stratigraphy and other physical traces, accurately identify grave goods, and so forth. During subsequent laboratory studies, emphasis should be placed on collaborative conservation of bones and artifacts with long-term, secure curation of these materials. What is critical about *in situ* collaboration of archaeologists and physical anthropologists is the opportunity to engage in creative dynamism of all sorts that may leads to insights and new directions of inquiry that cannot be readily anticipated.

Excavation should not be narrowly focused on cemeteries or tombs to the exclusion of other associated sites. Vital archaeological study of the nature and functioning of nearby domestic sites, food preparation areas, craft workshops, fortifications, monumental centers, and the like must be undertaken in concert.
Paleoenvironmental data must also be examined, and should include the integration of paleoethnobotanists, geoarchaeologists, and other allied specialists.

In the interpretative phase, the specialized bodies of knowledge of physical anthropology and archaeology lead to related reconstructions of biological status, mortuary rituals, and related contextual data. These individual reconstructions are each a precursor to a synthetic biocultural model, the definitive goal of the entire effort. Population structures, political organization, agency, adaptation and evolution, social organization, agency, ethnicity, and health can be approached as various manifestations of overarching biocultural macro-dynamics. This model, married at this point to cultural theory and interpretations of health, can be of significant explanatory capacity. Stemming from explanation are new questions, hypotheses, and models, which then return to the formulation of a new research problem.

The responsibility of the investigators to share data and publish their findings extends beyond the academic circles of their home country but to the nation where the research was carried out. In the case of Peru, local scholars are often marginalized when publications are in English and printed in North American journals or books that are generally inaccessible. Furthermore, sharing the fruits of discovery with local populations is imperative. Physical anthropology-archaeology collaboration must also provide for ultimate educational and museographic dissemination of results as well (Elera and Shimada 2006).

Overall, a holistic manner of investigative integration is rarely practiced, despite Buikstra’s (1977) call some 30 years ago. Shimada’s Sicán and Pachacamac
Archaeological Projects in Peru and Hodder’s ongoing excavations at Çatalhöyük in Turkey are two cases of field research where physical anthropologists and archaeologists work jointly in all phases of research design and implementation.

Another consideration involves graduate student curricula. Training in symbolic archaeology does not widely involve extensive crossover in empirical domains which can lead to provincialized thought and mistrust and misunderstanding of the interpretative power of numbers. Physical anthropologists on the other end of the spectrum may see ideas about agency or structural violence as soft fiction and impart the same to their pupils. If the bonds of such thinking are to be broken, the science/theory and empirical/symbolic divide must be constructively rethought. Fostering an atmosphere where this is possible is partially attainable with a strong four-field approach. Confronting the issue of compatibility of theory and practice is equally vital; volumes such as Goodman and Leatherman (1998b) could be required reading in biological anthropology courses.

**CONCLUSION**

The anthropological study of burials can open unprecedented windows on the human condition. One of the overarching themes in this chapter, especially regarding bioarchaeology, is context. Context is the catalyst of explanation. Much as Binford (1962) boldly declared that archaeology was anthropology or it was nothing, the same can be said here. Bioarchaeology has no real meaning outside of its context.
This chapter has introduced the three major approaches used in this work to understand the significance of burials and their contents: mortuary archaeology, bioarchaeology, and biodistance. Rather than being cast as divergent approaches, this chapter has pursued a contextually relevant synthesis between processual and postprocessual thinking and a theory of bioarchaeology. Biodistance analysis opens key vistas on population structures and historical processes of fundamental import to mortuary analysis and other elements of the bioarchaeological approach.

Bioarchaeology can close the widening theory/science and culture/biology divide. Incorporating mortuary archaeology in the broader endeavor is indeed part of our task, but not all of it. While written nearly a decade ago, concepts and theories on the bioanthropology of political economies presented by Goodman and Leatherman’s (1998b) can also lead the way. A genuine biocultural synthesis must see culture in biology. Goodman and Leatherman (1998a:19-20) state health is ultimately a product of an interwoven matrix of social relations (power) in which individuals interface with proximate environments and gain access to basic resources. The second layer links the first with more regional (or global) conditions. History represents the fulcrum between the first two layers and latter two: human agents actively construct their biocultural environments (real people in the past did real things that had real consequences). The keys to understanding are in ecology, ideology, society, and configurations of human biology. Over the next five chapters, these lines of evidence by which to interpret the significance of the postcontact burial and biology in Mórrope, Peru, will be assembled in detail, beginning with the ecology and environment of the Lambayeque Valley Complex.
CHAPTER 3

LAND AND CULTURE: HUMAN-ENVIRONMENT INTERPLAY IN THE LAMBAYEYQUE VALLEY COMPLEX, NORTHERN COASTAL PERU

The Lambayeque Valley Complex on the northern north coast of Peru was the setting of dynamic cultural developments which directly influenced the course of the final millennium and a half of autogenous Andean civilization and the outcomes of Spanish colonialism in the Andes. The trajectory, organization, and development of human societies spanning the pre-Hispanic and historic Lambayeque Valley emerged from a myriad of factors underscored by complex human-environment interactions.

As the natural world and environment pervade all physical and social existence (Bawden 1996:63), environment is a “prime mover” in shaping human experiences of political configurations, economic patterns, and relationships with the cosmos itself. Central to the aim of achieving a holistic vision of biocultural context, this chapter aims to present a thoughtful and detailed overview of environmental characteristics of the unique Lambayeque Valley Complex and its broader setting of the north coast of Peru.
CENTRAL ANDEAN ECOLOGICAL DIVERSITY

The Central Andes are among the most dynamic and diverse environments on Earth, shaped by three paramount factors: the Andes mountains, the Pacific Ocean, and latitude. The Andes mountain chain, which flanks the entire western coast of South America, is divided into three major regions. The southern boundary of the North Andes is traditionally drawn in far-northern Peru near Tumbes and Puira (e.g., Bennett 1948). The North Andes extends into Ecuador and Colombia as the mountains narrow, curving inland and eastward. Distance from the Pacific Ocean promotes significant rainfall and lush vegetation in the Northern Andes. South of Lake Titicaca, the South Andes turn westward and run north-south to the tips of Argentina and Chile; the high and unbroken peaks of the eastern cordillera remove moisture emanating from Amazonia and results in the arid *altiplano* plateau which extends south well beyond the tropic of Capricorn (Shimada 1994a:36). The Andes dominate physical reality of the landmass. Many of the majestic peaks feature permanent glaciers and snow cover.

Years of research by German and French geographers documented a variety of features that sets the Central Andes apart from other regions in South America and the rest of the world. The Central Andes (0 - 6,798 meters above sea level) are densely populated and cultivated unlike all other alpine regions, thanks to benefits derived from the equatorial latitude (from 5° to 17° south). As one ascends east from the arid coast 200 to 250 kilometers inland, rugged, treeless cis-Andean foothills and mountains, temperate intermontane basins, high-altitude grasslands, and imposing peaks are encountered. Descending along the eastern escarpments, completely different ecological zones are
encountered including humid tropical rainforests as high as 2,500 meters. Extraordinary environmental diversity results from horizontally compacted extreme elevation changes. On the precipitous eastern slope of the Andes, elevational difference as little as 30 meters may involve a different set of cultigens and farming techniques (Brush 1982).

Examining cis-Andean transects from the north to south coast of Peru show that on the northern north coast, foothills are lower and farther inland, while river valleys are less circumscribed by the mountains. The Andean slope is also far more gradual and mountains reach a maximum elevation of only 4,500 meters (Shimada 1994a:41). This feature of geography provides for the existence of low gradient coastal valleys like the Lambayeque region which is blessed with large perennial rivers that water thick fertile alluvia.

The interaction of the warm landmass with the cold Peru Current creates a narrow strip of desert coastline in the central Andes, regularly punctuated by over 40 arid river valleys containing mountain streams that run from the highlands and empty into the Pacific Ocean. Additional baseline characteristics include the widespread distribution of the indigenous llama and the unpredictable, often catastrophic environmental ‘quirks’ such as drought, earthquake, and El Niño-related torrential rainfall (Shimada 1994a: 36).

The broad generalization of Andean geography is useful to highlight overarching features of Central Andean physical reality, but still lacks a proper perception of microenvironmental variation, perhaps of greatest import to indigenous awareness and interaction with the natural world. The often cited concept “Three Worlds of the Andes,” (coast, highland, and jungle) oversimplifies the dynamic, flexible, and continuous
physical and cultural spectrum of human-environment interaction, territorial expansion, resource exploitation, and biocultural adaptation. Likewise, conceptions of the coastal valleys as a series of repetitive ecological units are entirely inaccurate.

Archaeologists historically aggravated these misperceptions via static, misleading, or erroneous interpretations of paleoenvironmental data often underscored by *a priori* assumptions that modern scientific data can be directly transposed to ancient environments and indigenous perceptions (see Craig [1984] for examples and cautions). Ultimately, knowledge concerning Andean ecological diversity remains basic; paleoenvironmental investigations in concert with ecologists and geologists need to be foundational to archaeological research programs.

**THE NORTH COAST OF PERU**

Most of the 2,400 kilometer-long Peruvian coastline could be described as a monotonous, treeless desert interrupted by lush, roughly triangular irrigated bottomlands watered by some 40 perennial rivers and pockets of *lomas* vegetation on mountain slopes between the valleys (Shimada 1994a: 43). The north coast of Peru includes 14 river valleys which run from the Andean piedmont in the east to the ocean in the west. Listed in order from north to south, they are the Olmos, Motupe, La Leche, Lambayeque, Reque, Zaña, Jequetepeque, Chicama, Moche, Virú, Chao, Santa, Nepeña, and Casma Valleys, which span over 400 linear kilometers of coastline (Figure 3.1). The boundaries of the north coast region are defined by the extensive Sechura Desert to the north and an
Figure 3.1: The north coast of Peru, highlighting valley locations and the north-south bi-partition. Based on a map courtesy of and by Izumi Shimada.
approximately 60 kilometer stretch of active sand dunes and mountains that abut the
Pacific coast just south of the Casma drainage.

During the late Pleistocene and early Holocene, paleoclimatic indicators reveal a
markedly different coastal environment than that of today: greater precipitation,
grasslands, and extensive scrub and tropical forests that supported the speciation and
radiation of Pleistocene herbivorous megafauna and camelids (Craig1985). The remnants
of a tropical rainforest habitat in the upper Zaña Valley adjacent to Hacienda Udima are
probably the only traces of a once extensive cis-Andean “life zone” established during
the more pluvial late Pleistocene (Craig 1985; Dillehay et al. 2004). However, with the
end of the most recent glacial maximum, the environment began to change radically and
the effects of de-glaciation were felt throughout the Andes and the Western Hemisphere.
One major change involved a coastward movement of the Antarctic Peruvian current
which initiated a process of desiccation and desertification. All indicators, such as
uninterrupted sequences of highly soluble guano deposits on offshore islands,
independently demonstrate steady-state conditions of a maritime desert in place since the
end of the last ice age (Craig 1985).

Land and Water

Today, the westernmost ecological zone of the north coast of Peru is a relatively
cool coastal desert which receives only a few millimeters of annual precipitation. The
heating of cool, damp ocean air as it passes over the warm landmass creates strong
afternoon sea breezes that move inland filling in convection lows. Coupled with a low
temperature gradient, the air increases its capacity to hold onto moisture until regional
trade wind patterns push cloud formations inland, and cooler temperatures at elevations
greater than 1,500 meters promote precipitation (Johnson 1976). The result of this
temperature inversion can leave the coast virtually rainless for years. The Lambayeque
Valley city of Chiclayo, for instance, sits at approximately at 6° 47’ south, receives
abundant year-round sunshine, features a mean annual temperature of 22°C (and can
reach as high as 35°C and as low as 10°C) and average humidity of 76 percent (Table
3.1) (Coronado 2004).

Yunga regions are present the upper reaches of the coastal valleys and extend up
to 2,500 meters. Regular seasonal rainfall in yunga zones and at higher altitudes is the
source of water for most of the coastal river valleys originate. These cis-Andean slopes
are noted for year-round sunshine and warmth (typically between 20°-27°C), valuable
cultigens such as highly valued fruits, peppers, and coca, and mineral resources
including copper, iron oxides, and silver (Shimada 1994a: 37). Archaeological evidence
points to the attractiveness of the yunga to both coastal and highland groups. Coeval
Moche, Recuay, and Cajamarca societies may have contested control of the region

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Table 3.1: Lambayeque Valley Meteorological Data, 2001. Estación Chiclayo, 6° 47’
South, 79° 50’ East, Altitude 27 m.s.n.m. Source: Ministerio de Agricultura del Peru.
(Shimada 1982; Topic and Topic 1983). The presence of Sicán and Chimú ceramics and north coast toponyms in the eastern north Peruvian *yunga* (e.g., Rostworoski 1985) signals north coast polities likely established a small number of colonies to cultivate their own maize and coca and other resources like timber, medicinal plants, and gold ore.

However, the paramount concern for control of the *yunga* was likely access to the principle intakes for the “mother” or “Maximum Elevation Canals” (MECs) which feed all downstream canals and determine the extent of irrigation in a coastal valley. The inland location of the MEC is fundamental to define where a coastal valley starts in the east, while the Pacific coast represents the western boundary. Northern and southern margins of a valley were likely demarcated by valley edges and major gravity-fed waterways such as canals (Netherly 1984). The principal reason for the control of the MECs was perhaps best stated by Kosok (1965:10): “irrigation has always been the *sine quo non* of agricultural production. Without it, life would be impossible. It is true at present – it was true in the past.”

Still, seasonal fluctuations in water persist despite human innovation. With rainfall greatest in the highlands during the southern hemisphere spring and summer the maximum discharge volumes of coastal rivers occur usually at the end of the wet season from March to April. Periodic rainfall on the coast during the wet season is also possible. The dry season generally falls during the winter (June thru September). The winter interlude is often the slack period of agricultural cycles. Little water reaches the coast and canal cleaning and repair phases are scheduled as they were in late pre-Hispanic and Colonial times (Netherly 1984).
The Pacific Ocean

The other central, interactive force shaping the north coast human societies is the Pacific Ocean. The Peru (or Humbolt) Current originates in the Antarctic and creeps just offshore flowing at just 0.3 knots. This generates stable temperatures resembling those further out to sea. While cool water temperatures contribute to desertification of the coast, the same coastal waters allow rich sources of marine life to flourish just offshore. Prevailing southerly winds shear off the surface waters creating a phenomena known as an “Ekmann Spiral,” where cold water, low in dissolved oxygen but high in nitrogen and phosphorous, can rise to the surface from depths of 300 meters (Cane 1986; Collins 1984). Constant upwelling of nutrient salt sustains a colossal population of phytoplankton serves as the foundation of an unparalleled ecological pyramid consisting of fish, shellfish, marine mammals, and birds. Both ancient and modern Peruvians have exploited this, one of the richest fishing grounds in the world. Moseley (1975) posited marine resources were fundamental to the development of Andean social complexity.

Anchovies gather by the billions near the ocean surface and are preyed on by world’s largest populations of cormorants (*Phalacrocorax bougainvilli*), boobies (*Sula varigata*), and pelicans (*Pelicanus thangus*) – while human over-fishing in the late 20th century led to a collapse in the industry (Idyll 1973). The feasting seabirds, which nest on offshore islands, also produce thousands of tons of guano annually, returning nitrogen and phosphorous to the sea. Offshore guano deposits as much as 150 meters in height have been intensely mined by pre-Hispanic, Colonial-era, and modern peoples as an excellent terrestrial fertilizer (Julien 1985). Emphasis on fish and guano resources have
long been at the forefront of many scholars’ characterizations of Andean maritime subsistence, though Masuda (1985) highlights the continuing perception of and major dietary emphasis placed on algae and seaweed by coastal Peruvians. Masuda also observes that many archaeologists tend to downplay marine resources following the emergence of agricultural societies, whereas marine resources continue to be foundational to present-day subsistence.

It is plausible that north coast populations such as the Mochica viewed the Pacific Ocean and the Andes mountains in terms of complementary opposites. Mountain worship was widespread in both the highlands and the coast. Mountain spirits were thought to control erratic but critical meteorological phenomenon such as rain (the ultimate source of the ocean) which agricultural fertility and the well-being of livestock were contingent upon (Reinhard 1985: 13). The Pacific Ocean, on the other hand, offered a stable year-round supply of resources, and judging from first millennium A.D. Moche ceramic art and fineline painting, the dualistic interplay between land and water probably extended to climate and cosmology as the key to life, water, and the dynamic forces of the universe (Bourget 2001a; Shimada 1994a: 38).

Bawden (1996:70-72) considers the tradition of monumental truncated adobe pyramids and platform mounds (or huacas) on the north coast as portraying mountain symbolisms. Platform mounds may have been literally conceived of as man-made mountains, capable of bringing the spiritual power of mountains into the human realm. The use of corporate symbolisms to decorate these structures would have helped legitimize politicians and priests, who atop these mountain-derived artificial entrances to
the supernatural world would have likely accessed a spiritual capacity to provide water, fertility, and other life-giving capacities on behalf of the people (Bawden 1996: 72). In other words, *huacas* were the interface between “the physical and the metaphysical aspects of human experience, equally sanctifying the landscape and its inhabitants and linking them in an interdependent relationship, at once tenuous and fundamental. The natural world in this relationship is culture” (Bawden 1996:65).

*Creative Responses to Environmental Constraints*

The north coast of Peru is a paradoxical setting, hostile to human life with a wide range of environmental constraints. It also contains a variety of natural resources, combined with human creativity, can support a remarkable demographic and economic potential. Many creative solutions to environmental pressures are pursued on local levels. While the perennial rivers of the north coast allow for large-scale irrigation agriculture, water is always scarce. Under pressure to make productive use of limited water, sunken gardens (also called *pukios, huachaques*, or *hoyas*) are widespread along the north coast and developed perhaps during Moche III (ca. A.D. 300-450) or earlier. *Pukios* are commonly situated outside irrigated areas in large excavated depressions or on the side of *quebradas* that takes advantage of high water tables, and as such, can be used for cultivation through the dry season. While reservoirs may have been in use during the Moche era, their small number and overall small size suggests less than widespread use and impact.
Some indigenous farmers will embark on risky floodplain cultivation, as practiced in the mid-La Leche Valley, to cultivate one crop per year (Shimada 1994a: 53). Following the disastrous 1982-83 El Niño rains, an immense freshwater lake formed in the Sechura Desert. Hyper-arid lands became massive pastures and just to the south, farmers in Mórrope (northwest Lambayeque Valley) gained a good harvest of maize, sweet potato, watermelon, and gourds using a pre-Hispanic short-term cultivation plot technique (Shimada 1994a: 52).

Sand dunes are used in the modern Jequetepeque Valley to bury sacks of rice and other grains for long-term storage and for protection against insects and rodents and may explain the general pre-Hispanic paucity of storage buildings (Eling 1987:165). Considering the high demand for wood fuel in craft production efforts, llama dung was used as an alternative fuel at the late Moche city of Pampa Grande and the Middle Sicán multi-craft workshop of Huaca Sialupe. Remains of hardwood fuels in excavated kilns and smelting furnaces included numerous small diameter branches indicating exploitation of branches over the entire tree (Goldstein 2007).

The above solutions were probably reasonably effective in coping with short term or locally focused resource stress. Yet, evidence of other adaptations to the environment comes to light at higher organizational levels. The pre-Hispanic parcialidad system of socioeconomic organization divided populations into occupationally specialized communities such as silversmiths, fishers, saltmakers, and potters (Ramírez 1982; Rostworoski 1975). In other words, community-level economic specialization seems to have been a mechanism to broaden the coastal resource base while stimulating greater
interregional economic interaction and interdependence (Shimada 1994a: 54). Kimura (1985) also notes the varying forms and roles of endogamy in Andean societies in the *puna* zones and coastal valleys, created economically self-sufficient units bounded by ties of social solidarity. On an even higher organizational plain, Schaedel (1985) considers that environmental variation played a deep role in the emergence of macro-level ethnic groups, or *etnías*, on both the coast and in the highlands.

One of the shared cornerstones of autonomous north coast civilizations was a distinct coastal or “horizontal” emphasis on resource procurement and economy envisioned by Shimada (1982). The contemporary study of cultural-environmental relationship in the pre-Hispanic Andes was born out of Murra’s (1972) influential concept of ‘verticality.’ Murra examined how South Central Andean highland cultures extended simultaneous control of multiple ecological or resource zones along ‘vertical’ or altitudinal gradients. This approach led to a consciousness among Andean archaeologists regarding the contribution of environmental conditions to particular economic, subsistence strategies, and socioeconomic organizations (Shimada 1982, 1999; Masuda et al. 1985).

On the pre-Hispanic north coast, complex societies such as the Moche, Sicán, and Chimú established economic and resource self-sufficiency not by verticality, but through a horizontal strategy, expanding political influence and hegemony along the coastline to exploit the widest variety terrestrial and marine resources and microenvironments as possible (Shimada 1982). Vertical expansion to procure of highland resources was negligible: the extent of exploitation into the Andean foothills penetrated *yunga* zones to
only about 1000 meters in altitude. This characterization does not mean that a coastal setting dictated a deterministic interaction with the natural world, but that the environment sets basic parameters in the continuous, dynamic interplay between humans and the physical world (Shimada 1985a: ix).

*Environmental Instability and Change*

The north coast of Peru is also subject to a variety of largely unpredictable and potentially catastrophic natural phenomena. The Andean cordillera is among the most actively evolving mountain chains on the earth, and the Andes are often struck by often severe tectonic activity. Earthquakes and volcanic eruptions result as the Nazca Oceanic Plate is subducted under the westward moving South American Plate resulting in accretive uplift. However, the potential impact of earthquakes can be gauged by the 1970 temblor that stuck rural northern Peru, instantaneously killing over 70,000 people in and around the town of Yungay by an ice- and mud flow (Eriksen et al. 1970). In 2007, a magnitude 7.9 earthquake devastated the south coast of Peru.

Earthquakes also have the potential of restricting, altering, or even cutting off canals and irrigation works. Archaeological evidence of prehistoric earthquakes may be visible in north coast MECs where simultaneous breaks are present at stress points where the MEC curves (Shimada 1981: 432). *Tsunamis*, or tidal waves secondary to tremors, appear to be less frequent. Archaeological evidence of *tsunamis* is very sparse (Bird et al. 1985) though in at least one historic example, an 1873 tidal wave carried an American warship three kilometers inland from its anchorage at Arica, Chile, where its remains still

Cumulative effects of much slower acting tectonic activity can bear even more significant consequences. Much of the Lambayeque Valley Complex is uplifted Pleistocene and Holocene seafloor, while many of the foothills and mountains to the east span Cretaceous to Precambrian geological deposits (Coronado 2004). While this pattern of uplift has characterized the building of the modern coastline for millennia, the tempo and locations of uplift events can be quite variable. Coinciding with Moche origins around the time of Christ, a major episode of uplift increased coastal elevation some three to six meters.

By A.D. 550, this specific uplift event led to the downcutting of Moche River and reduction of arable land as well as contributing to a major episode of El Niño-related flash flooding (Moseley and Deeds 1982). Conversely, such uplift did not transpire in the contemporaneous Lambayeque region. Also, the overall extent of modern cultivation on the north coast appears well below the pre-Hispanic maximum. Changes in ground slope leaving canal intakes stranded below their irrigation channels may be one primary factor (Moseley et al. 1983). Uplift also exposes once submerged sand beds which results in large sand sheets that blow inland and can gradually bury canals, fields, and settlements. While one indigenous technique encourages planting shrubs such as algarrobo and zapote to effectively stabilize smaller sand dunes, sand sheets are among the most formidable natural forces of all. The El Pur Pur formation, one of the largest active dunes
in the world, is located between the Moche and Virú Valleys. It is literally unstoppable as it continues to encroach on the Pan-American Highway (Kosok 1965: 66, Figure 12).

The most frequent environmental disturbance experienced on the north coast is the El Niño phenomenon, caused by a massive body of warm water (up to 31°C and low in mineral, dissolved oxygen, plankton, and saline concentrations) originating somewhere east or northeast of the Galapagos Islands and periodically invades southward into the cold Peru Current (Cane 1986). This phenomenon began ca. 3000 B.C. (Sandweiss et al 1996, 1997), and is referred to as El Niño, as it commonly appears around Christmas. It is only partially understood but is a component of a highly complex, circum-Pacific interaction between ocean currents and air masses. El Niño occurs irregularly and can vary greatly in intensity. The north coast is the first region to feel the direct and most intense effects of the phenomenon. Devastating events unfold once or twice per century or once every several centuries corresponding to global climatic shifts to drier or wetter periods. The two “mega” El Niño events seem now to date close to A.D. 500 and 1050.

During an El Niño event, reduced winds help form deep convective cells offshore which move inland. Intense rain and thunderstorms over the coast and adjacent highlands produce torrential downpours and catastrophic flooding. During the 1925 El Niño, the city of Trujillo received 394.4 mm of rain in March of that year, 226 mm of the total in just three days (Nials et al. 1979). The Chancay River in the Lambayeque Valley carried an estimated 2.25 billion cubic meters of water from March to April 1925. The Reque and La Leche rivers eclipsed their critical threshold and jumped their banks to follow a new course during the El Niños of 1925 and 1100, respectively (Shimada 1994a: 48).
Severe El Niño flooding can obviously disrupt or destroy agricultural production creating potential subsistence stress. Also, massive quantities of sand and sediment are deposited at the mouths of the coastal rivers following the floods. These deposits may later result in new sand sheets driven inland by local winds to bury irrigation canals and field systems. Marine subsistence resources are also highly susceptible to disruption. The rise in ocean temperature results in massive fish kills. As a result of the combined effects of the El Niño phenomenon on the north coast of Peru, local leadership can be severely tested. Supercommunal efforts are often required to repair irrigation canals and rebuild other damaged critical infrastructure. Following the devastating 1578 El Niño multiple communities helped restore the canal supplying drinking water to Ferreñafe following a year of intensive labor (Shimada 1994a: 48-49).

However, it is inaccurate to envision El Niño events as being wholly destabilizing to society and subsistence. For example, warm-water marine species fill in vacant ecological niches in coastal waters as new dietary choices emerge. During the El Niño of 1983, residents of Lima were treated to an overabundance of rare scallops and octopus while in the Lambayeque Valley town of Pimentel, tropical fish and shrimp were caught (Caviedes 2001). After initial distress of fish kills and resource shortfalls, dietary relief and even culinary adventure may result (Shimada 1994a: 49).
THE LAMBAYEQUE VALLEY COMPLEX

The Lambayeque Valley Complex is a unique setting on the Peruvian coast. Unlike its neighbors to the south, the Lambayeque Valley Complex is composed of five constituent river valley systems – from north to south, the Motupe, La Leche, Lambayeque, Reque, and Zaña – integrated into a single intervalley irrigation network during the Moche era (Figure 3.2). Broadly speaking, the region is transitional between the narrow circumscribed valleys to the south and the deserts to the north. The topography of the Lambayeque Complex is dominated by a triangular pediplain delimited by two branches of the Cordillera Occidental; one branch runs roughly northeast-southwest north of Chongoyape and Pátapo where it abruptly inflects towards the La Leche drainage, while the relatively unbroken southern branch runs from the highlands to Cerro de Reque (Shimada 1976:24). The Lambayeque complex is ideal for extensive irrigation agriculture, and the interconnected La Leche-Lambayeque plain alone offers some 136,000 hectares of arable land. During the region’s cultural apogee from about A.D. 1000-1375, Kosok (1959, 1965) estimated the Lambayeque Valley Complex contained one-third of the entire human population and one third of the total amount of arable land of the entire Peruvian coast.

Nearly eighty years ago, Kroeber (1930:55-57) perceived that on the southern north coast, valleys are well-separated by extensive expanses of mountains and desert. Within the Lambayeque Valley Complex, the lower La Leche Valley merges imperceptibly into the Lambayeque Valley, which likewise merges with the Reque
Figure 3.2: The Lambayeque Valley Complex. Redrawn by Haagen Klaus from Shimada (1994a:58, Figure 3.15) and based on an unpublished map by Paul Kosok in the possession of the late Richard P. Schaedel.
drainage. As the mountains recede 50 kilometers or more inland, cultivation on the southern north coast is found further and further from the sea. The Lambayeque and Reque Rivers, the Taymi Canal which links into the lower La Leche system, and the Collique-Zaña Valley canal connectors all flow from a primary MEC some 50 kilometers inland (compared to the Moche Valley MEC, 18 kilometers inland).

Microenvironments in the Lambayeque Region

The Lambayeque Valley Complex cannot be seen as a homogenous setting as is all too often perceived. It contains a range of microenvironments, ranging from coastal deserts, forests, expansive cultivated plains, pastures, and arid pampas nestled among Andean foothills and larger inland mountains (Shimada 1976) (Figure 3.3; Table 3.2). First, a relatively treeless littoral zone encompasses a narrow stretch of shore which is quite variable itself: the shore near Morro de Eten is narrow and rocky, while in areas like the Caleta de San José, Santa Rosa, and Pimentel the beach is wide and sandy. The fisherman of the traditional villages of San José and Santa Rosa in particular use the small caballito boats fashioned from reed bundles and are essentially identical to those in first millennium Moche art. Near the mouth of the Reque River near Puerto Eten, a unique lagoon-marsh microenvironment supports a wide range of littoral flora and fauna and is probably amenable to pukio cultivation (Shimada 1976: 27-28). Most littoral zone populations are engaged in a maritime fishing economy, though it must be noted that beyond fish, mollusks and sea mammals (seals) are hunted. Salt is also a major product of the littoral zone (Shimada 1976:28). East of the littoral zone, coastal desert is found. This
Figure 3.3: Microenvironments in the Lambayeque Valley Complex:
A. Open desert of the Pampa de Reque (Photo: Haagen Klaus).
B. The littoral zone at Puerto Eten (Photo: Haagen Klaus).
C. Semi-tropical forest in the mid-La Leche Valley (Poma National Historic Sanctuary) (Photo: Haagen Klaus).
D. Monte zone scrub vegetation, southeast margin of Mórrope (Photo: Haagen Klaus).
E. Cultivated land on the outskirts of Pátapo (Photo: José Pinilla).
F. Interior of the Poma Forest, featuring small, recently dug irrigation canal (Photo: José Pinilla).
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</table>

Table 3.2: Land surface and use, Department of Lambayeque, 1994. Source: Instituto Nacional de Estadística e Informática del Perú.

The coastal desert zone is characterized by active and semi-stabilized sand dunes reaching some 10 to 20 kilometers inland, north and west of the city of Lambayeque (including Mórrope) and the extensive undulating sands between Reque and Mocupe in the Zaña drainage. In the 1970s, years of irrigation water shortages triggered invasion of active sands dunes into cultivation fields around Mórrope (Shimada 1976: 29). Coastal desert vegetation is sparse, but includes low shrubs, grasses, vine-like rhizomous plants, and *Tillandsia*, an epiphytic plant that extracts moisture from the air (Shimada 1976:29). Due to uplift (elevations range from five to 100 meters ASL) and resultant poor drainage, the coastal desert zone between Ferreñafe and Mórrope is highly saline and silted-in and has created deposits of clay, salt, and gypsum. Cultivation in the coastal desert zone is very minimal: Mórrope is the last locality to receive water from the La Leche River and water is always scarce. When sufficient water is available every six to seven years, corn and alfalfa are grown while cotton is the primary crop during the dry years (Bachmann 1921: 141).

The *monte* zone is a local designation referring to scrub growth of *algarrobo* (*Prospis chilensis, juliflora, and limensis*) (Willey 1953:17), *faique* (*Acacia*
macracantha), vichayo (Capparis ovalifolia), zapote (Capparais angulata) and palo verde (Parkinsonia aculeata) trees. The monte zone is thought to most closely resemble indigenous coverage but the clustered spatial distribution has been shaped by the impact of cultivation and cutting since the pre-Hispanic era.

Algarrobo trees are a major resource which bears large, edible sweet fruits (also used to produce the alcoholic beverage algarrobina), and has been employed as fodder for livestock. Algarrobo trees are the principle source of firewood, charcoal fuel, and non-adobe construction material. Shimada (1976: 34) states the monte zone experienced cycles of contraction and expansion, and may have reached its historical minimum extent during maximum cultivation during the Chimú era. Following Inka conquest, a rebound probably transpired as parts of the valley fell into disuse, but by the Colonial era, pressure was again put on the monte zone as it was exploited for animal feed and reduced by intensive sugar cane production and ever-growing demand for firewood as far south as Lima.

In the central La Leche drainage, an extensive semi-tropical forest arises from the desert forming the Poma Forest National Historic Sanctuary. The Poma Forest is densely inhabited by hundreds of species of birds such as parrots (Aratinga wagleri), anteaters (Tamandua sp.) pumas (Felis concolor), iguanas (Iguana iguana), boa constrictors (Constrictor constrictor), squirrels (Sciurus staminaus), foxes (Dusicyon sechurae), varieties of scorpions (e.g., Hadruroides lunates), wasps, bees, and spiders including tarantulas (e.g., Arycope sp., Loxoscles laeta) (Fernández 2004:8-14; Suárez 1985:37-48; also Shimada 1982). In the upper reaches of the La Leche Valley, the forests of Colán
and Chaparri are composed primarily of *espingo* trees which serve as extensive habitats for white-tailed deer (*Odocoileus virginianus*) spectacled bears (*Tremarctos ornatus*), peccaries (*Tayassu tajacu*), and pumas.

Riverine microenvironments also play a major role in the Lambayeque Valley Complex. The riverine zone involves the narrow strips of continuously forming rich alluvial floodplains and terraces that are themselves remnants of older floodplains now being incised by the rivers that originally formed them (Shimada 1976: 36). These zones can vary in size but generally are no wider than two kilometers. The Chancay River is the name of the natural river that merges with the Cumbil River (also known as the Maichil or Llonquinua River) some 15 kilometers east of Chongoyape and flows to La Puntilla where it bifurcates into the Reque river and the Taymi Canal. The Lambayeque River, which today branches off the Taymi near its origin, serves as the primary irrigation canal in the valley and was likely its natural drainage before human modifications. The amount of water passing through the zone is dependent on the time of year, and assuming normal rainfall, the Chancay River may discharge 150 to 250 million cubic meters of water during the rainy season as the riverine zone is temporarily inundated and enriched (Shimada 1976: 38). Riverine zones provide large cane (*Caña brava*), sand and gravel for construction purposes, freshwater fish, mollusks, and even large crayfish.

Riverine microenvironments spring up in irrigation canals many kilometers from the rivers themselves, such as along the various drains and ditches between Ferreñafe and Lambayeque which support a wide range of flora and fauna including ducks, shorebirds, and foxes. Intentional planting and cultivation of a variety of tropical fruit trees is also
practiced along the drains and may include banana, papaya, mango, plum, *chirimoya*, and *guava* (Shimada 1976: 41).

Special note must be paid to the irrigation systems of the Lambayeque Valley Complex (Figure 3.4). Shimada (1976, 1994a) emphasized the dynamic nature of these canals. Present irrigation systems cannot be assumed as close analogs to pre-Hispanic or Colonial networks. Five major canals compose the Lambayeque inter-valley irrigation network that brings water from the Chancay river into the La Leche and Zaña Valleys. These include the partially superimposed Racarumi I and II networks irrigating the Chongoyape basin and the Pampa de Chaparri, respectively (Shimada 1976: 66). Racarumi II was likely a later Chimú-era project, and was destroyed by floods in 1647. The Collique inter-valley canals brought water to the Zaña Valley possibly first during Moche times, and by the Chimú period, Zaña waters were directed into the Jequetepeque Valley. In other words, the waters from the Lambayeque Valley at one time irrigated three valleys, two of which irrigated two adjacent valleys, and the resultant massive five-valley hydrological system became the largest of its kind in the New World (Kosok 1965:147). The Taymi Canal is however, the most well-known of the Lambayeque Valley canals and was probably constructed during Moche IV or V and was expanded during the Middle Sicán (Tschauner 2001). It originates at the valley neck and heads north-northwest toward the La Leche Valley. The present canal closely corresponds to its earlier Colonial incarnations, but Shimada’s (1976:73-76) examination of historic documents reveals extensive changes including persistent modifications made by the settlers of Ferreñafe to maximize their tenuous access to water.
Figure 3.4: The extent of modern irrigation networks in the Lambayeque Valley Complex. The colonial-era tripartite division of cultivated lands can still be made out. Based on a map by Izumi Shimada (1994a: 39, Figure 3.1).

The Lambayeque River itself represents another major canal. The pre-Hispanic name of the river was recorded by Cabello (1586 [1951]:327) as Faquisllanga. Today, it provides water to the Valle Viejo (see below) in and around Chiclayo and Lambayeque. Though the 1925 floods destroyed the La Puntilla water diversion system, the Lambayeque River continued to flow along its old pluvial channel, and is highly probable that it presently contains less water than in previous eras (Rondon 1970; Shimada 1976: 9). The Lemep canal, which once branched off upstream of the Taymi canal, was the primary source of water for Monsefú, Reque, and Eten (Portugal 1966 27-8).
It is also useful to introduce the features of the valley bottoms as it relates to settlement and economy. The A-zone of the *Valle Viejo* (Old or Lower Valley) corresponds roughly to what Ramírez (1974) regards as the roughly triangular region east of Chiclayo – the prime alluvial land intensely exploited by historical sugar cane estates. The B-zone of the *Valle Viejo* covers the alluvial lands west of Chiclayo delimited by coastal desert and littoral zones. Ramírez (1974) adds the *Valle Nuevo*, an extension of the broad coastal floodplain north of Chiclayo. During the colonial period, *haciendas* occupied the prime land of the *Valle Viejo* while indigenous Mochica populated the other two zones, creating conditions of differential access to water, soils, and other resources (Kosok 1965: 151). In the B-zone of the *Valle Viejo*, small-scale but highly diversified agriculture is practiced by small individual land-holding farmers, yet a cash crop orientation is very evident; in the late 20th century, nearly 20,000 hectares of land in the *Valle Bajo* and *Nuevo* have been dedicated exclusively to sugarcane and rice production (Shimada 1976: 43-44).

The final microenvironment in the Lambayeque Valley Complex examined here are the valley flanks. This zone represents the transition between the fertile bottomlands and the Andean foothills. Such marginal lands actually appear to have been the primary focus of pre-Hispanic settlement. The flanks are generally sloping, barren surfaces overlain by gravel, boulders, and sand and are populated by a variety of dispersed subtropical trees and scrub. The latter promotes the use of the flank zone as the active scene of livestock herding. Vegetation is rarely permitted to reach its natural maximum due to human-animal activity (Shimada 1976: 54, 62).
The major *quebradas* (canyons) of the Lambayeque region are found among the flanks in the southern and eastern margins of the valley. Quebrada Montería, for example, originates near Chongoyape and extends east for some 20 kilometers to serve as the primary natural connector between the Lambayeque region and the upper Zaña Valley. The large pediplain of the Pampa de Chaparrí (currently uncultivated and completely depopulated) is the route from the middle Lambayeque Valley to the middle La Leche Valley to the north.

As a concluding point, Schaedel’s (1985) concept of pre-Hispanic Andean *etnías*, or ethnic groups, is closely linked to environmental variation and local cultural adaptation to such conditions. It is highly constructive to consider as Schaedel did that in late pre-Hispanic times and early Colonial times, the Lambayeque Valley Complex appears have been organized and divided into at least seven ethnic-political units (probably *parcialidades*) composed of the Reque, Eten-Monsefú, Patapo or Cinto, Collique, Ferreñafe, Lambayeque, and Chongoyape polities, while to the north La Leche polities included Jayanca, Túcume, and possibly Mochumí. Each of these polities inhabited distinct but complementary microenvironments.

**Resources and Subsistence**

Resources often attributed to the Andean highlands and Amazonia – camelids, colorful feathers, *espingo* seeds, arsenic-bearing ores, and even gold – are present in the past and modern Lambayeque region (Shimada 1994a: 43). The primary exception are camelids which were eliminated during the Colonial era. Except when species-
specific information is known, the term camelid is used as it is virtually impossible to
distinguish between domesticated llamas \([Lama\ glama]\) and alpacas \([Lama\ pacos]\) based
on skeletal morphology). At Cerro Morro de Eten, gold appears to have been mined from
a deposit on the eastern side of the summit. Copper ores, aresenopyrite, and scorodite
were locally mined (Merkel and Shimada 1988). Pre-Hispanic copper mines such as
Barranco Colorado in the La Leche Valley remain conspicuous today (Shimada 1994a:
Figure 3.8). In the northwestern Lambayeque Valley Complex, deposits of plaster and
salt have been mined intensively through the pre-Hispanic to colonial eras.

Despite potentially stressful environmental constraints and disturbances,
arkeologically documented pre-Hispanic subsistence patterns appear to reflect the self-
sufficient and persistent horizontal approach to resource exploitation from at least ca.
1300 B.C. Test pit excavations by Melody Shimada at Cupisnique-period Cholope (ca.
1300-600 B.C.) in the Poma National Historic Sanctuary revealed an already established
and extensive pattern of marine resource consumption including \(Donax\) shells, other
gastropods, and a range of anchovy and sardine-sized fish. Terrestrial mammals were
represented by camelid, guinea pig, dog, lizard, and mouse remains. Plant remains were
relatively scarce probably due to differential formation processes, but included squash,
corn, common beans, and cotton (Shimada 1982: 144-147). The principle pre-Hispanic
crop – corn – is today acknowledged as being deficient in production; the colonial
transformation of the Lambayeque Valley into a sugarcane producing region lent the
region a mono-cultural overtone (Shimada 1976: 49-51). Likewise, intense Late pre-
Hispanic and Early Colonial production of cotton has since ceased.
Excavation of refuse and other secondary deposits at Moche V Pampa Grande and Huaca del Pueblo Batán Grande (HPBG) recovered dietary remains included *zapote*, squash, corn, avocado, beans, peanut, guava, *lúcuma*, and chili peppers. The range of animal remains also diversifies to include white-tailed deer, fox, lizards, and includes marine fauna such as seals, jack-ass penguins, hammerhead sharks, and rays (Shimada 1982: Tables 5 and 6).

As demonstrated in Tables 3.3 and 3.4, available paleobotanical and zooarchaeological data on coastal Lambayeque Valley Complex foodways reveals a primary, complementary focus on consumption of terrestrial and marine coastal foods. Such relates well to the horizontal model of resource acquisition and environmental constraints. Late Moche and Sicán period populations essentially intensified the basic dietary pattern established at least a millennium earlier. While marine resources were intensely exploited throughout time, by the late Moche and Sicán period the economic importance of domesticated llamas probably became paramount and functioned as the primary source of protein for Lambayeque populations (Shimada 1982:184).

As discussed in the next chapter, Chimú and Inka conquest likely had little effect on subsistence economies in the Lambayeque region, though *production* of food was clearly intensified for redistribution into the imperial economies. Following Spanish conquest, Europeans quickly recognized the favorable conditions of the north coast: mild temperatures, a relatively sunny climate, potential for seaports, large tracts of arable land, and an indigenous population accustomed to working under a system of labor tribute (Ramírez 1985). Major landscape transformations began under the *hacienda* and estate
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<td>(chirimoya)</td>
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<td>(vichayo)</td>
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<td><em>Erythroxylon coca</em></td>
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<td>(coca)</td>
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<td>(cotton)</td>
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<td><em>Gyneryum sagittatum</em></td>
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<td>(cane)</td>
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<td>(pacae)</td>
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<td>(gourd)</td>
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<td><em>Lucuma bifera</em></td>
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<td>(lúcuma)</td>
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<td><em>Persia americana</em></td>
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<td>(avocado)</td>
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<td><em>Phaseolus vulgaris</em></td>
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<td>(common bean)</td>
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<td><em>Prosopis chilensis</em></td>
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<td>(algarrabo)</td>
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<td><em>Psidium guajava</em></td>
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<td>(guava)</td>
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<td><em>Zea maize</em></td>
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<tr>
<td>(corn)</td>
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Table 3.3: Paleobotanical evidence of plant exploitation in the pre-Hispanic Lambayeque Valley Complex. Zaña Valley data are taken from Dillehay et al. (2004); complete list of Sapamé, Cholope, and Pampa Grande data in Shimada (1982). The Huaca Sialupe data are only a partial list of subsistence remains identified by Goldstein (2007) which include over 75 diverse taxa recovered archaeologically in 2001 and identified by subsequent ethnographic study.
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<td><strong>Mammal/Reptile</strong></td>
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<tr>
<td><em>Bufo marinus/ blombergi</em> (toad)</td>
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<td><em>Canis familiaris</em> (domestic dog)</td>
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<td><em>Cavia porcellus</em> (guinea pig)</td>
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<td><em>Constrictor constrictor</em> (boa constrictor)</td>
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<tr>
<td><em>Cricetidae</em> (rat)</td>
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<tr>
<td><em>Dama virginianus</em> (white-tailed deer)</td>
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<td><em>Dicrodon guttulatum</em> (lizard)</td>
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<td><em>Didelphidae</em> sp. (oppossum)</td>
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<td><em>Dusicyon</em> sp. (fox)</td>
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<td><em>Lagudium peruanum</em> (chinchilla)</td>
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<td><em>Otariidae or Phocidae</em> (seal)</td>
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<td><em>Ranidae</em> (toad)</td>
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<td><strong>Birds</strong></td>
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<td><em>Anatidae</em> (duck)</td>
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<td><em>Cathartidae</em> (black vulture)</td>
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<td><em>Columbidae</em> (dove)</td>
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<td><em>Phalacrocorax</em> sp. (comorant)</td>
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<td><em>Sphenistidae</em> (jack-ass penguin)</td>
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<td><strong>Fish</strong></td>
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<td><em>Carangidae</em> (pampano)</td>
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<td><em>Carcharhinidae</em> (requiem shark)</td>
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<td><em>Cupeida</em> (sardine)</td>
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<td><em>Mugilidae</em> (mullet)</td>
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<td><em>Myliobatidae</em> (ray)</td>
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<td><em>Pomadasyidae</em> (grunt)</td>
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<td><em>Rhinobatidae</em> (angel shark)</td>
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<td><em>Sardinops</em> sp. (herring)</td>
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Table 3.4 Zooarchaeological evidence of pre-Hispanic faunal exploitation, Lambayeque Valley Complex, adapted from Shimada (1982).
Table 3.4 continued

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<td>Syluriformes (sleepers)</td>
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<tr>
<td><em>Spondylus princes</em> (thorny oyster)</td>
<td></td>
<td></td>
<td>◆</td>
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</tr>
<tr>
<td><em>Thaididae</em> (dog winkle)</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td><em>Tegula</em> sp. (Tegula top shell)</td>
<td></td>
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<td>◆</td>
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</tr>
<tr>
<td><em>Turbo</em> sp. (turban shell)</td>
<td>●</td>
<td></td>
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</tr>
<tr>
<td><em>Scutalus</em> sp. (land snail)</td>
<td>●</td>
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<td>●</td>
</tr>
<tr>
<td><em>Planorbidae</em> (pond snail)</td>
<td></td>
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<td>●</td>
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</tbody>
</table>
systems of land tenure, particularly with conversion of the Lambayeque Valley into massive sugar cane estates.

Not surprisingly, contemporary Lambayeque remains highly productive and produces between 20 to 40 percent of the nation’s annual agricultural output of sugar cane, rice, and sorghum (Coronado 2004:34). Over 60 cultigens are produced in the region, and while seeming diverse, agribusiness is dominated by sugar cane and rice production (Tables 3.5 and 3.6). Such emphasis is reflective of a major shift in cultigen production since European colonization, especially in the introduction of foreign crops such as sugar cane, rice, and soy.

Current agropastoral output is mostly aimed at foreign export, cultigens prepared in the industrial-scale rice processing molinos on the Pan-American Highway between the cities of Chiclayo and Lambayeque or the sugar cane processing plants elsewhere in the region. Some local food production does contribute to local subsistence needs. In more rural and traditional communities, such as La Zaranda or Poma III in the mid-La Leche Valley, it is not uncommon to find smaller agricultural chacras and animal husbandry (ranging from fowl, goats, and even honey bees) that simultaneously produce comestibles for household-level consumption as well food that can be periodically sold at local markets.

Perhaps the most profound historic changes involved indigenous perceptions of the landscape itself. The Spanish aimed to sever traditional cosmological and social links between the people and the land to accomplish several political, economic, and religious
<table>
<thead>
<tr>
<th>Rank</th>
<th>Cultigen</th>
<th>Total Tonnage Produced</th>
<th>Rank</th>
<th>Cultigen</th>
<th>Total Tonnage Produced</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Sugar Cane</td>
<td>1,898,500.0</td>
<td>35</td>
<td>Plums</td>
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<td>2</td>
<td>Rice (arroz cascara)</td>
<td>289,385.0</td>
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<tr>
<td>3</td>
<td>Alfalfa</td>
<td>112,582.0</td>
<td>37</td>
<td>Aji</td>
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<td>Corn (Maize amarillo)</td>
<td>85,124.0</td>
<td>38</td>
<td>Coffee</td>
<td>465.0</td>
</tr>
<tr>
<td>5</td>
<td>Lemon</td>
<td>50,728.0</td>
<td>39</td>
<td>Asparagus</td>
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<td>6</td>
<td>Cotton</td>
<td>21,950.0</td>
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<td>Chinese Onions</td>
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<td>Corn (Maize Choclo)</td>
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<td>Camote</td>
<td>18,946.0</td>
<td>42</td>
<td>Chrimoya</td>
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<tr>
<td>9</td>
<td>Mango</td>
<td>18,897.0</td>
<td>43</td>
<td>Cilantro</td>
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</tr>
<tr>
<td>10</td>
<td>Corn (Maize Chala)</td>
<td>12,151.0</td>
<td>44</td>
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<td>11</td>
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<td>45</td>
<td>Grapefruit</td>
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<td>46</td>
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<td>13</td>
<td>Corn (Maize Amilaceo)</td>
<td>5,738.0</td>
<td>47</td>
<td>Passion Fruit</td>
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<td>14</td>
<td>Beans (Frijol Caupi)</td>
<td>5,707.0</td>
<td>48</td>
<td>Sweet Lemon</td>
<td>121.0</td>
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<tr>
<td>15</td>
<td>Maracuya</td>
<td>5,352.0</td>
<td>49</td>
<td>Lúcuma</td>
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<td>16</td>
<td>Beans (Grano Verde)</td>
<td>5,097.0</td>
<td>50</td>
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<td>17</td>
<td>Various Grains</td>
<td>4,597.0</td>
<td>51</td>
<td>Melons</td>
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</tr>
<tr>
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<td>Onions</td>
<td>4,545.0</td>
<td>52</td>
<td>Red Apples</td>
<td>47.0</td>
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<td>19</td>
<td>Tomato</td>
<td>4,266.0</td>
<td>53</td>
<td>Coconut</td>
<td>37.0</td>
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<td>20</td>
<td>Oranges</td>
<td>3,448.0</td>
<td>54</td>
<td>Kiwicha</td>
<td>36.0</td>
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<tr>
<td>21</td>
<td>Pumpkin</td>
<td>2,824.0</td>
<td>55</td>
<td>Beans (Grano Seco)</td>
<td>34.0</td>
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<tr>
<td>22</td>
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<td>2,780.0</td>
<td>56</td>
<td>Guanabano</td>
<td>32.0</td>
</tr>
<tr>
<td>23</td>
<td>Marigold</td>
<td>2,240.0</td>
<td>57</td>
<td>Peaches</td>
<td>28.0</td>
</tr>
<tr>
<td>24</td>
<td>Cabbage</td>
<td>2,086.0</td>
<td>58</td>
<td>Dashes</td>
<td>23.5</td>
</tr>
<tr>
<td>25</td>
<td>Bananas</td>
<td>1,680.0</td>
<td>59</td>
<td>Aji Panca</td>
<td>23.0</td>
</tr>
<tr>
<td>26</td>
<td>Wheat</td>
<td>1,364.0</td>
<td>60</td>
<td>Cherries</td>
<td>20.0</td>
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<tr>
<td>27</td>
<td>Guava</td>
<td>1,346.0</td>
<td>61</td>
<td>Granado</td>
<td>15.0</td>
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<tr>
<td>28</td>
<td>Paprika</td>
<td>1,186.0</td>
<td>62</td>
<td>Nispero</td>
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</tr>
<tr>
<td>29</td>
<td>Carrots</td>
<td>1,086.0</td>
<td>63</td>
<td>Cacao</td>
<td>14.0</td>
</tr>
<tr>
<td>30</td>
<td>Sorghum</td>
<td>1,008.0</td>
<td>64</td>
<td>Pears</td>
<td>13.0</td>
</tr>
<tr>
<td>31</td>
<td>Corn (Maize Morado)</td>
<td>784.0</td>
<td>65</td>
<td>Guyabo</td>
<td>6.0</td>
</tr>
<tr>
<td>32</td>
<td>Betarraga</td>
<td>739.0</td>
<td>66</td>
<td>Figs</td>
<td>6.0</td>
</tr>
<tr>
<td>33</td>
<td>Lettuce</td>
<td>674.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Olluco</td>
<td>623.0</td>
<td></td>
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</tbody>
</table>

Table 3.5: Department of Lambayeque Agricultural Production, September 2005 to December 2006. Source: Minesterio de Agricultura del Perú.

goals. As a result, modern indigenous Peruvians especially perceive of the land in a manner very different than their pre-Hispanic ancestors. In some ways, a disconnection from the land seems to exist for many, beyond articulating with a domain of economic production. Indeed, modern indigenous perceptions are extraordinarily dynamic, historically contingent constructions and cannot be done justice here but are an ideal subject for future ethnographic study.

**The North Coast Geographic and Cultural Bipartition**

At least for most of the Christian era, an oscillating relationship involving cultural interaction, territorial expansion, and human-environment interplay existed between the northern and southern zones (Castillo and Donnan 1994a; Shimada 1994a, b). In closing this exposition of the natural setting, it is imperative to introduce the concept of the geographic and cultural bipartition of the north coast into a northern zone (largely represented by the Lambayeque Valley Complex) and a southern zone (extending from the Chicama/Moche Valley complex to the Casma Valley). The Jequetepeque Valley 106
appears as something of a transitional zone, a dynamic crossroads in contact with both
the northern and southern zones as well as highland Cajamarca.

Exactly when, where, and why this bipartition emerged remains to be adequately
studied. The northern north coast and southern north coast may never have been
sociopolitically homogenous, perhaps underwritten by fundamentally different human-
geographic interactions. Returning again to Kroeber’s (1930) early observations,
physiogeographically-based, differential access to resources including arable land and
water may also be very worthwhile considering as underlying causes. The northern north
coast is by far unique with the Lambayeque Valley Complex as the largest arable space in
the entire coast. Divergences also may have been formally initiated by regional
Cupisnique tribes or chiefdoms or during the following Salinar or Gallinazo cultures,
perhaps among prestige of ceremonial-civic centers, or other factors we do not yet
understand that gave rise to this dynamic competitive interaction.

Several colonial sources indicate the inhabitants of the northern coast were all so-
called Yunga speakers, but the northern zone inhabitants spoke the distinct Muchik
dialect, whereas Quingnam was found south of the Chicama Valley inclusive (Kroeber
1930; Rivet 1949). Multiple other cultural features, such as the northern zone predilection
to construct monumental platforms in the open instead of against the summits of hills and
divergent art and architectural styles also highlight some of these contrasts. Further
evidence for this fundamentally significant cultural, sociopolitical, and historical pattern
will be discussed in depth in the next chapter.
CONCLUSION

As Shimada (1985a:xi) states, “Central Andean civilization as a whole represents the culmination of complex and continuous interplay, a creative dynamism, of natural and cultural factors that, taken together, are without parallel.” Throughout this chapter, the theme of human-environment interactions on Andean, north coast, and coastal river valley scales have been explored. Over the last several decades, geographic, environmental, and archaeological studies of the Andean setting and human interactions with and adaptations to these diverse conditions have begun to shed light on the profound relevance of the environment. Bioarchaeological study requires an attendant depth of rigorously contextualized regional, diachronic, and cultural perspectives of human-environment dynamism. Unfortunately, in most bioarchaeological studies of the Andes, contexts of environment and ecology are given only rather cursory attention.

Significant inroads in Andean environmental studies have been made since the 1970s, including concepts of “verticality,” “horizontality,” and paleoenvironmental reconstructions. Overall awareness continues to grow of the complexity and extent of Andean ecological temporal and spatial variability, including those changes instigated by human activity. Yet, Shimada’s (1984a) comments still ring true today: in many cases, archaeological understandings often lack necessary specificity (such as subsistence versus non-subsistence resources, raw materials versus processed goods, seasonal versus perennial resources, manpower versus material goods, and so forth). Exactly how different political economies perceived of, extracted, processed, and redistributed materials – especially non-subsistence items under different environmental and
microenvironmental contexts – is still unresolved. Unfortunately, only cursory attention is paid to the environment in most Andean bioarchaeological research, if at all. Perhaps the most unexplored perspective on Andean human-environment dynamism is that of human biology itself, which we begin to investigate in this work.

In other words, a bioarchaeological understanding of environment can and should incorporate Salomon’s (1985: 527) vision of “an authentic description of [environment can arise] from a complementarity inherent in our science: the meeting between ecological thought and the interpretation of symbolic systems. Capturing the interplay between biosystem and system of cultural meanings – always problematic, never easy or axiomatic – will lead to an anthropological synthesis in the full sense of the word.”
CHAPTER 4

BEFORE CONQUEST: PRE-HISPANIC CULTURAL DEVELOPMENTS AND
THE MOCHICA ETHNIC GROUP IN THE LAMBAYEQUE REGION

The cultures of Central Andean prehistory have been scientifically studied for over a century, uncovering evidence of ancient technological, political, and historical developments unique in the New World. At the same time, current knowledge is far from being complete, holistic, or balanced. As the next step in the contextualization of late pre-Hispanic and Colonial Lambayeque Valley biohistory, this chapter provides a detailed overview of principle pre-Hispanic cultural developments. Central focus is placed on the history and organization of the Moche and Sicán polities and the emergence and persistence of the Mochica ethnic group on the northern north coast. Beyond providing basic foundations for interpretation, this chapter attempts to highlight archaeologically and bioarchaeologically significant topics, problems, and most importantly, historical contingencies. Biocultural patterns do not develop in a vacuum, and in order to understand any bioarchaeological “present,” its dialectical relationship with its past on local and regional levels must be understood in-depth.
Coastal Peru is in many ways a perfect setting for archaeological and bioarchaeological research, blessed with excellent preservation and one of the richest and most complex cultural histories in the world. Unfortunately, basic confounding factors in Andean archaeology stem from a variety of natural and historical factors. On an intrinsic level, site formation processes and preservation biases out of archaeologists’ control have resulted in the loss of many thousands of sites. Human factors however trump natural taphonomy, considering millennia of intensive agriculture, modern extraction of resources, and urban development. Centuries of intense grave looting have taken an especially immense toll. If one is to conservatively estimate there are 500,000 Moche-period ceramic vessels in museums and private collections around the world and the average Moche burial contained two ceramic bottles, at least one million Moche-era burials have been destroyed along the north coast.

Archaeologists themselves introduce a number of complex biases including sampling issues and interpretations based on skewed data, less-than-rigorous inferences, and problematic uses of analogy. Much of what has been written about north coast cultures are based on often one-dimensional study of artistic and technical qualities of looted craft goods. Following the 1987 discovery of elite Moche tombs at Sipán in the Lambayeque Valley Complex, Moche studies boomed. Regrettably, Moche archaeology developed a highly insular *prema dona* status over the last ten to fifteen years which has promoted a de-emphasis of other time periods, regions, and cultural developments
Proximity to a major city and the ancient Moche capital contributes to the popularity of the Moche-Chicama region as a location to conduct fieldwork.

Many long-standing theoretical and methodological paradigms in Andean archaeology are also sources of bias (Silverman 2000, 2004). For instance, Andeanists have tended to homogenize cultural developments and pigeon-hole them into preconceived notions of nomothetic or progressive social development (i.e., hunter-gatherers eventually developing into imperial states). Multiple attempts to define temporal periods were based on stylistic variation of looted grave goods – a practice so perilous that it should be not carried out (Kubler 1970, 1985).

Given an emerging understanding of the far more complex and nuanced historical contingencies that permeate Andean history (Dillehay et al. 2004), earlier notions and approaches have aged poorly. Theoretical constructs, concepts such as “agency,” “practice,” “resistance,” “world systems,” or interest in non-elite ideologies have entered only recently in Andean research to produce especially stimulating results (Silverman 2004: 6; also Bawden 1996, 2001, 2005 and Dillehay 2001). Still, much ground stands to be gained; in one recent example, Castillo (2004) described theory and theoretical debates uninteresting.

The influence of the Virú Valley Project of the late 1940s (Willey 1953; Strong and Evans (1952) was so pronounced it was followed as model for decades of subsequent research. Many research questions, methods, and interpretations of data have been reactively or mechanically conceived following underlying cultural-historic or processual paradigms. Methods seem to be slowly catching up. Long-term, multidisciplinary, and
regional archaeological studies stand to become the new models for research conception and design in Peruvian archaeology. Moreover, the following examination of north coast prehistory is especially vital to understanding the significance of biocultural development and change. This dissertation strongly engages the concept of deep contextualization and historical contingency (Pauketat 2001). In other words, a thorough and rigorous understanding of social context is required understand the archaeological ‘present’ as the archaeological “past” is fundamentally intertwined with the present.

EARLY AND FORMATIVE DEVELOPMENTS ON THE PERUVIAN COAST

From the First Settlers to Sedentism

The peopling the Andes was initiated perhaps 15,000 to 13,000 years ago (Dillehay 1989, 1997a). The paleoindians who colonized Andean South America were long inferred to have practiced a homogenous hunting and foraging lifeway and subsistence economy based on the diffusion of a fluted Clovis point tradition perfected in North America (Lynch 1999:222-223). Such notions of timing and cultural homogeneity are now questioned. Hard evidence for the exact routes of the peopling of the Andes remains elusive as coastal or highland routes and the number of groups involved remains debated (Chauchat 2006: 402; Dillehay et al. 2004:19-20). Sutter’s (2005) study of dental traits suggests the peopling of the Andes followed in two discontinuous waves. The first settlers appear to have been descendant from an ancestral sundadont population. Gene
flow into the northern Andes from Central America appears coincident with the adoption of agriculture and sinodont replacement of the earlier population.

The north coast of Peru was permanently colonized between 11,000 and 9,000 years ago (Bird et al. 1985; Chauchat 2006: 24; Dillehay et al. 2004; Lynch 1980; Rick 1980). Early coastal economies placed substantially emphasis on marine resources unlike highland communities (Dillehay et al. 2004). The paleoindian phenomenon known as Paijan is best studied from the Chicama Valley surface sites of Pampa de los Fósiles and the Quebrada de Cupisnique and the Moche-Virú intervalley stretches (Becerra and Carcelén 2004). Paijan site locations suggest a settlement emphasis on middle to upper valley regions (up to 1800 meters), but it is quite likely they probably practiced transhumance between the Andean foothills and the Pacific shore. Lower valley sites will probably forever remain a mystery: pre-Hispanic and modern agriculture certainly destroyed many, if not all, paleoindian camps. Remains of any coastal settlements were likewise lost when sea levels rose following the last glacial maximum.

The Paijan tradition was characterized by a highly mobile hunter-forager lifeway from 8700 to 5900 B.C. (Chauchat 2006; Briceño 2004a; Gálvez 2004). Dillehay et al. (2003, 2004) suggest that between 8600 and 6500 B.C., Paijan groups began to settle the ecotone between coast and the cis-Andean foothills as they decreased their mobility, aggregated, and established permanent camps and seasonal transhumance patterns. In other words, the social and economic foundations of later complex societies were being set, including traits such as planning and decision-making, risk management, resource sharing, and technological innovations (Dillehay et al. 2004: 22). In the Lambayeque
Valley Complex, the earliest stages of colonization and settlement are unstudied, partially due to a paucity of known sites and millennia of intensive agricultural activities that erased surface sites (D. Sandweiss 2005: personal communication; C. Wester 2005-6: personal communications). However, the margins of the lower, mid-, and upper valley await systematic survey. Possible starting points include the region in and around the Pampa de Etén, where Alva (1985a) described a shell mound associated with lithic artifacts, potentially some 5,000 years old, but was destroyed by recent stone mining activities. Junius Bird’s unpublished findings of Paijan projectile points near the Chiclayo International Airport may signal a mid-valley presence as well (Chauchat 2006: 397). There are definitely pre-ceramic burials that are deeply buried in the Poma Forest.

Post-Paijan developments are poorly studied. Manipulation of plant and animal species by earlier hunter-gatherers such as the Paijan probably contributed to the emergence of various domesticated plants (Bonavia 1996; Dillehay et al. 2004:25, Table 2.1; Rossen et al. 1997). Indigenous animal domesticates of the Andes were very few compared to other global centers of complex civilization: camelids, guinea pigs, ducks, and dogs. Details surrounding the domestication of llamas and alpacas remain debatable but the process was likely complete by 3500 B.C. (Kadwell et al. 2001; Wheeler 1995).

The transition from foraging to farming and sedentism is the largest lacuna in north coast history. Some of the only clues as to the nature of the foraging-farming transition on the coast are found in the Zaña Valley. Long before it was hydrologically incorporated into the Lambayeque sphere, Zaña Valley hunter-gatherers initiated a profound behavioral shift between by 5500 B.C: an emergent lifestyle characterized by
organized communities, careful burial of and ritual processing of the dead, social
differentiations, and small-scale food storage (Dillehay et al. 1997; Rossen and Dillehay
2001) and possibly preceded that of La Paloma on the central coast (Benfer 1989).

**EMERGENCE OF COMPLEX SOCIAL CONFIGURATIONS**

*Preceramic Developments on the Coast*

By 1500 B.C., major cultural shifts were complete along the Peruvian coast. Burger (1995: 28-32) hypothesizes seasonal cultivation began along the banks of rivers. Around 2000 B.C., crops contributed new sources of carbohydrates and sugars to a diet dominated by well-established exploitation of marine resources. Coastal peoples may have also engaged in reciprocal trading with inland agriculturalists as populations grew.

The most conspicuous hallmark of the Preceramic period on the central Peruvian coast are embodied at sites such as Aspero, El Paraíso, and Cardal by enormous platform mounds, U-shaped plazas, and sunken circular courts (Burger 1995; Shibata 2004). Such structures reflect the power of a small number of elites, probably personifying political and religious authority, who mobilized and directed labor on super-communal levels without state-level organization or socioeconomic differentiation (Burger 1995: 37).

The north coast also emerged as a major center of early monumental construction projects. During the late Initial Period (ca. 1200 B.C.), Sechin Alto became one of the largest architectural complexes in the world at the time (Pozorski and Pozorski 1987). Other suddenly large and complex sites dating to the Late Preceramic (2200 – 1800 B.C.)
are found at Alto Salaverry in the Moche Valley and Pampa de las Llamas-Moxeke and Huaynuná in the Casma Valley (Pozorski and Pozorski 1987, 1993). Of special note is a ventilated hearth structure at Huaynuná – not only suggestive of interaction with highland sites such as Kotosh and La Galgada – but may be the among the earliest evidence of rituals fires and burnt offerings on the north coast (Pozorski and Pozorski 1993:47).

Predating these developments appears to be a precocious, anachronistic polity centered at the preceramic central coast site of Caral in the Supe Valley (Shady 2005, 2006; Hass and Creamer 2002). Initial data suggest a polity of unprecedented power, labor organization, and complexity thrived there ca. 3000 to 1800 B.C., perhaps fueled by administration of coastal-highland trade networks. More precise visions of the long-term and regional influences of Caral and the circumstances surrounding its decline remain to be defined, but many centuries would pass before these achievements were eclipsed.

Despite known early contacts with pottery-using societies of Ecuador, Peruvians began to utilize ceramic technologies ca. 2,000 B.C., and around 1,800-1,500 B.C., pottery production began on the north coast, ending the very long Preceramic period. Early coastal Peruvian pottery bears was probably a largely autogenous development (Burger 1995). Ceramics practically aided in cooking and storage activities, but provided a new domain for economic, ideological, and artistic activities.

The Cupisnique Culture and Religion

A series of cultural trajectories on the north coast were set into motion over three millennia ago which contributed directly to the late pre-Hispanic and indigenous Colonial
period societies. Larco Hoyle (1941) first used the designation Cupisnique to describe a pottery style and production technology he noted among funerary ceramics found in the Cupisnique Quebrada (Chicama Valley). Radiocarbon dates indicate that from 1500 to 700 B.C. the Cupisnique art style and religious tradition spanned in the La Leche-Lambayeque-Jequetepeque-Chicama-Moche stretch of the north coast (Elera 1998).

The Cupisnique are best known from their art which included representations of plants, animals, humans, stylized felines, and supernatural entities. Gray to black ceramics featured elaborate incised geometric designs, patterned burnishing, stamping, appliqué, and punctation rather than painted designs (Shimada et al. 1998). Central themes of the rich Cupisnique mythology seem to revolve around a feline and an anthropomorphized arachnid. Spider entities were often depicted holding a decapitated head and is often associated with lush plant growth from which trophy heads, severed hands, and other body parts grow (Burger 1995: 96). Cupisnique art is often asymmetrical, well illustrated by stirrup-spout vessels that depict a human-like face on the left side and the feline or spider face on the right side – interpreted as representing the transformative powers of a shaman to facilitate communication between earthly and supernatural realms (Burger 1995; Elera 1993, 1998).

The Cupisnique culture has long been confused with or subsumed under the Chavín regional religious phenomena. Recent studies indicate contemporaneous Cupisnique peoples interacted dynamically with the widespread Chavín iconography and associated ideologies that emanated from the highlands (Bischoff 1994). The Cupisnique tradition was autogenous and locally dominant over the Chavin diffusion on the north
coast. “Chavin” iconographic conventions such as agnathic fangs depicted on supernaturals is likely a north coast development adopted by Chavin artisans and not the other way around (Bischoff 1997; Elera 1998).

It is hypothesized a centralized religious authority integrated Cupisnique populations on an intra-valley, tribal or chiefdom level capable of directing the creation and operation of large-scale civic-ceremonial centers. Examples of Cupisnique architecture are characterized from only a few studied examples such as the Huaca de los Reyes (Moche Valley), Limoncarro and Puémape (Jequetepeque Valley), Purulén (Zaña Valley), and Huaca Lucia (La Leche Valley). These structures exhibit various shared features: relatively low-tiered platforms, centrally inset stairways as wide as 16 meters, rectangular forecourts, and most unique of all, elaborate colonnades (Burger 1995; Shimada 1986). Some of the smaller centers, in the Zaña and Jequetepeque Valleys (Dillehay 1998; Ravines 1985), were laid out according to dualistic principles, characterized by opposing U-shaped plazas, small mound structures, and ritual fires. Though far less common, geoglyphs stylistically linked to the Cupisnique tradition has been documented up-valley from Purulén at Pampa de Caña Cruz (Alva 1985b). In the La Leche Valley, a large geoglyph near Mochumi Viejo similarly features a stylized anthropomorphic face blended with feline features (Kosok 1965: 161, Plate 30).

At the monumental site of Kuntur Wasi in the Cajamarca highlands, architectural styles and iconography decorating resplendent metal and ceramic elite burial goods at are remarkable mirrors of the Cupisnique style (Kato 1993; Inokuchi 1998; Onuki 1997; Onuki et al. 1989). Kuntur Wasi may represent a highland Cupisnique colony or
alternatively members of a local Cajamarca polity participating in the social, economic, and ideological sphere of their coastal neighbors. Ceramic wares may also point to other possible colonies or affiliated groups present at Cerro Ñañañiqué on the far northern north coast of Upper Piura (Kaulike 1998).

Evidence of emerging social inequality and the emergence of social elites in Cupisnique society exist in the form of a settlement hierarchy and differentiated burial treatments (Elera 1998) (also Chapter 5). During Late Cupisnique phase, the emergence of metallurgy promoted the manufacture of precious metal objects. Elaborate gold crowns, ear spools, and pendants appeared for the first time in the Andes, most notably at Kuntur Wasi and Chongoyape. Gold objects were probably used as symbols of social and religious authority (Elera 1998: 280). Since 2007, Walter Alva and his team are excavating a major Cupisnique ceremonial center at Colluz near the west base of Cerro Ventaron near Pomalca in the lower Lambayeque Valley.

In the Lambayeque Valley Complex, Elera (1986) documented evidence suggestive of a Cupisnique necropolis and ceremonial center featuring the remains of an artificial ramp (820 meters long, 2.5 meters wide, and 5 meters in height) leading from the sea to the cerro. The presence of human remains eroding out of areas adjacent to stone temple foundations at the summit were identified during the author’s pedestrian surveys in 2001 and 2006. Future research aims to test the hypothesis that these remains represent the earliest evidence of human sacrifice on the north coast. Another Cupisnique political and religious center was uncovered by grave looters in the 1920s, as they sacked elite Cupisnique tombs near the upper valley town of Chongoyape (Lothrop 1941).
The Poma Forest in the La Leche drainage has a long and complex history featuring nearly 50 major archaeological sites spanning 3000 years of prehistory (Shimada 1981a, 1986, 2000). Starting around 1300 B.C., the ceremonial structures of Huaca Lucia and Huaca Soledad were established (Shimada 1981b; 1986). Huaca Lucia was a two-tiered platform mound topped by a U-shaped enclosure dominated by a colonnade of 24 red-painted circular columns (each 1.2 meters in diameter and composed of conical adobe building blocks set within a clay mortar). Long-degraded polychrome murals adorned the enclosing walls. The platform was joined to a magnificently preserved, north-facing staircase, 16 m wide and 10 m tall (Shimada 1986: 166-170). For unknown reasons, Huaca Lucia was abandoned and ritualistically entombed. Sterile sand, likely taken from the sand sheets that cover most of the lower La Leche Valley beginning some three kilometers to the south, was used to bury Huaca Lucia in a single event that may have lasted a few months and involved a remarkable outlay of labor. A lower and upper clay seal, both perfectly level, sealed the staircase and temple top, respectively. The practice of ‘temple entombment’ in the Lambayeque region strongly suggests influence or religious connections to contemporaneous highland religious traditions (Bonnier 1997; Izumi and Terada 1972: 304) during the Cupisnique era.

Machine excavation of the Poma Canal in the 1970s by the Peruvian Ministry of Agriculture at the center of the Poma National Historic Sanctuary unintentionally identified a Cupisnique ceramic production center with 57 kilns along a 500 meter stretch (Shimada et al. 1998). Nearly all the kilns were pear- or keyhole shaped and featured a principle chamber lined with refractory mixture, a dome-like superstructure, and at least
one chimney (Shimada et al. 1998: 37, Figure 12). Subsequent firing experiments using sensors placed within a full-scale kiln replica along with an excavated 2,700 year-old kiln demonstrated the efficiency and high degree of control potters exercised over their firing atmosphere. Chemical and physical analyses suggest these goods were locally consumed.

The Cupisnique decline around 700 B.C. is poorly understood. Evidence from Cupisnique coastal sites suggests the Cupisnique society was destabilized by environmental perturbations, including catastrophic El Niño events and the effects of a possible tsunami that impacted the coast (Elera 1998; Elera et al. 1992). The Cupisnique legacy, however, influenced the rest of north coast prehistory.

_The Salinar Enigma_

The latter half of the first millennium B.C. was dominated by the Salinar style. Salinar differs from earlier Cupisnique style in several respects, such as their emphasis on reddish, oxidized wares. With a core region in the Chicama-Moche-Virú-Santa Valleys, Salinar influence was noted perhaps as far north as the Lambayeque and Piura regions and as far south as the Nepeña Valley. Dedicated studies of the Salinar-period Lambayeque Valley have yet to be undertaken. The Salinar may have involved a coastal expansion of northern highland cultures that, at least artistically hybridized with the coastal Cupisnique (Elera 1998; Seki 1997). Conversely, reproduction of stirrup-spout vessel forms and local decorative techniques indicate the ‘Cupisnique-ization’ of the intrusive culture (Elera 1993, 1997). Salinar population centers were established mostly in the mid-valley and hillside stretches of the coastal valleys.
Some archaeologists think that strife existed between the intrusive Salinar and indigenous populations (that is, Cupisnique descendants) in the lower valleys. Some of the first ‘fortifications’ on the north coast appear to have been constructed during this time (Willey 1953; Wilson 1988). These structures may be cautiously interpreted as evidence of increased social tensions or a degree of organized warfare.

Shimada (1994a) states it is incorrect to describe Salinar as an intermediate stage of development between Cupisnique and Moche cultures. Salinar may instead represent a process of dynamic and perhaps stressful interaction between two peoples who likely competed for access to coastal and valley resources. Significant clarification of the Salinar enigma may well proceed from bioarchaeology. It may be possible to test the hypothesis that Salinar-period populations exhibited an elevated prevalence of interpersonal traumatic injury and if “Cupisnique-ization” extended to coastal-highland gene flow as well.

The Gallinazo Tradition

At about the same time the Salinar declined the Gallinazo culture rose to prominence. Current interet is highlighting the pivotal role of the Gallinazo in north coast prehistory including their deep role in Moche origins and the direction of subsequent local and ethnic group developments. Bennett (1939) was the first to formally identify this culture in the Virú Valley. Diagnostic Gallinazo ceramics and art styles are present on nearly the entire north coast with the possible exceptions of the Piura Valley (Shimada 1994a). The strongest manifestations of Gallinazo culture are noted in the Chicama-
Moche-Virú-Santa stretch of the North Coast Gallinazo material styles are characterized by pedestal shaped bowls, stirrup-spout vessels, and simple, unslipped jars decorated with human or zoomorphic facial representations on the neck – the emblematic face-neck jar (Shimada and Maguña 1994). The Gallinazo peoples maintained a chiefdom-level society with several notable ceremonial-civic centers. Irregular clusters of villages and so-called “urban” settlement sprung up around monumental platform mounds. Sun dried adobe bricks were used as the primary building material by the Gallinazo.

In the Lambayeque Valley Complex, an extensive Gallinazo presence has been noted through both survey and excavation (Shimada and Maguña 1994). The stone-terraced Gallinazo site of Cerro Sajino on the northern margin of the Pampa de Chaparrí was instrumental in controlling access to the Raca Rumi canals in the upper La Leche drainage. Associated incised and appliqué decorated Gallinazo ceramics at the adjacent Cerro Huaringa (later a principle Sicán copper mine) suggest exploitation of copper ores was initiated by the Gallinazo.

Two kilometers to the west of Cerro Huaringa is Cerro La Calera, a 49,000 m² structure. A primary political and religious center for the La Leche Gallinazo communities was likely Huaca Letrada-Paradones, located on the northeast flank of Cerro Tambo Real. This U-shaped complex was dominated by a primary adobe platform mound measured some 100 meters east-west, 60 meters north-south, and was originally 20 meters high (Shimada and Maguña 1994: 43-47). Thick deposits of associated camelid dung and camelid bones indicate that by Gallinazo times, llama pastoralism was a central component to local and regional economy.
One of the most important observations of the Gallinazo involves the persistence of Gallinazo styles throughout Moche times and beyond. Contrary to earlier conceptions, Gallinazo simply did not terminate at the beginning of the Moche era nor is it clear there was a forceful subjugation of Gallinazo polities by the Moche as suggested by Strong and Evans (1952) and Wilson (1988). The adobe brick-segmentary construction technique like that used at Castillo de Tomoval in the Virú Valley (Willey 1953:163-164) became an architectural convention that would be utilized on a much greater scale in the following millennium. Polychrome murals at the subsequent Moche-period Huaca de la Luna bear direct parallels to earlier Gallinazo art (Uceda et al. 1994). Ubbelohde-Doering (1957) and Donnan and Cock (1997) describe late Moche burials (ca. A.D. 550-750) containing both diagnostic Moche and Gallinazo vessels. Excavation of Huaca La Merced identified classic Gallinazo face-neck jars being produced during Moche III (ca. AD 300-400) and persisted into securely dated Middle Sicán contexts in the Poma region (A.D. 900-1100) (Shimada and Maguña 1994). It is not improbably that Gallinazo structures rest at the cores of the Moche Huacas del Sol and Luna.

Remarkable findings have recently come to light at the Virú Valley site of Huancaco (Bourget 2003, 2004; Millaire 2004a). Multiple lines of archaeological data reveal the persistence of a Gallinazo polity during the Moche era that interacted with the regional Moche economy. Mitochondrial DNA analyses are further revolutionizing Gallinazo archaeology. Sampled Huancaco burials that show these Gallinazo individuals are genetically indistinguishable from the Moche (Shimada 2004). In other words, the Gallinazo peoples are the Moche and visa versa.
When speaking of the Gallinazo, a fundamental distinction should be made between its political, biological, and artistic elements. Most Gallinazo polities were incorporated into the Moche culture. Gallinazo populations and artistic traditions continued to exist among the commoners, and on the northern north coast, even outlived the Moche polity itself. While much of the interrelationships between these cultures remain to be understood, the Gallinazo may be hypothesized as representing the roots of widespread and recognizable north coast biocultural substratum that continued to exist under the surface of Moche and Sicán societies. The Gallinazo gene pool is closely if not directly related to earlier coastal Cupisnique populations while their descendants represented the local populations of the Moche, Sicán, and Chimú periods.

THE MOCHE CULTURE

_Moche Cultural History, ca. A.D. 100-750_

The Moche represent the primary cultural development on the north coast of Peru during the first millennium A.D. While the Moche have been studied for over 100 years, the 1987 discovery of an unlooted “royal” tomb at Sipán in the Lambayeque Valley spurred a veritable boom in Moche archaeology, making it perhaps the most studied pre-Inka culture. Paradoxically, understandings of the Moche are quite problematic. Since the early 1900s, impressive Moche art forms have been used as the primary source of information about Moche culture. Moche art history is not the same as Moche archaeology. The vast majority of “art” objects are derived from looted burials. In other
words, the iconography of contextually disembodied funerary goods has been used to generate an understanding of the Moche. Archaeological evidence helps supplement the entrenched art history approach, but major methodological and conceptual lags still exist.

Moche culture is currently divided into five stylistic-chronological phases as first established by Larco Hoyle (1948). This chronology has been stratigraphically verified and refined from several southern north coast sites, but the applicability of the first three phases on the northern north coast requires further study. Moche origins are enigmatic, primarily due to a lack of corresponding fieldwork. Sometime around the time of Christ, nascent Moche I-II art styles emerged. The Moche genesis probably occurred in at least two different locations along the north coast (Castillo and Donnan 1994a; Shimada 1994b). These early Moche polities likely arose from sociopolitical changes in the preexisting Gallinazo regional hierarchy and were likely allied through gift giving and shared religious beliefs and art styles as reflected in persistent themes in ceramics and metalwork (Shimada 1999).

The main locus of early Moche developments occurred in a northern polity located in the La Leche-Lambayeque Valley, while a southern polity centered in the Chicama-Moche region would rise to dominance later. The discovery of early Moche tombs (Moche II-III, ca. A.D. 200-400) at the Huaca Rajada complex, Sipán, shed first light on the dominant early Moche polity located within the Lambayeque Valley (Alva 1994, 2001; Alva and Donnan 1993). The elite tombs at Sipán are inferred as royal mausoleum representing closely-related elite priest-politicians, warriors, family members, and retainers. They were interred with large quantities of sumptuary goods including
precious metal items such that the Sipán tombs represent the richest unlooted burials scientifically documented in the New World.

Another Moche polity may have emerged directly between the northern and southern sectors in the Jequetpeque Valley evidenced by salvage excavation of a looted Moche I tomb at La Mina (Narváez 1994) and high-status early Moche tombs atDos Cabezas (Donnan 2001, 2003). This polity likely never eclipsed their neighbors, but grew to an impressive standing near the end of the Moche culture (Castillo and Donnan 1994b). The early Moche presence in the enigmatic Vicús region of the far northern Piura region is discontinuous with the rest of the coast (Makowski 1994). Due to intense looting and very limited field research, almost nothing concrete is known about the Moche presence in the Vicús area. Sumptuous metal and ceramic items looted from the region are indistinguishable from Moche Phase I and II styles while others display exotic mixtures of Moche styles hybridized with local forms. The Vicús region may have been home to an early Moche colony and contained a select group of Moche artisans reproducing “heartland” styles as local artisans produced hybrid forms incorporating local of a trophy-head cult and condor iconography (Shimada 1994a: 75-77).

These various polities had long been lumped together as a single “Moche” style which failed to perceive the dynamic interrelationships between these distinct sociopolitical foci. It is no longer tenable to view the Moche culture as a single, predatory polity originating in the Moche Valley. The fundamental north-south bipartition of the north coast is manifested in Moche origins and later development. Differences between northern and southern Moche can be detected among sherds of face-neck jars recovered
from Cerro el Aguillar de Bebederos near the neck of the Zaña Valley (Shimada, 1994b: 372; Fig. 11.3) which can be broadly described as Moche in style but the pastes, slips, and paints differ from those in the south. In some cases, the northern Moche painted in negative images (Shimada 1994b: 375). The famous Moche “portrait” vessels are a southern manifestation whereas the exquisite Moche V fineline decorated ceramics are a northern north coast convention. The northern Moche may have recycled marked adobe bricks from earlier time periods (Shimada 1994b: 375). Mitochondrial DNA analysis of Moche elites in the Lambayeque and Chicama-Moche Valleys suggest they were probably breeding isolates with little sustained gene flow (Shimada et al. 2005: 81).

On the other hand, it is equally important to note parallel characteristics, especially the pairing of Valleys in the early stages of Moche development. In both northern and southern sectors, one small valley with limited run-off was politically linked with one large valley featuring a relatively stable perennial water supply. It appears the smaller valleys, with their monumental constructions, were the seats of political power. Small size permitted a high degree of political, economic, and social centralization while the larger, adjacent valleys functioned as their breadbaskets (Kosok 1965: 88).

By Moche III - IV, (A.D. 300-450), the southern polity in the Moche Valley was most visibly ambitious in terms of horizontal, coastal expansion (Shimada 1999). It eclipsed and incorporated the northern La Leche-Lambayeque polity and expanded southward as far as the Huarmey Valley. Traditionally, the southern Moche capital had been identified outside of the modern city of Trujillo at the site of Moche. The site is dominated by the remains of two monumental truncated adobe mounds. The gargantuan
Huaca del Sol, once the largest adobe structure in the New World, was composed of an estimated 143 million handmade adobe bricks and measured over 342 meters long, 159 meters wide, and 40 meters high (Hastings and Moseley 1975). Despite its prominence, it has received limited archaeological attention in the past (Herrera and Chauchat 2003; Moseley 1975b). Some 500 meters to the east is the Huaca de la Luna, separated from Huaca del Sol by an extensive nucleated zone that included high-status residences, craft workshops and cemeteries (Chapdelaine 2001; Uceda 1998). Extensive study of the Huaca de la Luna carried out since the 1990s by the Universidad Nacional de Trujillo (Uceda et al. 1997, 1998, 2000, 2004) has helped characterize the nature of this complex which was dedicated to ritual activities, elite (possibly priest) burials, and human sacrifice.

Some have suggested that Moche iconography depicts a southern Moche militaristic campaign of aggressive expansion that conquered neighboring populations and established a multi-valley hegemony (Strong and Evans 1952; Wilson 1988). While organized Moche militarism may have played some role, scenes of combat and prisoner-taking have been reinterpreted as representations of ritual combat among the Moche rather than the means of sociopolitical integration (Bourget 2001b, 2005; Alva and Donnan 1993: 127-141). The long-held Huaca del Sol/Luna-centric vision of Moche political life has been effectively challenged. Architecture and murals at the Huaca Cao Viejo are virtually identical to the Huaca de la Luna (Franco et al. 1994, 2001, 2003; Franco and Vilela 2005; Gálvez and Briceño 2001). These similarities attest to direct
political-religious connections between valleys and monumental sites perhaps involving dualistic principles of Moche governance involving twin capitals.

Sometime in late Moche IV (A.D. 450-550), over 350 kilometers of contiguous coastline was united by the southern Moche (Figure 4.1). Some scholars feel this configuration represented the region’s first multi-valley state. However, the lack of a clear definition of a ‘state’ and well-defined material expressions of constituent social systems that can be traced through time makes for a weak, if not false designation of a state-level society (Shimada 1999: 465). It may be more accurate to envision the Moche IV southern polity as a kind of ‘super-chiefdom’ instead.

After hundreds of years of dominance, an extended period of abnormal and intense El Niño-related environmental catastrophes helped instigate a wide range of social and political transformations (Shimada et al. 1991). Religious leaders may have been largely discredited as the public perceived their failure to avert catastrophe. Immense pressure was likewise placed on economy and infrastructure resulting in political strife. The southern Moche collapsed. The Huaca del Sol and Huaca de la Luna were abandoned and consumed by the desert. Territory south of the Moche Valley fell away from their influence. A new configuration of ideology emerged at Galindo in the mid-Moche Valley as elites aimed to incorporate non-local styles and ideas distancing themselves from the recently failed religion (Bawden 1982, 1996, 2001, 2005).

In the Lambayeque Valley Complex, a radical re-organization of sociopolitical systems marked the beginning of Moche V (A.D. 550-750). Shimada (1976, 1994a) argues the first true urbanized settlements and state-level organization developed in
Figure 4.1: The north coast of Peru, highlighting the inferred extent of Moche territory and influence at the height of Moche IV (A.D. 450-550) and highlighting major sites discussed in the text. Adapted from a map drawn by and courtesy of Izumi Shimada.
Moche V at the urban site of Pampa Grande. Notable features of the Moche V state included a redistributive economy, highly specialized production systems, and unparalleled sociopolitical complexity (Shimada 1994a, 2001a). Ethnic Gallinazo people appear to have been integrated into Pampa Grande directly. Inferred state-directed relocation of ethnic Gallinazo farmers and craft specialists to Pampa Grande is associated with face-neck jars and other traditional ethnic markers that accompanied their presence (Shimada 1994a: 171-2, figure 7.3.1, 7.3.2). Other highly prominent late Moche sites included the ceremonial center of San José de Moro (Castillo 2001, 2003) and Pacatnamú (Donnan and Cock 1997) in the Jequetepeque Valley.

Despite these efforts, the final political disintegration of the Moche occurred at Pampa Grande around A.D. 700-750 (Shimada 1994a: 248-252). A model of internal revolt offers the most likely explanation for this process, exacerbated by another El Niño disturbance (Shimada 1994a: 249). In the vacuum that followed, highland Cajamarca colonies may have thrived for a century or longer in the Lambayeque region, their presence marked by the abrupt appearance of the distinct Costal Cajamarca style (Shimada 1994a: 251; Shimada and Elera 1982). The Moche cultural tradition seemed to linger on in some provincial areas in the Jequetepeque region until about A.D. 800.

Moche Organizational Features and Religion

Moche social structure has long been envisioned in terms of a rigid stratified class system ruled by a small core of political and religious elite. These elite are envisioned as the managers of monumental construction projects involving intense outlays of labor.
Considering that Moche visual culture was highly expressive of broader social and political values, social structure may well be reflected in certain artistic conventions and a three-tiered settlement hierarchy which corresponded to three or four levels of vertical class ranking. Urban architectural organization at Moche V Pampa Grande also appears to fall into a clearly delineated class-based organization (Shimada 1994a). Variations in burial treatment are inferred as representing distinct classes (Donnan 1995; Milliare 2002; Topic 1982). Yet, variables used to quantify or qualify “class” have often been varied and inconsistently applied.

There is some reason to believe upward social mobility and the growth of a “middle class” were features of southern Moche III-IV (Chapdelaine 2001). Iconography and archaeological finds are also beginning to shed light on the significance of elite women (Donnan and Castillo 1994; Verano 2007). These observations require much additional testing and refinement as well as defining horizontal and age-based status differences (as explored by Millaire [2002]).

Spanish colonial administrative and legal documents from the colonial the sixteenth century Lambayeque and Chicama Valleys describe the vestiges of a widespread dualistic structure of sociopolitical organization spanning at least the Lambayeque-Moche Valley stretch of the north coast if not the entire Peruvian coast (Netherly 1984, 1990; Rostworowski 1961). The system, called *parcialidad* by the Spanish (meaning “part of a whole”) featured grouped pairs of ranked moieties at every level of organization (Netherly 1990: 464, Figure 1; colonial *parcialidades* are discussed in detail in Chapter 6). In this system not even the paramount lord, or curaca, governed
alone; this fundamental conciliatory feature acted as a check on unilateral action (Netherly 1990: 464). Still, lords exercised hegemony over human and natural resources under their señorío. Status corresponded to the size of the population they controlled. Parcialidad organization also explains why middle and lower-level political units often survived the political disintegration of major polities (Netherly 1990:464).

Evidence of parcialidades is archaeologically detectable on the north coast throughout the Late Horizon and Late Intermediate periods (Hayashida 1998; Shimada 2001a) and earlier in late Moche society (Shimada 2001a). Parcialidades appears to have underwritten craft production at Moche V Pampa Grande. This remarkably conservative and pervasive form of sociopolitical organization existed on the north coast for at least a millennium before European contact. It is also quite likely Moche V peoples did not invent the system but inherited these organizational concepts from earlier Gallinazo or Cupisnique times.

Moche narrative art is perhaps surpassed only by the ancient Greeks. By Moche III-IV, the northern Moche developed precociously innovative metalworking technologies well-illustrated by the finds from the Vicús region and Sipán tombs (Alva 1994; Alva and Donnan 1993; Makowski 1994). Ceramic production was highly specialized and largely based on mold technologies and hand modeling (Russell et al. 1998; Uceda and Armas 1998; Shimada 2001a). Iconographic and art history studies provide stimulating perspectives on the Moche (Berezkin 1980; Bourget 1994; 2001b; 2005; 2006; Donnan 1976; Donnan and McClelland 1999; Golte 1994; Hocquenghem 1987, among many, many others).
Despite the many problems that plague iconographic research, studies of Moche art reveal a cosmology that institutionalized fertility, death, and human sacrifice as central aspects of their belief system (Benson 1975; Bourget 2006; Shimada 1994a, 1999). The powerful content of Moche art was universally embraced because “Moche leaders had infused an ideological message drawn from north coast cultural experience with the emotional force of myth and history” (Bawden 2001: 296). Despite the apparent overwhelming diversity, fine-line paintings and ceramics are set within small number or mythological or cosmological themes (Donnan’s [1976] “thematic approach”). Moche art has also been recognized for its explicit sexual imagery (Kaufmann-Doig 2001; Larco Hoyle 1965). Bourget (2006) and Weismantel (2004) are helping dispel misconception of Moche sexual openness and instead place such imagery within contexts of rulership, ancestors, and fertility. Large-scale polychrome adobe murals and fineline paintings depict violent rituals including human sacrifice and associated ‘decapitator’ entities (Benson 1972; Schaedel 1951a,b; Franco et al. 1994; Uceda et al. 1994). The dramatic reality of depictions of human sacrifices appears validated by recent archaeological finds (Bourget 1998, 2001a, b; Verano 2001a, b).

THE SICÁN CULTURE

Following the Moche V disintegration at Pampa Grande, a society known as the Sicán rose from a minimal local polity to a position of regional domination. The term ‘Sicán’ designates the archaeological culture centered in the Poma Forest in La Leche
Valley from A.D. 800 to 1375. It is taken from the Muchik word *Signan* or *Cican*—glossed as House or Temple of the Moon—which is the local name for the ruins of the capital precinct (Shimada 1985c). While several early Andean archaeologists took note of this culture, their work was cursory and impressionistic (Bennett 1939; Brüning 1922[1989]; Kosok 1965). Sicán culture has been described by inaccurate or misleading designations like “Eten,” “Middle Chimú” or the “Lambayeque Culture,” the latter referring to a stylistic characterization of looted funerary ceramics (Zevallos 1971).

Under the direction of Izumi Shimada since 1978, the Sicán Archaeological Project pursued a holistic, long-term, interdisciplinary, and regional study of the Sicán, including its environmental, historical, social, and technological characteristics.

**Sicán Origins**

Archaeological data documenting major cultural changes coupled with over 100 secure radiocarbon dates allow for the partitioning of Sicán culture into three distinct periods: Early Sicán (A.D. 750/800-900), Middle Sicán (A.D. 900-1100) and Late Sicán (A.D. 1100-1375) (Shimada 1990, 2000). The details of Early Sicán are unclear, partly due to a lack of material evidence. No precise locus for Early Sicán developments is readily identifiable. Early Sicán ceramic materials carry on a trend of highly polished, reduced blackware ceramics that appeared during Moche V. The growing prominence of blackware preceded an unprecedented “craze for monochrome blackware” during Middle Sicán (Lyon 1991: 32). Blackware spread through the coast and evolved as the dominant finish for Middle Sicán sumptuary ceramics. Logographic *paleteada* ceramics were

It is worth commenting on the oral legend of Naymlap often attributed to Sicán origins. Recorded early in the Colonial period, this lore tells of the founding of a pre-Chimú dynasty in the Lambayeque region by a foreign leader named Naymlap and his entourage. A few scholars have attempted to archaeologically verify the Naymlap legend (Donnan 1990a). These studies are not convincing, partly because of their failure to operationalize specific methods for testing the legend, and that the legend is accepted a priori as a verifiable and straightforward series of events (Shimada 1990: 303). Rowe (1948), Netherley (1988), and Zuidema (1990) consider the possibility the legend is either pure myth or a mix of historical events and social and cosmological symbolisms shaped by both Inka and Spanish conquests. Bawden’s (1996) analysis of the Moche Tule Boat Theme reveals a well-developed antecedent mythology involving a culture hero arriving from the sea. Despite these considerations, Naymlap lore contains some resemblances to archaeologically documented elements of Sicán history. The presence of ‘foreign’ rulers, the dynasty’s duration, political collapse associated with a flooding event, and ultimate incorporation into the Chimú Kingdom to varying degrees correspond to archaeological data. Alternative hypotheses of Sicán origins offered by Shimada (1990: 358-361) include a scenario of an endogenous religious revival led by a
charismatic leader. Naymlap lore is wonderfully tantalizing but it will remain of little archaeological value.

**Cultural Florescence of the Middle Sicán Period**

The Middle Sicán period (A.D. 900-1100) encompasses the fluorescence and climax of the Sicán state on the north coast of Peru and represents the apogee of the northern north coast’s autogenous cultural development as a whole. Existing regional cultural processes and trends were amplified as innovative political and religious structures developed, many of which had no local precedents. The Middle Sicán period included the development of a distinct religious art and ideology, innovative and large-scale pyrotechnologies associated with craft production and a resurgence of monumental platform mound construction (Shimada 1997, 2000).

During the florescence of the Middle Sicán period, characteristics of state-level organization were exhibited in (1) the control and deployment of multiple modes of resource exploitation including labor service and land annexation, (2) distinct social classes with differential access to goods, services, and information, and (3) governance via a hierarchical centralized administration (Shimada 2000: 61). Unprecedented cultural power and wealth was wielded by a small group of ethnic elites who controlled overarching political, economic, religious formations of Sicán society. The Middle Sicán domain was comprised of a La-Leche-Lambayeque Valley core. A provincial presence is documented across a 400 kilometer stretch from the Piura region to the north to the Chicama Valleys to the south (Figure 4.2). A notion considered by Kosok (1965) recently
Figure 4.2: The north coast of Peru, highlighting the inferred extent of Middle Sicán influence ca. A.D. 1000. Major Sicán and other late pre-Hispanic sites are highlighted as discussed in the text. Adapted from a map drawn by and courtesy of Izumi Shimada.
uncritically reiterated by Conlee et al. (2004) held the Lambayeque Valley Complex was too large to be politically integrated before Chimú conquest. This statement is highly impressionistic. Instead, archaeological data reveal Middle Sicán ideological hegemony and signs their political economy was highly effectively in integrating the entire region.

**Middle Sicán Settlement Patterns**

The physical, political, and spiritual center of Middle Sicán culture was the massive religious precinct of Sicán, consisting of over one dozen monumental adobe platform mounds forming a planned elite funerary precinct within the Poma National Historic Sanctuary (Figure 4.3). Here, the small perennial La Leche River exits the Andean piedmont, draining abruptly into the large coastal plain. The area around Sicán is covered by a dense *algarrobo* (*Prosopis* sp.) and *zapote* (*Capparis angulata*) forest much as it was 1,000 years ago. The site is roughly in between the modern towns of Illimo and Batán Grande in the bottomlands of the mid-La Leche Valley.

Establishment of Huaca Lucia and Huaca Soledad around 1,300 B.C. initiated a long tradition of monumental constructions. A notable provincial Moche IV occupation is also noted in the area at Huacas Soledad, Lucia, and Facho. Yet, by far the most explosive phase of monumental architecture construction in the La Leche Valley was during the Middle Sicán period and numerous other provincial sites in the La Leche and Lambayeque region. The diachronic cultural focus on the Poma and La Leche regions reflect the fact that those who occupy the area had a central role in controlling the largest intervalley hydraulic system in the New World (Shimada 1986: 172) and mineral
resources such as copper, iron, rock salt, and silver (Letchman 1976). Control of Poma represents control over an extensive hardwood fuel supply, critical for craft production used to promote trade and political economy. The location is also central node in both north-south and east-west trade routes and communication networks.

Much has been learned about the Middle Sicán state from excavations at Huacas Loro, Rodillona, Las Ventanas, La Merced (Shimada 1990, 2000; Shimada et al., 2004). Sicán served as a temple-cemetery complex serving ceremonial and ritualistic needs of the elite. A large though dispersed residential population encircled the precinct. The

Figure 4.3: The religious-funerary precinct of Sicán in the Poma National Historic Sanctuary. Map by and courtesy of Izumi Shimada.
valley-pairing strategy is evident with the smaller La Leche Valley cultivated to a bare minimum, partly due to floods that have built up sediments which prevent easy irrigation (Shimada 1986: 172). The larger Lambayeque Valley to the south was utilized primarily for agriculture production (Schaedel (1951b: 240).

Middle Sicán *huacas* revived traditions of monumental construction which had ceased 200 years earlier. The use of chamber-and-fill techniques (another Moche revival) allowed for the relatively rapid erection of these structures and promoted the power and leadership of the elite. The entirety of the Sicán precinct may have been constructed in as little as 100 years. Use of uniquely marked bricks in *huaca* construction signified the contributions of specific communities or social groups that contributed building material to these prestigious structures under a kind of labor tax system (Shimada 1997).

Burial in shaft tombs under and adjacent to the truncated adobe pyramids and platforms at the Sicán site was likely an exclusive right for the elite lineages that governed the state. It is currently hypothesized each *huaca* served as the locus of a single lineage’s ancestor cult worshipped from the temples adorning the tops of the *huacas* and ‘nourished’ by *ushnu* conduits connecting the dead to the living world (Shimada 1986). The living elite therefore used the monumental *huacas* as political propaganda, symbols of their secular authority on earth. *Huacas* simultaneously functioned as tombstones and a locus to worship their cosmologically powerful ancestral dead (Shimada et al. 2004).

Outside the capital precinct, various secondary centers can be identified in the Lambayeque Valley Complex, including truncated pyramids at Túcume, Chotuna-Chornancap (Donnan 1990a, b), Huaca Pared-Uriatrtte, and Illimo, in the Reque drainage,
Huacas Miraflores and Taco. Each of these secondary centers are poorly understood. Middle Sicán structures at Túcume and Chotuna are difficult to study as they are superimposed by later Chimú and Inka architecture. Huaca Taco was destroyed in the 1998 El Niño floods. Pre-Hispanic Illimo was mostly leveled during the Colonial era as the modern town built atop the ruins preventing comprehensive archaeological study.

Yet, a partial window on Illimo, located approximately 20 kilometers north of the modern city of Lambayeque along the old Pan-American Highway, is available. Based on its inferred size and placement less than 5 kilometers to the east of Sicán, there is little doubt Illimo was probably one of its satellite centers. An impressive monumental sector is inferred extending from the old Pan-American Highway east to plaza principal. South of this zone was an extensive cemetery, locally called El Arenal. Rescue excavations in the cemetery area documented over 50 burials (Fernández 1997; Klaus et al. 2004a; Martínez 1996) which included a small Late Middle Sicán elite burial which attests to a central political significance of Illimo. The associated Huaca Pintada, approximately four kilometers south of Illimo, is described by Schaedel (1978) and Bonavia (1985) and was once perhaps adorned with impressive polychrome murals.

Further afield are scores of third- and fourth-tier sites in far more rural settings. Huaca del Pueblo Batán Grande, 13 kilometers east of Sicán (abbreviated HPBG), and was occupied continuously from ca. A.D. 450 to 1950. Excavations of HPBG by the Sicán Archaeological Project in 1979 and 1982-3 provide a vision of rural life during its Middle Sicán component. The oval-shaped mound, 40 meters long, 30 meters wide, and 6 meters in height contained evidence both domestic occupation (Shimada 1981b), and
craft production (arsenical copper smelting) for the state. The residents at HPBG were major consumers of locally produced *paleteada* ceramics (Cleland and Shimada 1998).

Another rural Middle Sicán site is Huaca Sialupe, located approximately seven kilometers northwest of the city of Lambayeque in the lower La Leche Valley where it imperceptibly merges with the lower Lambayeque Valley. Abundant clay deposits are created by stagnated floodwater from the La Leche River (Shimada 2001b; Taylor and Shimada 2001). Huaca Sialupe consists of five low platform mounds built on stabilized sand dunes that together cover a rectangular area 250 meters east-west by 400 meters north-south. Excavations by the Sicán Archaeological Project in 1999 and 2001 documented a Middle Sicán multi-craft workshop at Huaca Sialupe Mounds I and II with at least one attached cemetery on the eastern slope of the workshop and three domestic house mounds still occupied today. The artisans produced sumptuary ceramics, arsenical copper items, and gold objects around A.D. 1000 (Shimada and Wagner 2001). Emphasis was placed on mold-based, decorated single and double-spouted bottles, demonstrated by the extensive production debris recovered, which included over 25,000 diagnostic sherds, 2000 molds, and 100 matrices (Shimada and Montenegro 2002).

Huaca Sialupe was probably a satellite community of the inferred regional Sicán center of Huaca Pared-Uriarte one kilometer to the south. The Huaca Pared-Uriarte complex was built around a plaza which on a smaller scale mimics the layout of the capital of Sicán 22 kilometers to the northeast. Interestingly, the Sialupe artisans almost certainly did not cater to the material needs of the elites at Huaca Pared-Uriate (Rospigliosi 2007), but ceramics found in the Huaca Loro tombs and the Great Plaza are
chemically and physically indistinguishable from those made at Sialupe; these artisans’ goods were evidently distributed directly into the core.

At the far southern margin of the Lambayeque Valley Complex heartland of the Reque drainage, Centurión and Curo (2003) documented evidence of a specialized Middle-Late Sicán ritual site dedicated to human sacrifice possibly attached to Huaca Miraflores or Taco. Atop Cerro Cerrillos at the margin of the Reque drainage, rescue excavations in 2002 documented a U-shaped temple complex consisting of two superimposed platforms placed on a south-north axis. At least 70 individuals, mostly children and young adult males, had been violently mutilated and buried in the floors of the temple’s principle platform and plaza. However, given the almost marginal location, reproduction of a Moche-style sacrifice and burial program, and a lack of politically-charged Middle Sicán symbolisms, it is likely Cerro Cerrillos functioned largely under the ritual agency of local peoples, not the elite ethnic Sicán (Klaus et al. 2004b).

The Middle Sicán presence in the Zaña river Valley is poorly documented, but rescue excavations by Alva and Alva (1983) at Úcupe documented elaborate, partially intact Middle Sicán murals adorning what would have once been perhaps the principle Middle Sicán political center of the valley. In the Jequetepeque Valley, San José de Moro retained a major position in the regional political, economic, and ritual landscape as it continued to be an active cemetery receiving high-status individuals (Nelson et al. 2000). Castillo (2001:327-328) is unfortunately dismissive and provides a highly questionable characterization of a militaristically conquered and oppressed San José de Moro under Middle Sicán influence which sucked the cultural vitality out of the region.
At the southernmost margins of Middle Sicán society, a provincial mortuary population has been documented at the Huaca Cao Viejo of the El Brujo complex (Franco and Gálvez 2005). Around the end of Moche IV, the Huaca Cao Viejo was largely abandoned until the Transitional Period. Provincial Middle Sicán burials were placed in and around the east face of the mound. Franco and Gálvez (2005) consider the possibility that this heavily looted cemetery may have been composed of high, middle, and low status residents of nearby communities. Beyond that, very little is known about the nature of life and settlement in a Middle Sicán province or the modes of interaction with the state’s political economy.

The Middle Sicán Art Style and Craft Production

The Middle Sicán art style would seem to represent major innovations, discontinuous with antecedent religious and artistic styles including the narrative Moche tradition. Closer study shows Sicán art and iconography resulted from a fusion of earlier Moche and contemporaneous Wari and Pachacamac traits, blending selected elements into a new overall configuration (Shimada 2000: 52). Still, a relatively restricted set of images and subjects served in Sicán iconography. Human representations were limited while zoomorphic forms were somewhat more common (Zevallos 1990; Shimada 2000).

The hallmark of Middle Sicán art was the corporate image of the celestial “Sicán Deity” This icon dominated the iconography of all expressive media, such as ceramics, metal objects, murals, and textiles. Eminently recognizable features include characteristically upturned, comma or almond-shaped eyes, a triangular nose, and
stylized ears (Figure 4.4). Systematic study shows the basic icon is directly related to the raptorial bird of the Early Sicán canon synthesized with Moche and Wari deity concepts (Menzel 1977). In the new Sicán format, the Deity connoted cosmological symbolisms of its omnipotent power related to the sun, moon, and water (Shimada 2000: 52, 53). Common reference to the icon as a ‘Huaco Rey’ (King Ceramic) and identification as the image of Naymlap himself is exceedingly misleading and erroneous. Sicán craft production was the major avenue for the propagation of state ideology via iconography. Middle Sicán metals – rather than ceramics – demonstrate the highest levels of technical and artistic qualities. Metalwork has been defined as the “aesthetic locus” of Middle Figure 4.4: Characteristic Sicán Deity iconography:
A. Middle Sicán burial mask placed around the head of the Huaca Loro East Tomb

principle personage. Photo by Yutaka Yoshii/PAS and courtesy of Izumi Shimada. B. Middle Sicán blackware vessel, Huaca Las Ventanas. Photo by Haagen Klaus and courtesy of the Museo Nacional Sicán.
Sicán art and craftsmanship (Shimada et al. 2000). Experimental smelting in both replica and original furnaces reveal the high demand on raw materials, fuels, and intense labor by the production of metal objects in Middle Sicán society (Goldstein 2007; Shimada 1985). Middle Sicán craft production – metalwork, ceramics, lapidary, and weaving alike – were part of a tightly integrated sumptuary goods production system (Shimada 1998).

Gold, silver, and tumbaga (arsenical copper alloyed with small amounts of silver and gold) metal items were restricted to ceremonial and ornamental use by the socially elite (Shimada et al. 2000). Through the invention of arsenical copper smelting, the Sicán initiated the Bronze Age in Peru. Arsenical copper replaced copper as the primary utilitarian, trade, and ritual metal (Bezúr and Shimada 2002). Metal smelting was also ritualized or mystified. Food and fetal camelid offerings were associated with smelting furnace construction and abandonment (Shimada 2000: 55). Furthermore, the vast majority of metal items were produced for ceremonial and funerary uses, imbued with religious and cosmological significance in addition to the considerable economic and social considerations of metal in general.

As part of the cross-craft interactivity, ceramic art emulated metalwork. Middle Sicán fineware ceramics were predominantly mold-made, highly polished blackware vessels with accompanying representations of the Sicán Deity. Many fineware vessels were distinctive with single or double-spouted forms, the latter featuring bridge between the opposing spouts. The use of logographic or geometric designs on the paddles used to form vessels was another major innovation of Middle Sicán artisans. By A.D. 950,
paleteada technology had become widespread throughout the northern Peruvian coast and persists to this day in and around Mórrope (Cleland and Shimada 1998: 112).

Middle Sicán Economy

Subsistence strategies and economic power were central organizational features of Middle Sicán society. Middle Sicán economy followed a self-sufficient horizontal strategy, exploiting local resources along the coast up to about 1000 meters in attitude. Large-scale irrigation agriculture of the Lambayeque Valley Complex region produced several staple cultigens, including maize, gourds, squash, beans, avocados, and cotton (Shimada 1982: 172-3) while domesticated camelids were likely the principle dietary source of protein. Camelids also served as beasts of burden, functioning as the mechanism of trade and transport. Middle Sicán fishers continued to exploit the rich marine resources and formed the other pillar of Middle Sicán subsistence and economy.

Long-distance trade was integral to Middle Sicán economic power. Expansion and hegemony was not accomplished through apparently peaceful economic means. A vast trade network was established in as little as 50 years and spanned nearly 1000 kilometers north to south (Shimada 2000: 59). It is hypothesized coastal Sicán products like maize, cotton, fish, metal blanks, and ingots were commodified items as near as highland Cajamarca (Shimada 1982). In return, Cajamarca could offer access to sources of irrigation water and raw materials unavailable on the coast. This particular relationship may have been the “initial kick” in an amplification of regional and interregional economies with the Sicán elite serving as administrators (Shimada 1982: 179). Various
items found in Middle Sicán elite tombs were imported, exotic materials: *Spondylus* and *Conus* shells are common off coastal Ecuadorian waters while amber and emerald items originated in Colombia (Shimada 2000: 58). The dart throwers found in the Huaca Loro East Tomb were almost certainly manufactured in coastal Ecuador (Shimada 1995). Middle Sicán ceramics have been found west to the Marañon and Chinchipe Rivers, both major sources of placer-mined gold ore (Shimada 2000: 59). The southern boundaries of the Middle Sicán trade network are unclear, but tentative iconographic evidence considered by Shimada (1995, 2000) suggests Middle Sicán-Tiwanaku interaction.

*Middle Sicán Social Organization: A Multiethnic Culture*

The current reconstruction of Middle Sicán social organization is based in a multidimensional approach using archaeological data, mortuary patterns, and skeletal biological, and molecular genetic data (Shimada et al. 2004, 2005). Overall, Sicán culture appears to have been a complex, multietnic, hierarchical society comprised of three to four social classes organized along fairly ridged social boundaries. Three or more cultural traditions or ethnic groups may have coexisted in Middle Sicán society. Though a variety of criteria can be used to distinguish these social classes and ethnic groups, the access to and use of metals in funerary rituals was used as a highly visible and intentional marker of social status in this relatively rigid hierarchical society (see Table 5.1)

In terms of vertical class distinction, at the apex of Middle Sicán society was a small, ethnically distinct ruling class of elites or nobles who wielded political, economic, and religious power over the rest of the population. These individuals were the prime
movers, incarnations of the Sicán Lord on earth, establishing and maintaining the
sociopolitical integration. There seems to have been little to no boundary between the
roles of political leader and priest. Middle Sicán government probably resembled the
Medieval Vatican, in that it was a politically and economically powerful theocratic state.

The Middle Sicán elite may have been both culturally and biologically foreign to
the north coast of Peru, worshiping their own ancestor cult and practicing unique
mortuary patterns (Shimada et al. 2004). Sicán elites are exclusively associated with gold
and silver items in their burials. Mitochondrial DNA patterns of Moche and Sicán elites,
tomb retainers, commoners, and sacrificial victims have been recently studied (Shimada
et al. 2005). Inferred Moche or Mochica individuals bear strong mtDNA affinities to
local central Andean populations. Though results possibly are affected by small sample
size, inferred ethnic Sicán elites are most closely related to northern Andean populations,
suggestive of an ethnic Sicán southward migration from coastal Ecuador into the
Lambayeque Valley Complex after A.D. 750. Bio-ethnic boundaries seem quite distinct.
Low ethnic phenotypic variability and maintenance of north Andean haplogroup affinity
indicates endogamy and patrilocality were mechanisms of elite kinship (Shimada et al.
2004). Little or no gene flow and intermarriage with local populations is apparent.

Some horizontal elite class differentiation is evident. As mentioned earlier, the
most sumptuous Middle Sicán burial (including several small medium- and low-quality
gold items) outside of the Sicán precinct was documented in nearby Illimo during rescue
excavations in 1996 by the National Brüning Archaeology and Ethnography Museum
(Martinez 1997). Mortuary and dental phenetic patterning of the principle personage at
the center of the tomb (the ‘Warrior of Illimo’) demonstrates strong local affinity and lacks biological similarity to the ethnic Sicán. The tomb may illustrate one strategy of Middle Sicán sociopolitical integration: incorporation of local lords from pre-existing *parcialidades* into the lower echelons of elite power (Klaus et al. 2004a).

Another group associated with elite status both iconographically and archaeologically are women wearing lip plugs, or labrets. Labretted females, linked to the ethnohistorically-known Tallan ethnic group of far northern Peru and southern Ecuador (Cordy-Collins 2001a) are depicted in Middle Sicán iconography with upturned eyes and often holding or nursing a child. Bioarchaeological study of one labretted female suggests local Lambayeque biological affinity (Klaus et al. 2004a). While the presence of an intrusive group of elite Tallan women associated with the elite Sicán is a very distinct possibility, emulation of Tallan style seems to have been practiced by some elite women.

Underneath the ethnic Sicán elite served a larger group of lower nobility marked by the presence of *tumbaga* alloy metal items in their graves (Shimada 1995). These individuals may have been responsible for more earthly and regional governance including labor organization. To date, virtually no lower nobility tombs or skeletons have been scientifically excavated, and the identity of these individuals remains a mystery. It is yet to be determined if the lower nobility were low-ranking, ethnic Sicán elite, high-ranking, local peoples, or a mixture of both.

Social commoners, buried with utilitarian arsenical copper alloy objects, were the laborers, agriculturalists, fishers, and artisans who represented the Middle Sicán society’s functioning heart. Broad-stroke “commoner” designation applies to the mostly sedentary,
local populations that continued to exist in the region dating back to Moche and Gallinazo times. Judging from ethnohistorical and archaeological data, the social commoner class was certainly far more diverse, divided along the lines of economically-specialized *parcialidades* as distinct, endogamous groups of economically specialized fishers, farmers, ceramic artisans, metal smiths, llama herders, and the like.

*The Mochica Ethnic Group*

Several lines of evidence are beginning to characterize the identity of the Middle Sicán commoners in the Lambayeque Valley Complex. The majority of Middle Sicán population was likely composed of ethnically Mochica individuals – descendents of the earlier Moche culture (Klaus 2003). Despite changes in material culture or political organization, a Mochica practices and identity seem to have thrived under the surface of subsequent cultural developments in the Lambayeque Valley Complex. One window on Mochica identity is found in material culture. Distinctly Mochicoid art styles persist in the Lambayeque region after A.D., 750 and are often fused with the Middle Sicán style.

Fineline decorated Middle Sicán vessels are present in museum collections. A painted textile recovered from a looted tomb by featured a Sicán cosmovision, at the center of which was the Sicán Lord (Shimada 1995: 136-7, Figure 120). However, the entity was posed with a ceremonial *tumi* knife in one hand and a decapitated human head held by the hair in another – directly reproducing the earlier Moche Decapitator motif. Another painted textile from the Huaca Loro West Tomb featured marching warriors each holding a decapitated head which echoes Moche depictions of marching warriors
associated with human sacrifice. It is quite probable the Sicán elite actively incorporated and manipulated such local and deeply rooted symbols into their iconography to legitimize their hegemony and configuration of religious ideology.

Reproduction of other material culture hallmarks and traditions may have been manipulated and reproduced entirely by the local populations themselves. For example, at the Huaca Sialupe workshop a mold of kneeling warrior was recovered. This is classic pose in Moche art, but the warrior featured upturned Middle Sicán eyes. Elsewhere at Huaca Sialupe, ceramics decorated by polychrome war bundle motifs were also found. A number of looted Middle Sicán ceramics in the collection of the National Brüning Archaeology and Ethnography Museum in Lambayeque and elsewhere depict sexual motifs following the Moche style including depictions of copulating couples, felatio, and a seated Sicán Deity holding a massive erect phallus in between his legs. Many secondary icons also continue in local material culture, most notably the stepped pyramid icon. Stepped pyramid icons appear as far back as Cupisnique and Salinar periods. In the Moche canon, the stepped pyramid is clearly linked to representations of *huacas* and associated politico-religious power. The symbolism may ultimately derive from an abstracted mountain which highlights its cosmological significance.

Perhaps the most significant ethnic markers are found in the conservative Mochica burial ritual of that crystallized in the first few centuries A.D. and persisted until contact: interment of an extended corpse aligned on a north-south axis in a simple pit no more than two meters in any dimension, accompanied by ceramic, metal, or camelid offerings (described in detail in Chapter 5.) Recent evidence also demonstrates persistent
and pervasive practices of prolonged primary burial, manipulation of skeletal remains, and secondary burials that maintained links between the living Mochica and their ancestral dead (Klaus and Shimada 2003).

In sum, a Mochica substratum in the late pre-Hispanic Lambayeque Valley Complex signals a unique persistence of a local identity, cultural memory, and practical consciousness that outlived all imposed political systems including the Sicán. Practice of this identity by local peoples reinforced social boundaries and group solidarity especially in the context of intense interaction with Sicán elites and later Chimú and Inka groups.

Perception of the Mochica ethnic group adds to the complexity of possible north coast evolutionary schemes (Figure 4.5). Much remains to be resolved, however, regarding the origins of the Mochica ethnic group or substratum of the late pre-Hispanic period. It is logical to infer the Mochica were descendants of earlier Gallinazo peoples who participated as members of the Moche culture. Yet, how and when do we differentiate Gallinazo from Mochica? Was the Moche V collapse an event of ethnogenesis that recast a Mochica ethnicity in its wake? Was there an earlier “Mochefication” of Gallinazo populations? What is the relationship and status of the Gallinazo substratum in the late pre-Hispanic Lambayeque Valley? Did they directly evolve into this pattern referred here as “Mochica?” How widespread was the expression of ethnic Mochica customs on the north coast, or was it a phenomenon focused in the Lambayeque region?
Figure 4.5: Models of sociopolitical and cultural developments on the north coast of Peru. Illustration by Haagen Klaus, based on Shimada (1994a: 67, Figure 4.2).
At least one Sicán commoner subculture, probably directly associated with the Mochica, can be identified via ethnoarchaeological and archaeological patterns of paleteada pottery production (Cleland and Shimada 1998: 141). They were set apart from other potters by their portable, household-based, paddle-and-anvil production technology. Paleteada potting was additionally self-sustaining and exempt from state control. Shimada (1995: 148) infers a fourth and lowest ranked social tier: commoners who do not have any metals associated with their burial.

*Sociopolitical Reorganization of the Late Sicán Period*

The Middle Sicán state suffered an abrupt and violent collapse after only a few hundred years of dominance. Around A.D. 1020, a strong El Niño struck and a shift to a 30-year period of drought began. This was associated the systematically torching of the temples atop the huacas at Sicán in a concerted effort to remove the leadership. Aggrandizement of what may have been locally perceived as a foreign people and their ancestral cult that was extremely resource-intensive and imaginably fostered undercurrents of resentment among the general Mochica populace (Shimada 2000: 61). Perceived failure of the elite to effectively mitigate the supernatural elements of the crisis was another possible factor leading to the destruction of the temples at Sicán (Shimada 2000: 61). The Sicán precinct was largely abandoned, signaling the dawn of the Late Sicán period.

The Late Sicán period has yet to be studied in the same depth. It is clear the Sicán Deity disappeared immediately though virtually all secondary icons continued. This was
not a time of overt collapse, but a reorganization resembling that of Moche V. Aside from religion and politics, there is little to suggest daily life changed during this transition. The Late Sicán period featured the establishment of a new capital at Túcume where the Lambayeque and La Leche drainages merge. Discernable Late Sicán influence continued into the northern Piura region while southern influence extended no further south than the Jequetepeque region (Shimada 2000:62-3).

Late Sicán political leadership likely returned to local or indigenous Mochica elites. Unprecedented spatial clustering of monumental huacas at Túcume may represent a symbolic reunification or reconfiguration of local elite lineages (Shimada 2000: 63). During the Late Sicán, some of the largest monumental structures ever constructed on the north coast took shape at Túcume. Túcume has only recently undergone archaeological study (Heyerdahl et al. 1995), revealing it as a massive, multi-component ceremonial-administrational center rather than housing any kind of a large urban population. Most Late Sicán constructions are superimposed by later Chimú and Inka constructions and ritual remains. Rescue excavations by J. Centurión in 2005 in the Reque drainage at Cascajales documented the presence of several Late Sicán burials including a sacrifice victim which likely portends existence of an important Late Sicán polity in the southern Lambayeque region. At Pacatnamú approximately 100 kilometers south of Túcume, another prominent Late Sicán center emerged (Donnan and Cock 1986).
DEVELOPMENTS UNDER CHIMÚ IMPERIAL RULE

Chimú Society and Empire

Around A.D.1375, the dynamic competition between the north and south zones of the north coast tipped back in favor to the southern zone. The historically known Chimú Kingdom, a predatory imperial polity centered in the Moche Valley, began to expand out of its homeland and established the largest pre-Hispanic coastal state of Andean history. Much of the modern conception of the Chimú has been derived from the Chan Chan-Moche Valley Project directed by Michael E. Moseley and Carol J. Mackey from 1968-1976 (Moseley and Day 1982). The Chimú capital of Chan Chan was the largest pre-Hispanic Andean city encompassing nearly 25 square kilometers. Immense quantities of material wealth and human capital went into the construction of the site which consisted of nine hierarchically organized Cuidadelas, or monumental royal compounds likely built in pairs (Cavallaro 1997), 35 smaller elite compounds, and dispersed barrios or neighborhoods. The Cuidadelas, formed from walls up to 10 meters tall and 650 meters long, covering up to 200,000 square meters (Day 1982). Towards the southern end of the Cuidadelas were massive burial platforms believed to function as a mausoleum for an ancestor cult pertaining to the dead king and his corporate group (Conrad 1982, 1990). The spatial relationships inside Cuidadelas may have symbolized nothing less than unquestionable power and immutable order (Shimada 2000: 97). Perhaps as many as 12,000 artisans engaged in weaving and metalworking at Chan Chan (Topic 1990) and were probably organized along parcialidad principles.
Shimada (2000:100) identifies chronology as the Achilles heel of Chimú archaeology. Dates derived from current architectural and ceramic seriations, ethnohistory, and radiocarbon dates remain controversial and inadequate. The Chimú origins are poorly characterized. Cavallero’s (1997) conservative multivariate seriation of \textit{Ciudadela} architectural features places the founding of Chan Chan sometime between the twelfth and thirteenth century A.D.

A dynastic history recorded in 1604 by an “Anonymous Trujillano” describes the founder of the Chimú, Tacaynamo, arriving by balsa raft in the valley of Chimor (Moche Valley) who was sent by great lords from the north. If this lore reflects historical events and people, the timing of Tacaynamo’s arrival could roughly correspond to the Middle Sicán collapse. One may consider the extraordinary possibility that Tacaynamo was a fleeing Middle Sicán lord who sought refuge and an opportunity to reestablish his political base (Shimada 1990: 371). The 1604 history claims the first wave of expansion involved the consolidation of the Moche Valley proper under the second king, Guacricaur. El Niño-related disruptions that destroyed intra-valley irrigation networks ca. A.D. 1100 have often been cited as the “initial spark” of Chimú expansion. Kolata (1990:135) envisions this event caused the Chimú economy to shift from provincial exploitation of local resources to a “parasitic extraction of foreign resources.” This may be inaccurate as the second wave of expansion ca. A.D. 1200 under the third named king Ñançenpinco dates to nearly a century after the flood episode. The second expansion reached the banks of the Jequetepeque River, and the province was ruled from Farfán, where a complete \textit{Ciudadela} with accompanying burial platform was erected (Mackey
2006). The third wave of Chimú expansion under King Minchacamanhat engulfed the Lambayeque Valley Complex and extended north to Tumbez (Richardson et al. 1990). Chimú intrusion into Lambayeque is bracketed by multiple radiocarbon dates between 1350 and 1400 (Shimada 2000:102).

Chimú art was neither innovative nor refined. Motifs were static and repetitive. Earlier traditions of narrative art were extinct. Realistic depictions in ceramic art as well as the reemergence of the stirrup-spout ceramic bottle design were apparently archaic Moche revivals. Ceramics were typically monochrome dark grey reduced wares made from simple two-piece molds and do not display careful craftsmanship. The aesthetic locus may have instead rested again with metals and textiles. The Chimú state was secular and their art lacks strong religious or mythological overtones. A deity icon is noted but despite similarities with the Sicán Deity, it is most likely a hybrid Moche-Wari deity and did not possess the same attributes as the Sicán Lord (Shimada 2000:105).

The Lambayeque Region under the Chimú Empire

The Sicán heartland of the Lambayeque Valley Complex had much to offer to the Chimú political economy. The presence of Chimú governors in the Lambayeque region articulated with the empire’s concern to maintain highly productive agricultural hinterlands to support the growing population at Chan Chan (Cabello 1586 [1951]: 327-330). Containing one third the population and arable land of the north coast, the Lambayeque region was a bonanza to the imperial treasury. Chimú administrators pushed the extent of cultivable land in Lambayeque to its pre-Hispanic maximum, perhaps some
30 percent greater than the modern extent of farmland (Shimada 2000: 103). The Sicán trade network was taken over by the Chimú. Other evidence strongly indicates Sicán master craftsmen and metal smiths were taken to Chan Chan as Sicán metalworking technologies and traditions were directly incorporated into Chimú craft production. The Lambayeque region more than doubled the productive resources under Chimú control helping to underwrite one large, final expansion of Chan Chan.

Chimú administrators were shrewd. They did not interfere with long standing social institutions and know-how (Shimada 2000:103). Administration of the Lambayeque Valley Complex followed the imposition of a standardized, three-tiered administrative hierarchy and use of direct or indirect strategies, ranging from state-imposed resettlement or co-option of local paramount lords (Shimada 2000: 104). Administrators at low-level provincial centers were likely charged with the control of agricultural production and maintenance of irrigation canals.

Túcume was co-opted as the Chimú provincial administration center, evidenced by construction of audencias and extensive expansions of pre-existing compounds. The Huaca Larga pyramid which grew to over 700 meters in length, 280 meters wide, and 20 meters high (Heyerdahl et al. 1995: 79-80, 192-193). Polychrome murals depicting diving sea birds and maritime-themed adobe friezes decorated various structures. Local elites may have ruled from Huaca Larga, presumably sponsored by the Chimú lords of the Moche Valley. Yet, the identity of the Túcume elites remains unclear. Testing the hypothesis of the presence of foreign Chimú administrators in residence at Túcume is a worthwhile task for future bioarchaeological investigations of Chimú statecraft.
Audencias were also constructed at population centers at Saltur and Cinto, the industrial center of Cerro Huaringa, and at La Puntilla that overlooked the strategic Taymi canal intake (Fernández 2004). Hybrid Sicán-Chimú ceramic styles were widely produced and distributed. The practice of *huaca* hostage – removing sacred objects to hold their followers in bondage – may have occurred at Chotuna (Donnan 1990b) and at Túcume with the inferred removal of ancestor mummies (Heyerdahl et al. 1995).

Úcupe, an inferred Sicán provincial administrative center, was co-opted by the Chimú to serve the same function. The heavily damaged Chimú component may have included a funerary platform and high status burials (Klaus and Wester 2005; Wester 1996). Palateada production continued, Tschauner and colleagues’ (1994) excavation of a specialized ceramic workshop at Pampa de Burros 10 km east of Cinto reveal the production of provincial Chimú utilitarian ceramics without on-site supervision. The autonomous residents also carried out the distribution of these wares outside the redistributive economy of the Chimú state.

**INKA CONQUEST ON THE NORTH COAST**

*Inka Invasion and Administration*

Inevitably, the Chimú came into contact with the Inka state. Inka expansion was often characterized as first involving initial diplomatic overtures to local lords. If these advances were accepted, the lords were fêted, rewarded with precious metals, cloth, women, and were allowed to maintain their offices (Ramirez 1990). Subjugation was
refused by king Chimu Capac, and the two great empires of Andean prehistory engaged in direct conflict. According to Cabello Balboa (1586 [1751]: 314, 317, 319, 331), Inka armies led by Topa Inca Yapanqui around the year A.D. 1460 fought and defeated the Chimú. A year later, Inka marched down the coast following their conquest of Ecuador and for the first time directly contacted north coast polities.

One of the most significant impacts on life on the north coast after being incorporated into the Inka province of Chinchasuyu involved land tenure (Ramírez 1990: 519-525). Land was set aside for exclusive, centrally-controlled state production and access to hunting grounds, fishing waters, forest, and mines. The Inka practice of *mi’ta* (labor tax system) resettled entire communities or specialized *parcialidades* to distant regions. The impact of *mitamaes* relocated from the highlands or south coast inside the north coast is generally unknown beyond the fact that the strategy was practiced. Considering known historical relationships, close socioeconomic links remained between *mitamaes* and their distant paramount lords (Ramírez 1990: 528-29). Further cultural and linguistic barriers probably inhibited significant cultural interchange or gene flow between indigenous populations and transplanted enclaves of foreign peoples.

The Inka also sought to control the unique coastal system of economic exchange, and began to convert ceremonial events into opportunities for barter and trade that would ultimately become tribute (Ramírez 1990:532). Ultimately, Inka impacts were probably quite limited as: (1) the north coast was subjected to Inka hegemony for less than a century; (2) the coast was not as intensely centralized as the Inka heartland; and (3) the Inka encountered a highly organized north coast culture whose deeply entrenched
customs and traditions could not be rapidly changed by imperial mandate (Ramírez 1990:532). Ultimately, local political structures, prestige systems, ideologies, languages, economic focus, and identities remained relatively unchanged.

The Inka in Lambayeque

Inka-administered Lambayeque is minimally understood. Many aspects of Chimú statecraft and administration may have been adopted by the Inka. As long as local paramount lords were compliant, hereditary political offices were respected. Local lords would have been in control of the day-to-day management of the land. Resistance to the Inka was countered with decisive force. In the Jayanca region along northern frontier of the La Leche drainage, armed resistance to Inka rule led to the imprisonment and permanent deportation of the curaca to Cuzco (Cabello Balboa (1586 [1751]: 331).

Túcume remained the paramount provincial center in the Lambayeque region as the entire site thrived. Heyerdahl and colleagues (1995) infer Inka administrators symbolically converted Cerro La Raya, the natural isolated mountain that dominates the site, into a religious and political monument. At Huaca Larga, it is possible that a combination of local elites along with Inka administrators directed the local political economy. Buried in Huaca Larga (Room 1 Platform 2), a well-preserved mummy bundle wearing accoutrements and dress of the Inka nobility was suggested to be “the last Inca governor of Túcume who controlled the entire Lambayeque region” (Narváez 1995a: 96). However, the possibility of a local paramount lord emulating the symbols of Inka imperial authority and legitimacy should be considered as seriously.
of the Sacred Stone persisted including deposition of classical Inka figurines (Narváez 1995b:107-111). The most recent excavations in the small plaza immediately north of the Temple have uncovered a late pre-Hispanic ritual program that resulted in nearly 100 mutilated young adult male sacrifice victims (Toyne 2005-6: personal communications).

The primary north-south Inka trunk road ran through the central Lambayeque Valley Complex attached two which were at least two Inka imperial *tambos*: Tambo Real in the La Leche Valley and Tambo de Posope near Cerro de Pátapo (Fernández 2004: 72). Hayashida (1998) studied two craft workshops (Tambo Real and La Viña) associated with administrative centers in the La Leche drainage. Potters were clearly producing polychrome wares that imitated Cuzco Inka motifs and but also used traditional north coast production technologies and designs including pinching techniques and *paleteada* at Tambo Real. Hayashida (1998) also considers the possibility these two segregated craft producing communities – Tambo Real potters specialized in domestic *ollas* and *crisoles* while those at La Viña produced mostly mold-made jars – were distinct pre-existing *parcialidades*. The chemical composition of ceramics sampled at Inka Túcume is distinct from pottery examined by Hayashida. Heyerdahl and colleagues (1995) consequently infer the distribution of pottery produced among these two La Leche Valley *parcialidades* may not have extended much beyond household or community levels. Changes to local redistributive economic patterns during the Inka period begs further investigation. Elsewhere, direct Inka imperial presence seems more ephemeral.

Overall, ethnohistoric and archaeological evidence show Lambayeque Valley Complex populations remained large and economically productive despite the end of the
Middle Sicán polity and two waves of imperial conquest. Continuing use of the inter-
valley Antigua Taymi, Collique and Antigua Jayanca canals is matched by large hillside
urban settlements at Salture, Sipán, and Cinto in the mid-Lambayeque Valley (Shimada
2000) and countless smaller dispersed settlements and hamlets.

CONCLUSION

The pre-Hispanic cultures the north coast of Peru were the products of some
10,000 years of social, environmental, and historical dynamism contingent on both
autogenous cultural developments and external influences. The Middle Sicán society in
particular represented the ultimate florescence of in situ Lambayeque Valley Complex
development. An underlying theme in this chapter is the multiple intertwined historical
contingencies that shaped the cultural configurations between Moche, Sicán, and the
Mochica ethnic group. In many ways, these biocultural contingencies partially illustrate
the complex evolution of innovative political and economic systems. At the same time,
continuity of local populations and associated cultural substrata are equally evident.
Despite major cultural changes and periods of external domination, local populations,
descendant from the Gallinazo and Moche, continued to exhibit continuity with their
local heritage in the Lambayeque Valley Complex.
CHAPTER 5

THE MORTUARY ARCHAEOLOGY OF THE NORTH COAST OF PERU

The Central Andean mortuary record is one of the most rich and complex of human history. In many ways, the north coast of Peru is a “natural laboratory” for mortuary analysis and bioarchaeology. The desert environment provides excellent preservation of bone, skin, hair, brain tissue, burial textiles, cane coffins, gourds, food offerings, and evidence of pre- and post-interment ritual activities. Yet, a wide range of conceptual, methodological, and taphonomic issues confound straightforward study.

This chapter has three aims. First, the history, current orientations, and future of mortuary theory in Andean mortuary studies will be examined. Second, a comprehensive diachronic and regional characterization of north coast burial patterns follows, which is particularly important as many north coast mortuary studies are not well-contextualized. Special emphasis is placed the definition and development of Moche, Sicán, and ethnic Mochica burial traditions. The third section summarizes an emerging understanding of physical, ritual interaction between the living and the dead on the north coast of Peru.
OVERVIEW AND PROBLEM CONTEXT

Over the past century, thousands of human burials have been encountered in scores of Central Andean sites. Burials have long been used as a means to an end: decorated grave goods defined chronologies and were the raw material for iconographic studies. The lack of value placed on other material and non-material elements of burial has been compounded by the relative absence of physical anthropology in Andean anthropology, partly due to the failure to integrate a physical anthropologist in the 1940s Virú Valley Project. Burial analysis became equivocal with the study of grave lots.

The material culture of many pre-Hispanic coastal societies provide unique evidence of mortuary rituals. Moche narrative art included many depictions of death and the dead (Benson 1975, 1997; Bourget 2006, Hocquenghem 1981). Bourget (2006)’s outstanding study of Moche sexual and death imagery provides a compelling interpretation of mortuary ritual relating to meanings of fertility and rulership. The iconography of the Moche Burial Theme has been recognized as a mix of symbolic and realistic elements (Donnan and McClelland 1978; Hill 1998), though Bourget’s (2006) recent study effectively casts doubt on a strictly representational vision of the Burial Theme itself. Elsewhere the Moche represented burial in ceramic bottle sculptures (Bourget 2006: 188, Figure 4.2; Castillo 2000: 124). Bourget (2006: 199-201, Figure 4.16) identified representations of a specialized Moche mortuary structure or charnel house. Wooden models depicting funeral processions are known from Chimú and Chancay cultures (Uceda 1997a). Some Recuay ceramics may represent dead individuals
wrapped in *fardos* and funerary structures (DeLeonardis and Lau 2004; Lau 2000: 187; Figure 9). Still, this rich artistic corpus is but one line of evidence of ancient burial rituals and cannot be treated as sufficient reflections of actual ritual practices.

Studies of Andean burials can also be enriched by ethnohistoric sources. Throughout the Colonial era, Spanish officials documented local customs, beliefs, and histories to generate evidence in the persecution of so-called indigenous idolaters. Such efforts unintentionally produced a wealth of remarkable information. However biased or incomplete, ethnohistories included descriptions of funerary rituals (i.e., Cobo 1991 [1653]; Guaman Poma de Ayala 1980[1615]; Rowe 1948; Salomon and Urioste 1991). A major caveat involves these writers describing rituals of ethnically Chimú or Inka peoples during the sixteenth and seventeenth centuries. Time depth, social dissimilarities, and historical impacts of European conquest make one-to-one extensions of ethnohistoric observations to archaeological patterns difficult to justify. Thus, applicability and analogical use of these sources must be carefully and systematically qualified.

Despite these many positive factors, any attempt to archaeologically reconstruct mortuary behaviors or ancient Andean social organization requires great caution and multiple lines of evidence. Burial samples in Peru are often fundamentally skewed. Looting has destroyed much of the burial record. Modern *huaqueros*, or grave looters, are largely driven by illegal national and international demand for ceramic grave goods and textiles. The exact number of tombs and cemeteries destroyed by their activities will probably never be known. Until the late 1970s, the Poma National Historic Sanctuary was the site of the most organized grave looting in the Americas. Organized gangs
systematically looted cemeteries and tombs six days a week aided by heavy machinery, and left in their wake at least 100,000 loot pits (Vreeland and Shimada 1981). Even if every unlooted burial could be accounted for, the available mortuary record is a fraction of what once existed. This leads to a semi-representative sample at best that biases archaeological samples in ways that are difficult to assess. There also seems to be a skewed nature of grave looting itself, as *huaqueros* search for richer tombs and sometimes may not systematically sack “poorer” cemeteries.

Archaeological bias leads to excavation of the most conspicuous monumental sites (e.g., Alva and Donnan 1994; Castillo and Donnan 1994; Donnan 2001; Donnan and Mackey 1978; Franco et al. 2001; Strong and Evans 1952; Ubbelohde-Doering 1967, 1983). Almost no extant burial samples have been developed via explicit sampling design. In other situations, cemetery excavations were inspired solely by iconographic or ceramic studies. When an intact cemetery is studied it is usually found by accident or excavated in rapid rescue of salvage operations, as in the case of the Puruchuco-Huaquerones cemetery on the outskirts of Lima (Cock 2002). Given the disproportionate attention to Moche burials on the north coast, understandings of antecedent and subsequent mortuary patterns have suffered.

*Theory in Andean Mortuary Archaeology*

Since the early days of scientific archaeology in the Andes, a descriptive paradigm was dominant. Burial descriptions of some kind often accompanied other findings (Bennett 1939; Donnan 1973; Larco Hoyle 1941, 1944, 1945a, b, 1948; Strong
and Evans 1952; Ubbelohde-Doering 1967; Uhle 1913, 1991 [1903]). These works were part of the late nineteenth and early twentieth century ceramic-centric tradition. By the 1950s, gravelots had been chronically oversampled and generated large artifact collections (Shimada 1994a:16). The quality of documentation and description during this era is variable but on the whole is quite poor. For example, Bennett (1939) does not provide burial photos or drawings but only terse and internally inconsistent burial descriptions. Donnan’s (1973) study of Moche funerary ceramics in the Santa Valley similarly involved some burial excavations, but skeletons were represented as stick-figure line drawings, and only basic mortuary data is presented. While Donnan and colleagues’ approach to mortuary data has become more sophisticated over their years much to their credit, even Donnan and Cock’s (1997) valuable study of late Moche burials at Pacatnamú are essentially descriptive and burial drawings are idealized rather than realistic renderings. Castillo and Donnan (1994b), Donnan and Cock (1997), Narváez (1995a, 1996) illustrate persisting descriptive paradigms among both Peruvian and foreign scholars. Incomplete publication of burial data also hinders the possibility of conducting multivariate mortuary analyses post facto.

This “theoretical wasteland” began to be populated by works guided by processual thinking in the 1970s. Dwyer and Dwyer’s (1975) analysis of Paracas burial is one such early attempt. Primary interpretations were based on textile iconography and a literal application of ethnohistory while associated human remains are ignored. Conversely, Menzel (1977)’s pathbreaking revisitation of Uhle’s early work involved detailed descriptions of burial patterns to reconstruct Ica Valley society before and after
Inka conquest. Menzel’s contextual approach predates the postprocessual concept and highlights the complementary integration of ethnohistoric and archaeological data.

Donnan and Mackey’s (1978) diachronic study of Moche Valley burials was guided by representationalist and overly-broad generalization in their study of 61 Moche graves - most recovered from bulldozed trenches on the east side Huaca del Sol- as being representative of Moche mortuary patterns and social structure as a whole. Similar thinking plagues Quilter’s (1989) study of mortuary patterns at the central coastal Preceramic site of Paloma in the Chilca Valley, especially in that social structure is assumed to be directly represented in burial.

Arriaza (1995) similarly concludes treatment of the dead among northern Chile’s Chinchorro hunter-gatherer-fisher peoples reflects an egalitarian social organization that lasted for over 4000 years. Direct social representation in mortuary patterns is assumed, and samples treated as representative without justification. Alternative hypotheses of status manipulation and the symbolic creation ‘egalitarian’ burial patterns might be worth considering as well. Yet, Arriaza’s work does stand out in its discussion of mortuary theory and analogy as theoretical considerations help guide interpretation. Weiss’s (2003) explicitly theoretical and well-contextualized re-visitation of Chinchorro mortuary patterns provides a dynamic explanation of Chinchorro mortuary practices in which she considers the implication of mobile Chinchorro peoples burying their dead in distinct, permanent cemeteries.

Dillehay’s (1995b) edited volume is perhaps the most serious and theoretically-inclined attempt to address Andean mortuary patterns to date. The study of mortuary
patterns are framed in terms of ritual processes inextricably linked to fundamental, though negotiable, concepts of death central to cultures’ identity, history, and stability (Dillehay 1995a:19). Rowe (1995) and Lyon (1995) both acknowledge many of the shortcomings of previous and current mortuary research. Other contributors (Donnan 1995; Carmichael 1995; Buikstra 1995; Salomon 1995; Verano 1995) see evidence for symbolic linkages and relationships between the living and the dead, though Donnan (1995) and Carmichael (1995) have a tendency to treat mortuary patterns as simplistic processual cultural fossils that reflect social organization.

In several other papers, the representationalist view is questioned. Drennan (1995) interprets the nature of stone tomb construction in Colombia’s San Agustín culture not as reflections of social organization but of a partially institutionalized political organization based on personalized leadership and a simple economy. Salomon (1995) argues that highland ayllu practices of ancestor veneration served the central structuring element to these communities and how they maintain their political power, identity, and cosmology. Buikstra (1995) makes the argument for both representational and non-representational modes of treating the dead in the Moquegua Valley through a combination of burial patterns and cultural and historical contexts.

*The Lo Andino Problem*

In the Dillehay volume, Salomon (1995) and Bastien (1995) seem to espouse *lo andino* thinking. Simply put, *lo andino* is an assumption there is one overarching normative Andean essence, pattern of behavior, symbolic system, and set of perceptions.
It can be invoked, for instance, to demonstrate commonality between the patterns and meanings of a Sicán, Wari, Cupisnique, Nazca, and Inka burial. Or, if one were interested in examining Moche ritual calendars, ethnohistoric Inka calendrical cycles serve as the direct model (Hocquenghem 1987), since the Moche and the Inka shared one “Andean-ness.” Vastly different historical and environmental settings and extensive spatial and temporal separation are not important.

_Lo andino_ is partially a conflated product of ethnohistoric writing, where all things Andean were portrayed through an Inka-centric view that did not describe other populations to equal extent. Stanish (2005: 230-231) states ideas of a single Andean culture resulted from Spanish colonial policy that aimed to homogenize at least three major cultural-linguistic-ecological zones: the central and north coasts, the north and central highlands, and the south-central Andes, each characterized by relatively insular pre-Inkaic trajectories. _Lo andino_ thinking is also fatally reductionistic, in that differences between the Middle Sicán, Tiwanaku, and Chachapoyas cultures, would be essentially choices of color or other trivial variables. However, it is equally clear that some broad cultural and mortuary behavior similarities exist in the Andes which should be systematically investigated. As we will see, many of the keys to broader and informative uses of burial patterns and ethnohistoric analogy may be developed from particularistic, if somewhat tentative, comparisons between regions and time periods; simply assuming _lo andino_ is untenable (Isbell 1997: 23-24; Lyon 1995: 381-382).
Postprocessual Interpretations

One of the first postprocessual interpretations of Andean mortuary patterns was offered by Isbell (1997) who studied open sepulcher *chullpas* of the highland landscape and offered a new hypothesis on the origins of *ayllu* social organization. *Ayllus* centered around veneration of mummified ancestors that were both visible and cared for inside *chullpas* which served as an idiom for hierarchical power, kinship structures, and communal “owned” by ancestors in a manner that diffuses class-based tension. While some (i.e., Moseley 2001) state the *ayllu* is an ancient tradition, Isbell (1997) argues for its relative youth and the manners in which the Spanish radically transformed *ayllus*. Isbell (1997) is profoundly self-aware of its theoretical orientation and use of hermenutics.

On the north coast, Bawden (2001, 2005), Klaus (2003), Klaus and Tam (in press) and Shimada et al. (2004) are among those who investigated identity, ideology, ethnicity, and ethnogenesis in burial patterns. Bawden’s stimulating postprocessual and Marxist approach addresses issues of power, fluid manipulation of ethnic constructions, practical consciousness, and *habitus*. Elsewhere, Chapdelaine et al. (2005) interpret Moche burials in the Santa Valley in terms of the reproduction of local, non-Moche social identity and symbolism. Isbell and Cook’s (2002) study of Wari burials at Conchopata are revealing about society, ideology, and mortuary complexity, including a form of possible ancestor worship that was distinct from the Inka. Power, social power, flexible identities, ethnicity, and gender are among several intriguing issues that Makowski (2002) begins to
address in the interpretation of burials at the end of the Formative Period in the Lower Lurin Valley of the central coast.

In sum, mortuary archaeology in the central Andes had a checkered beginning, but holds exceptional promise. One sign of fruitful growth is the increasing engagement with theory. Treatment of mortuary patterns as simple social reflections is no longer tenable as it does a disservice to the investigator and the subject. Today, the role of Andean mortuary archaeology is expanding as an analytical tool which “allow[s] increasing accuracy in the elucidation of other aspects of human behavior – social status and nutrition, the social narration of death, the investment of tomb construction, the role of the deceased in the past, division of labor, warfare, social class structure, centralization of power, and cosmology to name a few” (Dillehay 1995a: 281). Mortuary archaeology is an essential approach for archaeologists if they seek a comprehensive and holistic understanding of pre-Hispanic Andean cultures.

A DIACHRONIC APPROXIMATION OF NORTH COAST MORTUARY PATTERNS

Formative-Era Developments

Current knowledge of early north coast mortuary patterns is very limited but some observations can be made. Several factors inhibit the study of Late Pleistocene-Early Holocene mortuary patterns (Dillehay 1997b), including a lack of research interest, destruction of early sites, highly-mobile lifeways (hence, no cemeteries), and the
possibility of mortuary programs that did not leave much in the way of recoverable human remains. Chronologically, graves excavated by Chauchat (2006) at the site of Pampa de los Fósiles 13 are the earliest known burials on the north coast, radiocarbon dated to 10,200±180 B.P. (uncalibrated). Paijanense peoples seem to have disposed of their dead in simple pits placed in close proximity to their camps, positioning flexed bodies on its side, with the knees drawn up towards the chest. Pampa de los Fósiles 13 Tumba 2 contained the remains of an adult male whose upper body may have been wrapped in a reed mat. Tumba 2 also was associated with ash, carbon deposits, and heat-altered sediments – evidence of in situ fire preceding burial.

The intervening millennia between the Paijan and Formative Cupisnique culture are virtually unstudied. Thanks to Rossen and Dillehay (2001), a very unusual mortuary behavior has been identified in the Zaña Valley during the transition from foraging to farming. At two Las Pircas phase sites, human remains mostly consisted of cut or deliberately snapped piles of long bones (modified in the same manner as butchered faunal remains), were carefully placed in piles or pits. Available evidence indicates most of these individuals were possibly males. In addition to this specialized treatment of the dead they consider ritual cannibalism was also practiced and designed to mitigate and control the supernatural powers and spirits of new and experimental resources. This fascinating hypothesis deserves much further study.

Bird et al. (1985) describe the burials of at least 33 Preclassic period individuals (before 2500 B.C.) at Huaca Prieta at the mouth of the Chicama Valley. Disposal of the dead in zones of domestic refuse – in other words, garbage dumps – is suggestive of a
less formalized mortuary program, though intentionally flexed body positions, inclusion of grave goods such as gourds, placement of stone and porpoise bones above the grave, and practices of wrapping the dead in textile or reed materials reveal emergent mortuary complexity. In later occupation of Huaca Prieta, bodies were interred under house floors again in flexed positions with no common cardinal orientation (Bird et al. 1985: 59).

Other Early Formative burials include those from Pampa Gramalote (Moche Valley) which are essentially identical to other contemporaneous north coast burials (Pozorski and Pozorski 1979).

Bird et al. (1985), Elera (1998) and Larco Hoyle (1941) report a number of Cupisnique burials from the Chicama and Jequetepeque Valleys. Various body positions were documented at the Barbacoa and Palenque cemeteries in the Chicama Valley, with the dead deposited on their sides, backs, laying face down, semi-extended, and fully extended (Larco Hoyle 1941: 162-170).

Elera’s (1998) research at Puémape in the lower Jequetepeque Valley however provides intriguing diachronic insights on burial ritual spanning Early, Middle, and Late Cupisnique phases and the subsequent Salinar period. Of the 24 Early Cupisnique Puémape burials, flexed and semi-flexed bodies were typically positioned with the hands over the face and placed in simple oval pits located in domestic settings. No single body orientation was practiced though a tendency for north-south (NE-SW) was noted. Typically, a reed mat covered the corpse which was associated with a primary cotton textile. Stones were placed over and around five individuals. Ceramic vessels and gourd grave goods were notably absent with the exception of two graves. Red pigment
identified as hematite was documented on the face of one individual (Elera 1998: 110-113). Elera (1998: 275) suggest burial patterns of the Early Cupisnique period reveal the lack of a social elite producing insignias or other statements of social power.

Middle Puémape burial patterns (corresponding to Middle or Classic Cupisnique), characterized by 42 graves, reveal an amplification of earlier patterns. In this period, body orientation was again highly variable, though a north-south or northeast-southwest orientation was most common, amounting to 29 percent of cases. Eight bodies were tightly flexed, another eight semi-flexed, and four bodies were laid out in an extended position. Arms and hands were frequently positioned by the sides of the bodies, though positioning of hands over the face and crossed limbs were also carried out. Bodies were again prepared before burial, consistently wrapped in a cotton textile covered by one or two reed mats. Wrapped cuy and dog bodies, rocks, modified gourds, food remains, and even ceramics were placed over or in between mat coverings. Rocks were placed over at least seven burials. Modified gourds were also placed with the dead. Ceramics were far more frequently used, and included stirrup-spout bottles, jars, neckless ollas, pots, bowls, and clay disks. Items related to personal adornment were also documented such as bracelets and bead necklaces. Reddish hematite was used to cover the faces of several deceased individuals, including and infant and young adult (Elera 1998: 118-143).

Elsewhere, burial at the site of La Bomba (middle Jequetepeque Valley) appear to participate in a system of regionally well-disseminated Middle Cupisnique rituals and material culture (Seki 1997). Regarding the latter, funerary customs indeed are suggestive of emergent social inequality, with the use of ear spools, shell and bone pendants and
bone snuff tubes as status markers. Use of sumptuous stirrup-spout bottles with complex religious imagery may involve to restricted access to and practice of an esoteric body of ritual knowledge. Elaborate Middle Cupisnique child burials may well be signs of ascribed status (Elera 1998: 279).

Though the Late Puémape cemetery had been heavily looted, data could be salvaged, and indicate shared funerary customs with the Late Cupisnique site of Morro de Eten south the mouth of the Reque River. At Morro de Eten, bodies were predominantly extended on their backs and orientated east-west facing the ocean (Elera 1986), possibly toward the offshore islands of Islas Lobos de Afuera that may have held special cosmological significance (Elera 2001: personal communication). Ceramic grave goods were commonplace. One Late Cupisnique burial, Entierro 4, deserves special attention. Ritual paraphernalia buried with this old adult male including an anthracite jet mirror and snuff spatulas associated with hallucinogenic materials. Elera (1986, 1994: 22-51) indicates this individual was likely a shaman in life. A long worked bone spatula or lance was found in situ behind the right knee with its rounded tip placed within a bony notch formed in the inferior intercondylar fossa. Accompanying periosteal inflammation indicated the object was habitually inserted into a mutilated popiliteal fossa in life.

In the Cajamarca highlands intact Late Cupisnique elite tombs have been documented which mirror their coastal counterparts, differing not in kind but in scale. Placed into the principle platform mound of the Kuntur Wasi complex were eight boot-shaped tombs each containing a flexed single individual placed on their side or in various face-up or face-down positions (Kato 1993; Onuki 1997). Accompanying grave goods
attest to intimate coastal cultural connections and elite status. The individuals were interred with precious metal items, decorated Strombus shells, gold ear spools, high-quality ceramic vessels, and necklaces made from thousands of worked stone, bone, and shell beads. Gold items included multi-piece crowns, large earrings, necklaces, pectorals, and ear spools fabricated from gold sheet and decorated in Cupisnique motifs using repoussé techniques. The faces of seven of individuals were painted with the bright red, mercuric hematite pigment called cinnabar (Onuki 1997). With a rapid emergence of metallurgy during the Late Cupisnique, funerary evidence at Morro de Eten, Chongoyape, and Kuntur Wasi indicates gold items and richly decorated stirrup-spout vessels embodied political, social, and religious authority wielded by small groups of elites (Elera 1998: 280).

Many overarching elements of burial ritual (body positioning, orientation, categories of grave goods) seen in subsequent Salinar, Gallinazo, Moche, Sicán, Chimú, and Colonial-era indigenous burials seem to have been established during by the Cupisnique. The tradition of placing metal objects in the mouth of the deceased was probably initiated by the Cupisnique as well (Elera and Pinilla 1990). Given the emergent social complexity of the time, future testing of Saxe’s (1970) Hypothesis 8 in Cupisnique contexts holds much promise. Overall, the similarity in these burial patterns “define an apparent cultural tradition which extended from Cupisnique to the Virú Valley, beginning in the Late Preceramic... [and is] a good starting point for identifying an ancient north coastal funerary tradition” (Elera 1998: 242).
Coastal Salinar-period burials are very poorly studied but available data point to a continuation of many earlier local traditions. Such may relate to “Cupisnique-ization” of intrusive Salinar populations (Elera 1997) or local Cupisnique descendants dynamically negotiating Salinar presence and material culture. At Puémape, 53 Salinar-period burials were superimposed atop the Cupisnique cemeteries (indicative of a local population reusing long-established burial grounds). These people also intentionally opened antecedent Cupisnique graves apparently in search of prestigious grave goods and human bones for ritual use. Bodies were almost universally extended, oriented northeast-southwest. Bodies were again wrapped in cotton burial shrouds but placed in a highly unusual face-down, ventral position (Elera 1998; Rubio 1994). Grave goods consisted predominantly of modified gourds sometimes containing the remains of marine foods.

The 21 published Salinar burials from the Moche and Virú Valleys show most bodies were placed on their sides in an extended position, sometimes with the knees slightly flexed (Donnan and Mackey 1978: 25-44; Larco Hoyle 1944: 16-19; Strong and Evans 1952: 48-56). These Salinar burials do however share a distinct north-south orientation. Ceramic vessels appear to be the most common grave good in the Moche-Virú region but also include gourds, metal objects placed in the mouth, spindle whorls, and food offerings (Donnan and Mackey 1978: 44). Salinar graves are mostly simple, unlined pits, though some reported from the Chicama Valley are characterized as a “crude sarcophagus,” covered by slabs of stone (Donnan and Mackey 1978: 44) – perhaps a forerunner of Moche adobe tombs.
A similarly limited corpus of Gallinazo burials suggests widespread, if not almost universal use of an extended position (Bennett 1950: 99-100; Donnan and Mackey 1978: 45-54; Larco Hoyle 1945: 25-28; Millare 2002: 17; Strong and Evans 1952: 71-79). Bodies were disposed of in simple pits under habitational floors, cemeteries, and inside platform mounds. Grave goods were considerably varied but adhered to a basic pattern that featured between one to six ceramics and gourds per inhumation. Copper and gold objects appear to be more frequent in Gallinazo burials. Bodies were placed in pits located in cemeteries associated with habitation or ceremonial structures.

By the dawn of the first millennium A.D., a gradual evolution of north coast burial patterns form played out based on a Cupisnique template, with extended burials becoming the dominant form during the Gallinazo epoch which ended around the dawn of the Christian era. Increasing uniformity of burial patterns also points to greater degrees of centrally organized and consolidated religious, political, and social institutions.

Burial in Moche Society

Attempts to characterize Moche burial patterns have been made by Donnan and Mackey (1978), Donnan (1995) and Millaire (2002); the latter serves as the most theoretically informed, sophisticated, and complete study of its kind. When considering the burials of the Moche culture, both temporal and geographic patterns must be addressed as well as social organization to comprehend the significance of these complex mortuary variations. Yet, up to the Moche IV-V transition, most burials shared a remarkable number of consistent features (Donnan 1995:154): orientation to a cardinal
point (most often a north-south axis, though east-west burials are known), interment of single burials in prepared pits or tombs, and inclusion of ceramic, metal, and camelid offerings (Figure 5.1). Early Moche I and II burials are poorly documented and disproportionately known from looted high status graves geographically. Social differentiation may have been a major dimension underlying variation in early Moche burials. Fragmentary evidence points to Early Moche collectives of the Vicús region on the far northern north coast buried their elites with sumptuous gold items. In the Jequetepeque Valley, a looted elite burial chamber at La Mina (Narváez 1994) evidences
elaborate tomb decoration and an outlay of highly skilled labor in funerary chamber construction, which included probable Y-shaped post and beam *horcone* roof constructions. Analysis of fragmentary human remains indicates the La Mina tomb contained at least five individuals including three subadults; hand bones were stained by copper oxidation (Verano 1994a).

Intact early Moche elite burials include one inferred high-status individual buried in a cane coffin at Pacatnamú (Hecker and Hecker 1983), and six graves at the Huaca del Sol (Millaire 2002: 140-141) are complemented by sumptuous tombs studied by Donnan (2001) at Dos Cabezas in the Jequetepeque Valley. Two radiocarbon dates question however the validity of assigning the Dos Cabezas tombs to Moche I based on associated ceramics; the issue remains to be resolved, and the recycling of grave goods from earlier periods may be a factor. This problem notwithstanding, the Dos Cabezas tombs also contained evidence of a newly recognized Moche practice: artifacts and other miniatures configured as scaled-down representations of the principle burials placed within the tomb (Donnan 2003).

Perhaps the best-known Moche burials are the Moche II-III elite tombs of Sipán, located in the Reque drainage of the Lambayeque Valley Complex. The twelve highly elaborate Sipán tombs have been described in great detail elsewhere (Alva 1994; 2001, 2003 Alva and Donnan 1993) and are only summarized here. The dead are thought to include ruling lords, priests, military leaders, and second-rank assistants to the military and priestly groups. Tombs 1 and 3 represent the ‘Lord of Sipán’ and ‘Old Lord of Sipán,’ respectively.
These two personages were buried in cane and wooden coffins placed within large adobe chambers with a multicomponent burial platform. Gold, silver, copper, ceramic, other items of unprecedented quality and quantity were placed with the deceased. In both cases, retainer burials included women and children and in Tomb 1, an adult male “guard” whose feet were presumably cut off. The disarticulation noted among the skeletons of the retainers suggests they were secondary burials and their deaths were not coterminous with the principle personages. Furthermore, considering the absence of physical signs of traumatic death (Verano 1995), it is urged here that common practice of referring to such individuals as “sacrifices” must be abandoned. Overall, interpretations of tomb organizations, grave goods, and mtDNA relationships point to a regional Moche royal family and their attendants (Shimada et al. 2005). Yet, the general lack of studies concerning non-elite Moche sites and burials in the Lambayeque region confounds broader understanding their broader significance.

During the Moche III-IV (also known as the Middle Moche Period), people in the Jequetepeque Valley interred their dead at Pacatnamú and San José de Moro in both simple pits and boot-shaped tombs in cemeteries adjacent to monumental platform mounds (Hecker and Hecker 1983). Cane coffins or tubes known from both sites probably correspond to higher-ranked burials. Most of the Pacatnamú graves (n=71) probably represent relatively low-status diversity (Millaire 2002). Though data on grave goods at San José de Morro have not been systematically published, Millaire (2002:148) feels they involve the most regionally elaborate funerary expressions. To the south, tombs studied at the Huaca Cao Viejo at the El Brujo Complex reveal funerary practices of
Chicama Valley elites. Like other Moche leaders, large quantities of copper, gold accouterments, textile banners, wooden staffs, ceramic bottles, and human retainers accompanied the Huaca Cao Viejo elites below the surface of this large platform mound (Franco et al. 2001).

A number of elite Moche women appear to have been identified. As with two other inferred elite woman interred at Huaca Cao Viejo, a recently excavated mummy bundle included quantities of gold items and weapons (in this case, ceremonial metal war clubs) though the participation of this woman in physically strenuous activities, such as combat, is unlikely (Verano 2007). Cinnabar was also used to anoint her body. Postdepositional offerings were apparently burned above her tomb. Despite the rich corpus of information that continues to flow from the Huaca El Brujo Complex, study of the Chicama Valley Moche is essentially focused on the El Brujo Complex. Most Chicama Valley Moche sites have been studied only superficially studied since the 1930s, while many of the thousands of ceramic vessels on display at the Museo de Arqueología Larco Herera in Lima proceeded from Chicama Valley ‘excavations’ sponsored by the Larco family and context has forever been lost (Millaire 2002:75).

Since Max Uhle’s 1899 burial excavations at the Moche site, over 200 burials have been documented in various locations in the Moche Valley, long (and erroneously) seen as the center of Moche civilization. At the site of Moche, both elite and non-elite individuals, universally extended on a north-south axis with the head facing north, have been found in cemeteries, residences, and corporate architecture (see Millare [2002] for summaries; also see multiple reports published in the Investigaciones en la Huaca de la
Luna series edited by Uceda and colleagues, including Uceda et al. [2004] released following Millaire’s study).

Elite individuals, likely members of a priestly class, were interred in tombs placed and other specialized settings in the architecture of the Huaca de la Luna (Tello et al. 2003). While many burials from the site of Moche appear relatively highly ranked, samples include members of what Chapdelaine (2001) infers as a Moche ‘middle class.’ Bodies were also deposited in nearby cemeteries and under floors of residences and workshops often with ceramic vessels in quantity in above-and below ground adobe chambers and simple pits. In some cases, large quantities of ceramic bottles were placed atop the body and completely covered the corpse (Tello et al. 2003: 165; Lámina 5.1).

Donnan and Mackey’s (1978) study of contemporaneous rural Moche burials at Huanchaco shed light on burial practices of a possible specialized community of rural whose burials are quintessentially Moche in style (Bawden 2001).

To the south, the most celebrated Moche burial of the Virú Valley was a Moche IV elite, the so-called ‘Warrior-Priest’ of Huaca de la Cruz (Strong and Evans 1952). Buried in an adobe chamber, the principle male personage was present in a cane coffin wearing a copper mask and accompanied by retainers (one woman with ligature about her neck), quantities of ceramic offerings, and three elaborate carved wooden staffs. Some 15 other burials were also documented atop Huaca de la Cruz ranging from more elaborate to simple graves, and leads Millare (2002: 158) to suggest a wide spectrum of the local population used the site as a cemetery. Recent work carried out at the site of Huancaco and Huaca Santa Clara in the Virú Valley are leading to a reevaluation of Moche-
Gallinazo interactions as noted in Chapter 3; burials from these sites do not appear to follow Moche burial grammars reflected in body positioning and grave good styles (Bourget 2003; Millaire 2004a). Instead these peoples may be inferred as ethnically Gallinazo peoples who did not participate in Moche material culture and ritual. It is possible that their burials practices intentionally were juxtaposed against mainstream Moche ritual.

In the Santa Valley, Donnan’s (1973) investigation suggested the local Moche II-IV peoples buried their dead in cemeteries some distance from major settlements – though this view may be an artifact of sampling. These extended burials were collectively unelaborated and probably represented those of lower social standing. More recent studies of Moche period funerary patterns in the Santa Valley by Chapdelaine and colleagues (2005) show highly variable body positions and orientations include face-down and semi-flexed corpses, suggestive of the reproduction of local burial traditions despite apparent Moche hegemony of the region. Moche burials in the Nepeña, Casma, and Huarmey Valleys are essentially unstudied. As such, it is impossible to characterize burial in the Moche society’s southern expanses.

The Moche IV-V transition, according to Bawden (1996, 2005) and Shimada (1994a) was a period of marked social upheaval and reorganization that extended to apparent changes in the 1,000 year-plus traditional mortuary template. Perhaps as sign of Wari cultural influence, flexed positions begin to appear at some Moche V sites as described by Shimada (1981a, 1994), Bawden (1994), and Disselhoff (1958).
At least one Moche V burial at Huaca Lucia (La Leche Valley) was tightly (hyper-) flexed (Shimada 1994a: 243; Figure 9.19). Yet, nearby at Huaca Soledad, other Moche V burials also documented by Shimada were extended and placed within a subterranean adobe brick-lined chamber with a short entry shaft. The most intense archaeological study of Moche V in the Lambayeque Valley was carried out at Pampa Grande, and surprisingly, not a single human burial was found. Given the nature of Pampa Grande, it is likely that when members of the cycling residential populations died, they probably went back to their home communities for burial.

In the Jequetepeque Valley, traditional forms and symbolic associations appear to persist—suggestive of a durable Moche identity that weathered the Moche IV-V transition. Donnan and Cock (1997) illustrate cemeteries at Pacatnamú featured extended bodies aligned north-south. Those interred in front of Huaca 31 were probably a higher-status collective, interred in cane coffins accompanied by up to several ceramic bottles. Simpler interments were present in other distinct cemeteries or under residential architecture.

Inland at San José de Moro, high-status burials persisted close to the Huaca la Capilla, including the complex tomb of a high-ranking ‘priestess’ (Donnan and Castillo 1994). Placed at the center of a rectangular adobe chamber, the middle-aged adult female principle personage was buried in a cane coffin. Four retainers also were present in the tomb, along with large quantities of ceramic vessels. A goblet was also found, which lead the investigators to believe this woman was the personage depicted in the earlier Moche Sacrifice Ceremony theme. Elsewhere at Late Moche San José de Moro, Castillo (2001,
2003) found that boot-shaped tombs persist as do north-south oriented extended bodies and categories and uses of grave goods.

Perhaps the greatest degree of social rupture and reconfiguration is evidenced among burials at Moche V Galindo in the Moche Valley (Bawden 1996, 2001, 2005). Elites, concerned with distancing themselves from the discredited Moche IV political and religious system, innovated new iconographic and architectural conventions. Combined with urbanization, local peoples became alienated. Commoner burials at Galindo shifted into mostly residential contexts with the dead deposited into stone-faced benches – burial was transformed into an unprecedented in-house ritual. Grave goods were largely absent in these burials with the exception of copper placed at the head or the feet. Lower-status residents of Galindo drew upon their deep historical and cultural foundations and attempted to reconstruct group identity through traditional social principles – literally inserting “the bodies of their dead ancestors into the pivotal social space of the household as sacred *huacas* and spiritual presences” (Bawden 2005: 29-30).

In summary, burials spanning the Moche culture are remarkably diverse but share a distinct set of basal structural and ritual features that transcend the northern and southern Moche polities, time, and space (Donnan 1995; Millaire 2002). What might have been the emic significance of these patterns?

North-south orientation of bodies and civic-ceremonial centers seems to have embodied some kind of Moche *axis mundi*, but what did it involve? Perhaps it represented placing the dead in a physical ‘space’ bounded on one side by the mountains and the other the sea; in other words, the land the people lived on. Perhaps north-south
orientation was an encoded statement of coastal identity. Use of copper items – derived from the earth itself – placed in the mouth or hands may relate to subterranean burial and could have related to the intentional act of making an imperishable ancestor, with the imperishable qualities of the metal extended in to the dead (Glowacki and Malpass 2003: 442). There is a good chance camelid heads and limbs buried with the dead reflect a feasting ritual before burial, and the meat-poor body parts placed with the dead in an act of symbolic food-sharing. Why ceramic grave goods with specific iconographic themes were buried with some dead Moche and not others is unclear. Were age and sex differences encoded in funerary expressions, such as with spindle whorls accompanying dead women? These and other related questions will surely remain unresolved for some time to come, and Millaire’s (2002) work is a vital first step in this direction.

However, Moche burials do embody a variety of more concrete or accessible social messages related to social organization which appear to encompass much of the material variability in the Moche funerary corpus (Millaire 2002: 165-172). Millaire holds that a rich gradient of funerary complexity and social mobility contributes to a model of Moche funerary-social structure where differential burial context (cemetery, residential, and non-residential) represents perhaps the only identifiable “class boundaries” at this time. Also, the social elite were buried with insignia relating to relating to their roles in life, often crafted from precious metals and other materials not available to other members of the society. If indeed, as Bourget (2005) elegantly argues, Moche leaders were principle actors of rituals portrayed in iconographic scenes who transgressed this world and that of ancestors, the materials and meanings of their burials
would be very divergent from that of their subjects and reinforced elite/non-elite
distinctions. The very same elites may have also fostered the universal practice of a
commong Moche mortuary pattern and its successful integration of a wide range of rural,
kinship-based peoples into its dominion by grounding the belief system in traditional
mythic and ancestral beliefs (Bawden 2001: 291) drawn from the Cupisnique, Salinar,
and Gallinazo legacies.

The Transitional Period and Early Sicán Mortuary Patterns

Following the final political disintegration of Moche V, a period of
decentralization and reorganization followed on the northern north coast. Called the
Transitional Period by those working in the Jequetepeque Valley, it overlaps with Early
Sicán (AD 750-900). Generally, the Transitional/Early Sicán burials are poorly studied.
Burials at San José de Moro remain quintessentially Moche (Nelson 1998) regarding
body position, use of burial chambers, and other funerary customs. However, boot-
shaped tombs disappear and material culture accompanying the dead changes
significantly. Wari-influenced ceramic bottle forms and decorations emerge, some of
which were imported while others were local imitations (Castillo 2001, 2003; Rubicado
and Castillo 2003). Coastal Cajamarca styles are also found, but a surge in frequency is
noted during the Late Transitional Period (Bernuy and Bernal 2005). Rubicado and
Castillo also describe funerary ceramics (though burial contexts are not discussed) that
bear “prototypes” of the Sicán Deity icon (2003; Figura 1.4; Lámina 1.3, 1.4).
In the Lambayeque Valley Complex, only one burial has been documented which could Early Sicán (Huaca del Pueblo Batán Grande [HPBG] Burial V T-2) (Shimada 1981b: 424-25). Elite status of this seated and flexed skeleton of an adult male is inferred from gold ear ornaments. The body was also accompanied by a single blackware vessel, a badly oxidized silver/copper tray-like plate and turquoise beads about the chest.

**Sicán Burial Practices**

Owing to the sampling strategies of the Sicán Archaeological Project, burials from the Middle Sicán heartland of the Lambayeque Valley Complex are representative of all known social strata and inferred ethnic groups. Considering that metal objects held the ultimate aesthetic qualities and ideological symbolisms of Middle Sicán society four very clear groups are defined as per the metals availability criteria discussed in Chapter 3 (Table 5.1). Thus, it is hypothesized that access to differentially valued metals defined and reinforced social stratification in burial. The following discussion of Middle Sicán burial patterns first follows class-based variations within the synchronic Lambayeque Valley Complex samples. Regional survey then follows.

**Middle Sicán Elite Burial**

By 2006, two intact elite tombs had been scientifically excavated at the site of Sicán. The East and West Tombs, located at the base of Huaca Loro, serve as a primary
Table 5.1. A model of Middle Sicán social differentiation in funerary treatment based on differential access to metals, based on Shimada et al. (in press).

Source of information about Middle Sicán elite mortuary ritual. Salvage excavations of looted Huaca Menor and Las Ventanas shaft tombs strongly suggest highly elaborated elite burials as well (Pedersen 1976; Shimada 2000). Current funerary data highlights internal consistencies and major variations among the ethnic Sicán elite. The Huaca Loro East Tomb was an 11 meter deep vertical shaft tomb placed just east of truncated pyramid’s eastern pediment (Figure 5.2). This highly choreographed Early Middle Sicán tomb contained five individuals and over 1.2 tons of diverse grave goods (two thirds by
weight was arsenical copper, *tumbaga* and high-karat gold objects) arranged concentrically and in layers above, on, and below this individual (Shimada 1995). These included a large wood and cane litter, standards and banners, *Spondylus* shells, crowns, bundles of copper instruments, and a pair of outstretched one meter-long golden gloves (Shimada 1995: 55). Other goods were located in niches at the base of the tomb or in caches throughout the tomb. Placed at the bottom center of the shaft tomb, the principle personage was a robust middle-aged adult male between 40-50 years of age (Farnum
2002; Yamaguchi 1994). His inverted and tightly flexed body was covered head-to-toe in cinnabar. The head had been rotated up 180 degrees to look east. The principle personage wore a masterfully crafted, high-karat gold mask bearing the unmistakable face of the Sicán Deity. His body was dressed in full regalia including a gold nose clip, ear spools, and at least four layers of bead pectorals. The presence of unfinished metal objects in the tomb and hypertrophied muscle attachments on the right arm could signify he was a master craftsman.

Above the personage were two subadults. About a meter to the northeast of the personage, the remains of two women were found. One woman was lying on her back, arms outstretched and legs splayed open. The other woman sat upright directly in front of her companion with arms extended forward, positioned as a midwife about to receive a newborn child. The women, the inverted fetal position of the principle personage, and the use of cinnabar (reminiscent of the blood that accompanies birth), makes the interpretation that the burial scene was a choreographed representation of the principal personage’s rebirth or reincarnation quite reasonable (Shimada 1995).

The 15 meter deep West Tomb was placed directly opposite the East Tomb on the other side of the North Platform. The West Tomb featured a nested, tomb-within-a-tomb construction (Figure 5.3). The 10 by 6 meter antechamber contained 12 shallow rectangular pits (six each on the north and south sides) and 10 niches symmetrically placed into the tomb walls. All of the pits and some of the niches contained the remains of 22 young adult women and one subadult. Most were in a flexed, seated, or laying position, accompanied by a few grave goods each ranging from broken ceramic vessels,
textiles, copper objects, and chalk (Shimada 2000: 57). Minor to moderate disarticulation, remains of fly puparia, and occasionally missing hand phalanges strongly indicates their deaths were not synchronous with the tomb construction had been curated in a mummified state (Klaus and Shimada 2003).

The 3 by 3 by 3 meter central chamber contained a seated and flexed, east-facing, masked male principle personage. This was a robust 40-50 year-old man (Farnum 2002). He wore full regalia and was accompanied by eight camelid heads, articulated
appendages of at least 25 camelids, a pair of large ceremonial metal gloves, and four 
tumbaga sheet-covered ceramic vessels, among other items (Shimada 2000). The West 
Tomb contained a mere 3.5 kilograms of low-karat gold and tumbaga metals.

The south side women seem to have had a special relationship with the principal 
personage. A cloth strip that covered two women descended into the central chamber to 
wrap around the upper torso of the principle personage (Shimada et al. 2004). South side 
women were buried mostly with Middle Sicán-style blackware ceramics. Dental traits 
and mtDNA haplotype distributions indicates this group was relatively closely related 
whereas the north side women appear far more heterogeneous and were associated with 
bichrome ceramics and painted textiles resembling earlier Moche styles and iconography 
(Shimada et al. 2004). These two groups of women probably represent Mochica 
descendants (north) and ethnic Sicán (south). The choreography of this tomb may have 
involved symbolisms involving the principle personage’s ability to integrate the two 
major groups of his society (Shimada et al. 2004).

The construction and organization of these tombs represent a significant departure 
from antecedent Moche traditions. Numerous artifactual and iconographic similarities are 
noted with coastal Ecuadorian Mateño culture (Shimada 1995). Antecedent shaft tombs 
can only be identified in central and highland Ecuador and Colombia (Shimada et al. 
2000). Haplogroup patterning of sampled ethnic Sicán individuals show affinity to 
modern North Andean populations rather than central or southern Andean peoples 
(Shimada et al. 2005). Middle Sicán elite tombs communicated not just power via metals 
availability elite ethnic and lineage group membership, setting themselves apart from
well-established local traditions (Klaus 2003). Elite mortuary ritual was dynamic, resource intensive, and may have even been the primary focus of Middle Sicán ceremonialism.

Data from the six month 2006 excavation of tombs at the northwestern pediment of the Huaca Loro mound is just beginning to be analyzed, but is very important to discuss. Trenches 1-3 were equidistant from the East Tomb, but were burial contexts there were unlike those discovered. Two principle shaft tombs (Tombs 1 and 2) which were surrounded by 22 single, relatively simple extended burials were predominated by adult females. It appears that the Huaca Loro elite cemetery not only had a “nested” organization but was divided into various sectors. This zone was formed by a series of major tombs surrounded by a group of simpler graves which raises the distinct possibility that the western portion of the cemetery below and around the Huaca Loro mound was reserved for female elites and their associates (Shimada et al. 2007).

Middle Sicán Lower Nobility Burial

The least studied segment of Middle Sicán society is an inferred lower elite or nobility. Generally, this group seems to have shared seated or flexed burial position. The presence of tumbaga objects most diagnostic for this group. It is unclear if the lower nobility consisted of lower-ranking ethnic Sicán, leaders co-opted from local political structures, or both. The use of small shaft tombs, a funerary mask (in one case) and red pigment on the face clearly emulate elite funerary patterns. To resolve these questions of
identity and statecraft, a larger sample of lower nobility burials will need to be studied via integration of mortuary pattern, bioarchaeological, and molecular genetic data.

Alva (1985c) describes what amounts to the only intact lower nobility burial studied to date: a seated/flexed individual placed in a small shaft tomb about 3 meters deep between Huacas La Botija and El Corte at Sicán. The personage wore a *tumbaga* or gilded *tumbaga* funerary mask in the characteristic likeness of the Sicán Deity. This individual was buried with nearly 50 small *crisoles*, conch and turquoise beads, and a few arsenical copper objects including a copper *tumi* knife. The burial clearly emulates elite tombs on a much smaller scale, and at the same time, quality and quantity of grave goods are discontinuous with Sicán commoner burials.

Intact sections of a partially looted shaft tomb at Huaca Las Ventanas Mound III contained the remains of a very elaborate lower nobility burial. This 11 meter-deep inverted pyramidal shaped tomb contained ceramic vessels wrapped in *tumbaga* sheet, double-spout ceramic vessels, camelid offerings, and large caches of shell and amber beads (Shimada et al. 2000: 32). The interior was covered in layers of painted cloth, carefully pasted on *tumbaga* sheets. The remains of up to nine women were found as well (Shimada 1995). In 1990, a series of small shaft tombs were exposed by erosion at the northwest corner of Huaca La Merced, but were looted before they could be excavated (Shimada n.d.). The remnants of the deepest shaft tomb included the badly damaged skeleton of a seated individual, shell beads, at least one ceramic vessel wrapped in *tumbaga* sheet, and a corroded *tumbaga* bell (Shimada et al. 2000).
Ethnic Mochica Burials of the Middle Sicán Period

Well over three dozen Middle Sicán burials of the commoner strata have been described at various sites including Sicán, Huaca Sialupe, HPBG, and Túcume (Klaus 2003; Narváez 1995a; Shimada 1995). While it is inferred that this group was economically diverse, social commoners followed a shared and repetitive mortuary pattern. Most burials were simple, shroud-wrapped single individuals placed in plain, unlined pits that did not exceed more than 2 meters in any one direction (Shimada 2000: 56). Bodies were laid out in an extended, supine position, almost always on a north-south axis, with the head to the south and feet to the north. Most, if not all commoners were buried in cotton shrouds. Some shrouds plain un-dyed cotton, while others featured fine striping or solid blue or red colors (Klaus 2003).

Commoner remains were placed under the floors of residences and workshops and in formal cemeteries. Grave goods were usually limited from one to five pieces of one to four categories of grave goods such as ceramic vessels, camelid body parts (mostly toes), arsenical copper objects such as sheaths or ingots, and chalk lumps (Shimada 2000). Ceramic vessels types vary between blackware bottles with the corporate Sicán Deity image and reddish-brown oxidized wares with white-on-red decoration reminiscent of the region’s earlier Gallinazo and Moche styles. Grave goods were placed around and occasionally atop of the body. Often, copper objects were placed in the hands, and in a few occasions, in the mouth as well (Klaus 2003).

Extended burials in Middle Sicán mortuary practices hold deep significance for several reasons. First, it is important to dispel the common misconception that flexed
burials were universal on the north coast that following Moche V, a view drawn from Donnan and Mackey’s (1978) data sets and others’ non-systematic or regional interpretation of late pre-Hispanic burial patterns. Second, extended burials correlate to inferred commoners rather than of the elite leadership. In essence, Sicán commoners followed traditional Mochica burial grammars. Combined with other lines of evidence indicating persistent elements of antecedent Moche culture in Middle Sicán society as outlined in Chapter 3, we are speaking of a distinct and dynamic *Mochica ethnic group*, long unrecognized under the surface of the Sicán culture.

Extended burials, with their relatively unelaborated grave lots, embodied a variety of social contexts during a time of rule by non-local elites whose ideology may well have contrasted with ethnic Sicán, Chimú, and Inka traditions (Figure 5.4). Traditional Mochica burial would have articulated with an immediate social memory, achieved a powerful juxtaposition with ethnic Sicán death rituals, and served to promote social cohesion among local peoples (Klaus 2003: 227-230). Along with numerous examples of Mochica burials lacking items bearing the politically and ideologically charged Middle Sicán Deity icon, simple, traditional burials may have embodied resistance against the new order (*sensu* Bawden 2001).

The characteristics of a representative ethnically Mochica commoner burial is well-illustrated by Huaca Sialupe Burial 01-5, (Figure 5.5), a middle-adult male placed in an extended position along the traditional north-south axis with the head to the south of the grave pit. A thin-walled, arsenical copper bowl with a crimped rim was placed in a
textile bag along the right arm. An undecorated double-spout blackware vessel was placed by the right side of the head. Worked shell disks were clutched within the right hand. Green staining of maxilla and mandible revealed a copper object, long disintegrated, was placed in the mouth. Two large ceramic jars decorated using *paleteada* techniques and a ceramic plate were placed on the floor above Burial 01-5, and may represent postdepositional offerings. The ashy compacted fill is suggestive of a fire set in
the grave before the body was interred. Similar extended burials at also known from HPBG and the Sicán site itself. Two traditional Mochica burials were documented in the 1995 Huaca Loro North Trench, one including a Sicán Deity ceramic (Burial 6 HL-T1-95) while the other was buried with a painted stirrup-spout vessel (Burial 3 HL-T1-95). Six superimposed traditional Mochica burials were found at Huaca Las Ventanas inside a large adobe chamber-like enclosure (Baraybar and Shimada 1993). Seated/flexed positions are very uncommon. Middle Sicán graves at Túcume (South Cemetery), Narváez (1995a, 1996) show traditional Mochica burials persisted.
Middle Sicán burials at Illimo were recovered in rescue operations by the National Brüning Archaeology and Ethnology Museum in Lambayeque in the mid-1990s. As described in Chapter 3, a Late Middle Sicán pit tomb containing the extended body of an elite individual aligned on a north-south axis dubbed “The Warrior of Illimo” (Figure 5.6) was located in a cemetery surrounded by some 52 traditional Mochica burials.

Among other regalia such as earspools and nose ornaments, the principle personage wore a necklace of four golden miniature human heads beads, a clear material symbol communicating elite status (Figure 5.7). The iconographic style of these gold head beads is rather Mochicoid, and is reminiscent of a gilded copper head bead necklace from the earlier Tomb 1 from nearby Sipán (Alva and Donnan 1993: 114, Figure 114).

Figure 5.6: Overall organization of Illimo Tomb I. Burial photo (A) by Juan Martínez; reconstructed tomb (B) painted by Alberto Gutierrez. Images courtesy of the Brüning Museum.
Significant quantities of ceramic vessels, camelid offerings, copper alloy, gilded copper, and *tumbaga* alloy items were placed throughout Tomb I. A burial ‘mask’ bearing the Sicán Deity icon was also found, but instead of being worn on the principle burial’s face as in the Huaca Loro East and West tombs, the copper mask (of a fairly low technical quality) was part of a large standard placed above his head. A spear or lance, over 2.6 m in length with a solid copper point was placed alongside the principle personage’s body. A small gold labret was also found by one of the female retainer’s face.

Elsewhere in the El Arenal cemetery at Illimo, the dead were in accordance with the imminently recognizable Mochica tradition and communicating ethnic Mochica

Figure 5.7: Various items from Illimo Tomb 1 (not to scale). (A) Burial “mask” or standard emblem. (B) Gilded copper *tumi* knife. (C). Gold head effigy necklace beads. (D) Gilded earspools with turquoise inlays. (E) Gilded copper spear point. All photos by Juan Martínez and courtesy of the Brüning Museum.
identity (Figure 5.8). Seemingly, this identity and its practice persisted at Illimo as it did in at Huaca Sialupe. Funerary elaborations ranged from simple to elaborate graves. Of the latter, grave goods could include up to ten Mochicoid ceramic vessels, copper-alloy tools and tumi knives, and distinctive blackware ceramics bearing ideologically and politically significant Middle Sicán deity iconography. Just as the earlier Moche artistic cannon promoted cultural cohesion via death rituals, the corporate-religious Sicán Deity iconography may have promoted social integration by linking both the living and dead to Middle Sicán society on a symbolic level (Klaus et al. 2004b).

Overall, the burials at Illimo suggest that while some Mochica may have resisted Middle Sicán ideology and icons, other Mochica were more smoothly incorporated into the new society, but strong ties to a vibrant Mochica identity and heritage were still

Figure 5.8: Traditional Mochica burials at Middle Sicán Illimo. (A) Burial 14A, (B) Burial 20, and (C) Burial 23. Photos by Marco Fernández and courtesy of the Brüning Museum.
The “Warrior of Illimo” was buried in elaborate fashion and included corporate symbols of the state. However, his burial followed all the underlying features of the Mochica tradition. In other words, this elite individual, probably a local paramount lord who was incorporated into the lower echelons of elite power structures, simultaneously blended his Mochica ethnicity with his social rank and the state.

At the margin of the Reque drainage due south of the town of Reque, rescue excavations in late 2002 directed by Jorge Centurión of the Brüning Museum documented a Middle to Late Sicán human sacrifice site at Cerro Cerrillos. The sacrifice rituals, discussed further in the next chapter, involved careful burial of the victims (mostly children and young adult males) rather than haphazard disposal (Figure 5.9). Again, the burial program reproduced the Mochica mortuary tradition, which suggests the temple was largely under the aegis of the local Mochica rather than elite Sicán leadership.

Figure 5.9: Cerro Cerrillos Burial 15. Photo by Jorge Centurión and courtesy of the Brüning Museum.
Late Sicán burial data is almost non-existent. By the Early Late Sicán, ca. AD 1100, bodies at HPBG began to be positioned in seated/flexed positions. HPBG Burial XII (T-3-‘82) was a middle-aged adult female placed in an irregular burial pit about 1.5 meters in diameter (Shimada n.d.). Six ceramic vessels, a set of arsenical copper sheaths, and chalk lumps were placed atop the seated and flexed body. The face was treated with a red ochre-hematite pigment which resembles cinnabar. HPBG Burial XII, (T-4-‘83) dates to the Early Late Sicán (Shimada 1990: 330-31). This individual was also in a flexed and seated position looking towards the north in a rectangular pit one meter deep. This individual was accompanied by 10 ceramic vessels, chalk, an arsenical copper tumi knife, and a spindle whorl, among other items. HPBG Burial XXVIII (HPBG-T-4-‘83) was in a flexed supine position. The only items placed with the dead were two bundles of arsenical copper sheaths on the left side of the body. It is unclear if these burials represent some kind of local mortuary custom shift, status emulation, specialized socioeconomic status, or other phenomenon.

**Sicán Burials Outside the Heartland**

Limited work in the Piura region has produced a wide range of tantalizing observations especially when placed in regional perspective. Excavations by Cárdenas et al. (1991, 1993) in the coastal enclave of Macizo de Illescas surrounded by the Sechura desert is strongly indicative of traditional Mochica population contemporaneous with Middle and Late Sicán periods. Extended bodies were accompanied by characteristic paleteada ceramics and even one relatively crude Gallinazocoid face-neck jar bearing a
Middle Sicán Deity-like face (Cardenas et al. 1991: 40, Foto 4). Further north in the Piura region, work at Cerro Ñañañique by Guffroy et al. (1989) revealed traditional, ethnically Mochica burials during the Middle and Late Sicán periods.

In the Jequetepeque region, little attempt has been made to publish Middle Sicán burials sampled at San José de Moro, with Nelson et al. (2001) as the notable exception. The few other terse descriptions and Middle Sicán burial mentioned by Castillo (2001, 2003) indicate seated/flexed burials became standard. Grave goods included quantities of Middle Sicán Deity ceramics and *tiza* (chalk). Higher status of some of these burials is quite likely, especially in the case of an adult woman buried wearing a copper Middle Sicán funerary mask (Nelson et al. 2000). Burial practices outside this funerary center remain unknown.

Middle Sicán burials from the El Brujo complex in the Chicama Valley seem however to represent a broader social spectrum (Franco and Gálvez 2005). Following the Moche occupation, the north face of the Huaca Cao Viejo was used as a cemetery. The Middle Sicán component was heavily looted, but salvage excavations recovered a sizable mortuary sample beginning in 1990. Higher status burials included complex funerary bundles, metal objects, and prepared burial spaces. Gold items were limited to the nose piece attached to one copper Middle Sicán-style burial mask. Other elements of adornment included copper crowns and masks. Apparent emulation of elite Middle Sicán practices such as at Huaca Loro is evident in at least one case (Entierro 7, Muestra 5) where the masked, seated individual featured outstretched wooden arms external to the *fardo*. Though Franco and Gálvez’s (2005) paper focused on elite burials, most of their
sample was composed of seated or tightly flexed commoners buried with the “standard” range of items and offerings. Identification with the Sicán state is inferred by the presence of Sicán Deity ceramics and other items bearing the politically important symbols just as at San José de Moro. Analysis of a small textile sample from Huaca Cao Viejo suggest continuity of garment shape and other styles, while local costume incorporated entirely distinctive traits during the Sicán era (Rodman and Lopez 2005).

Post-hoc interpretation of Moche Valley flexed and seated “Early Chimú” burials described by Donnan and Mackey (1978) are likely contemporaneous with Middle and Late Sicán. Ceramics purchased by Donnan from grave robbers include presumably locally produced and highly stylized Middle Sicán styles (Burials EC1, EC5, and EC 13).

Though beyond the scope of this discussion, it is worth mentioning that contemporaneous adjacent highland cultures, such as Cajamarca or Chachapoya peoples participated in very distinct and divergent burial traditions that did not overlap with the north coast (Kaufman-Doig and Ligabue 2003; von Hagan 2001; Wester et al. 2000).

Sicán-period mortuary patterns involved the greatest degree of innovation among the ethnic Sicán elites, serving to some degree as trendsetters. Elsewhere in the heartland, local peoples seem to have vigorously conserved Mochica identity and ritual. North of the Lambayeque Valley Complex a pervasive Mochica identity endured. Exactly why seated and flexed burials become generally ubiquitous in the southern valleys is a highly intriguing question. A working hypothesis is that Wari and Cajamarca-related influence indeed led to a shift in identity and mortuary ideology at least at major centers following the Moche V disintegration. Burials of rural populations may provide a different
perspective. It would appear the Lambayeque Valley Complex represented a boundary which the strength of such non-local influence did not penetrate to an equal degree.

*Burial on the Chimú and Chimú-Inka North Coast*

Several factors underlie the lack of study of Chimú-period graves on the north coast. Principally, funerary platforms at the Chimú capital of Chan Chan have been thoroughly looted and fixation on Moche archaeology is further distracting. Still, some data exists which can help characterize burial on terminal late pre-Hispanic north coast.

In the Lambayeque Valley Complex, the only Chimú-era burials that have been excavated outside of Túcume were during rescue excavations of a cemetery at the traditional, rural fishing village of La Caleta de San José (Rodriguez 1995). These 26 shroud-wrapped burials were universally extended on the traditional north-south axis with the head in the south end of the grave pit (Figure 5.10). Associated grave goods include unmistakable Chimú ceramics. What is surprising however, are the large number of grave goods in some burials. In Burial 19, some 72 hand-modeled *crisoles* had been placed with the body as well as an imported *Spondylus* shell reserved elite individuals. Clearly, some individuals important to the community of San José were interred here, and the practice of traditional burial persisted at this seaside site.

In the Lambayeque Valley Complex, most of the Chimú burials at Túcume were not part of the site’s elite, raising questions about retainer populations and possible burial pilgrimages. Narváez’s (1995, 1996) brief burial descriptions are largely centered on
recovered ceramics which confound more in-depth interpretation of these burials and limits the present discussion. Still, the majority of Chimú burials at Túcume appear to be placed in seated flexed positions, though a small number of coeval burials are said to have been in the traditional north-south extended positions (Narváez 1995: 178). During 2003 excavations at Huaca Sontillo in the Poma Forest carried out by the Museo Nacional Sicán, two intrusive Chimú-period burials were located, and followed the Mochica tradition. Bennett (1939: 106-112) excavated 28 burials near Huaca Solecape south of Mórrope, and found mostly extended bodies buried with diagnostic Chimú material culture.
Rescue excavations at Úcupe by Carlos Wester (1996) of the Brüning Museum recovered 36 Chimú-period burials at this inferred provincial Zaña Valley administrative center which had been heavily disturbed by modern looting and construction. Twenty-six graves were clustered in a single 10 by 10 meter excavation unit adjacent to an inferred high-status funerary platform. Twelve individuals (Figure 5.11a) were placed in a seated/flexed position, the ubiquitous ethnic Chimú burial position in their Moche Valley heartland (Donnan and Mackey 1978).

The remaining 20 burials were interred in the traditional ethnic Mochica pattern fashion (Figure 5.11b). As at Illimo, Chimú-style ceramics placed with several Mochica dead suggest some degree of local sociopolitical and ideological integration into the Chimú political realm. The majority of both seated and extended burials were aligned on

Figure 5.11: Chimú-style seated and flexed burials (A) and extended traditional Mochica burials (B) at Úcupe. Drawings by Carlos Wester and courtesy of the Brüning Museum.
a north-south axis, with the head facing north. The social significance of the Úcupe burial patterns is unclear. It is a distinct possibility they represent the purposeful communication and differentiation of two distinct Mochica and Chimú ethnicities. Conversely, the more ‘prestigious’ Chimú burial style may have been locally adopted, or both scenarios may be valid. Lacking adequate preservation of teeth for dental trait or mtDNA analysis, this question remains unresolved for the time being.

At the Jequetepeque Valley site of Farfán, the site’s social and occupational diversity is reflected in its mortuary patterning and expands on a number of previous questions (Mackey 2006; Mackey 2007: personal communication). Like Úcupe, both extended and flexed burials have been documented. During the Sicán and Chimú occupations, it appears that inferred commoners were placed in a seated/flexed position while those associated with elite rank were found extended akin to the Mochica tradition. This could possibly reflect a relocated foreign population working and living at Farfán, or alternatively, status inversion. By the Inka period, flexed and seated burials became common in the five mortuary facilities examined by Mackey and colleagues, and include a group of high-status women buried with weaving accoutrements.

Inside the Chan Chan ciudadelas T-shaped above-ground elite burial platforms were constructed to hold the body of a principle personage, and were surrounded by up to dozens of secondary chambers, probably for placement of retainers. Salvage excavations at the Huaca las Avispas indicates to some degree of the massive human and economic outlay involved in the burial rituals of a Chimú royal, which included over 90 subadults (possible sacrifices), textiles, shells, ceramics, and food offerings, some of which were
probably buried after the funeral ended (Pozorski 1971; Shimada 2000). The site of Moche came to be re-used as an offering and burial ground during the Chimú era, and Donnan and Mackey (1978) and Tufino (2004) find universally seated and flexed bodies often accompanied by ceramics, camelid offerings, and copper items.

Even less data exist on Inka period graves on the north coast and the Lambayeque region is no exception. Graves excavated from the South Cemetery, Huaca Facho, Huaca Larga, and the Temple of the Sacred Stone at Túcume are however instructive. Inka material culture permeates most contexts, as do seated and flexed burials, often accompanied by prestige items like *Spondylus* (Bennett 1939: 114; Narváez 1996: 216; Figura 171). Grave shapes and sizes vary at Inka-period Túcume from simple burial pits, rectangular burial chambers, and intrusive stone lined shaft tombs. As noted in Chapter 3, inferred elite administrators were buried in elaborate settings and included a group of previously inferred “weaving women” placed in flexed positions and associated with weaving accoutrements in Huaca Larga Platform 2 (Toyne 2002).

**ENDURING BONDS BETWEEN THE LIVING AND THE DEAD**

Ethnohistoric and archaeological evidence reveal tangible, physical contact between the living and the dead with curated ancestor mummies inside caves and open-sepulcher burial towers called *chullpas* various highland regions occupied by the Recuay, Chachapoyas, and Inka peoples over the last 1,500 years (Buikstra and Nystrom 2003; Lau 2002; Sillar 1994). Such practices indicate the existence of the *ayllu*, a lineage-like
social group serving dual purposes of preserving its mummified ancestral founders and allowing easy access for continuous veneration. Most of these studies, however, focused on the late pre-Hispanic or early colonial periods of highland Peru, where pertinent ethnohistoric and ethnographic information abounds.

In spite of more and generally better preserved excavated burials on the north coast of Peru, examination of links between the living and the dead lagged behind their highland counterparts. In contrast to highland practices of burial in easy-access, open *chullpas*, Isbell (1997:143-144) characterized burial on the central and north coast of Peru as the “*huaca* cemetery,” [in which] the body was sealed in an underground grave that was *never intended to be opened*” (italics added). Burying the dead in this manner was akin to disposing of them once and for all, permanently severing physical contact. Recent revaluation of the concept of the *huaca* cemetery shows it to be untenable. Hecker and Hecker (1992); Klaus (2003), Klaus and Shimada (2003), Millaire (2002, 2004b), Nelson (1998), Shimada et al. (in press) and Verano (1995) have brought attention the existence of widespread and dynamic burial practices linking and the living and the dead on the pre-Hispanic north coast, but also to its complexity, variability, and possible linkages to ancestor worship. These practices will be briefly summarized for the north coast drawing on the regional syntheses by Klaus (2003) and Shimada et al. (in press), and are vital to interpreting the mortuary pattern data presented in this dissertation.
Modes of Living-Dead Interactions: Delayed Primary Burial

The first mode of living-dead interactions is represented by delayed primary burial (designation adopted from Millaire [2002:172]) that appears to have emerged during the Moche era (Nelson 1998). In a number of Moche and Transitional Period burials at San José de Moro, Nelson (1998) identified mildly to drastically disarticulated in situ skeletons often associated missing foot or hand phalanges. In all cases, natural taphonomy and post-interment removal and rearrangement was ruled out. Nelson argues these burials had been naturally mummified and curated before interment; much of the disarticulation could be accounted by the process of maneuvering the brittle mummified remains into the boot-shaped tombs.

Evidence of this practice was also found in Sipán Tomb 1 (Verano 1995) and the Huaca Loro West Tomb. Regarding the latter, some of the north and south side women were found to be missing extremities (e.g., terminal phalanges) and were accompanied by broken and incomplete ceramic vessels. Elsewhere, bones were disarticulated to a degree difficult to account for by post-depositional shifting such as the entire right arm of Burial 7 found under the left side of the vertebral column. A few, small, ovoid empty pupal cases, presumably of muscoid flies (Faulkner 1986; Haskell et al. 2002), in direct association with Burials 9 and 14 allows for a convincingly estimate curation of these bodies for at least 20 days, probably buried as naturally mummified remains. As mentioned earlier, the head of the principal personage in the Huaca Loro East Tomb was found on the mat-covered floor, detached from the body and rotated 180 degrees right
side up and facing west. Lacking cut marks signaling decapitation and a missing C1 vertebra, the head was likely manipulated when the body was a brittle mummy.

Virtually every skeleton at Cerro Cerrillos was associated with muscoid fly puparia, and several cases of missing appendages (such as Burial 17 missing both feet in the absence of cut marks and postdepositional alteration) indicate body part removal before burial (Klaus et al. 2004c). At San José de Moro, Middle Sicán burials continue to show evidence of disarticulation and mummification (Nelson 2002: personal communication). The absence of any well-documented cases of delayed primary interment among published Chimú burials likely has more to do with the quality of documentation than a real absence.

In this practice, the dead could have been curated as little as a few weeks (estimated minimum time necessary to dig and furnish a Sicán shaft tomb, for instance) to as much as several decades. Millaire (2002:173) posits various contributing factors, including the desire to conform to a “specific calendar for performance of funerary rituals” or the need to transport the dead from the site of death to burial. Other plausible explanations, which are not all mutually exclusive, can also be considered.

Considering Quechua folklore recorded in colonial Huarochirí at the headwaters of the Lurín River on the central coast, Salomon and Urioste (1991:131) speculate pre-burial curation in the Andes aimed to infest the body with maggots. The dead person’s anima, or soul, escaped in the form of flies. The volatile, spiritual part of a person separated from the hard, dry, permanent, and ‘ancestral’ parts of the body, namely desiccated skin and bones (Salomon 1995: 330). Similarly, Moche iconography suggests
a fly may have symbolized the soul of the deceased (Hocquenghem 1981), paralleling the Quechua conception. Motivation to remove the mandible in delayed primary burials may have been involved the desire to create a larger opening for flies to lay their eggs and accelerate the liberation of the soul (Bourget 2001a).

Post-Depositional Alterations

A second mode of living dead relationships involves traditions of post-depositional alterations of human burials. Hecker and Hecker (1992:35, 45) were the first to perceive alterations of burials and removed bones as offerings in other burials had been misinterpreted as secondary burials or sacrifices. The earliest documented examples of intentional post-interment alterations are found in Cupisnique burials in the Jequetepeque and Chicama Valleys. Headless bodies, sometimes with a gourd or ceramic vessel placed above the shoulders, are known from Puémape as well as a Gallinazo burial in the Moche Valley (Donnan and Mackey 19787: 52-53). Removal, replacement, or the addition of skeletal elements are found among Salinar, Gallinazo, Moche, and Chimú examples at sites like Moche, Pacatnamú, San José de Moro, as well as Sicán burials at Huaca Sialupe and Cerro Nañañique (upper Piura Valley) (see Donnan and Cock 1997; Elera 1998; Guffroy et al. 1989; Larco 1941:193-201, 213-217; Ravines 1982:135; Rubio 1994).

Some of the best documented cases of post-interment alteration come from the Middle Sicán multi-craft workshop at Huaca Sialupe. Here, at least three different patterns of ancient post-interment disturbance were discerned at this site: removal, removal and rearrangement, and reburial (Klaus 2003). Burial 99-3 is a good example of
post-interment removal (Figure 5.12). The grave was opened specifically for the removal of this juvenile’s skull and feet some time after the body had skeletonized. The lack of disturbance to adjacent bones, particularly in the vertebral column, indicated no connective tissue remained when the skull and feet were removed.

In Burials 99-1 and 01-8, horizontal vertical stratigraphic observations show the graves had been opened in antiquity. Parts of the skeleton were removed, and then replaced in general anatomical position. The skull of Burial 99-1 was set face down but atop the shoulders, and the femur replaced backwards and upside down (Figure 5.12). The thoracic region of Burial 01-8 was disturbed, possibly by the addition of an intrusive grave good after burial. The right humerus was replaced in almost in proper anatomical position, with several paired left and right ribs on the respective sides of the humerus.

Figure 5.12: Huaca Sialupe Burials 99-1 (bottom) 99-2 (middle) and 99-3 (top). Photo: Izumi Shimada.
A variant of this pattern involved Burial 01-10, an intrusive Chimú-era offering of a child’s body, was found with the thoracic region was missing with and the skull was placed just above the pelvis (Figure 5.13). The left articulated forearm and hand were found by the left lower leg. The free-floating hyoid was intact in anatomical position. Two ribs with probable perimortem fractures were placed in between the legs. Lacking cut marks, the body was possibly pulled apart manually as mummified remains.

Heads are often the specific focus of these activities. Chapdelaine (2001:82-3) describes excavations in the urban zone at the site of Moche of a relatively high status individual (Burial 26-5) whose grave had been accessed during Moche times and most of the skull and both clavicles were removed. The rest of the tomb was untouched. The transformation of an elaborate Moche III tomb at Huaca Cao Viejo (during the midst of

Figure 5.13: Huaca Sialupe Burial 01-10. Photo: Haagen Klaus.
inferred El Niño rains dating to sometime in late Moche IV) involved removal of nearly all its contents (Franco et al. 1998). Only six crania and one mandible were left behind, and the headless body an old woman is thought to have been the principle of the tomb. Later in time, Donnan and Mackey (1978) also reported two Chimú and one Chimú-Inka burial that lacked heads.

The site of Pacatnamú presents additional examples of Moche post-depositional alterations. Virtually all of the tombs excavated by Ubbelohde-Doering in 1937-1938 (1983) were significantly disarticulated or missing major skeletal elements, particularly heads and long bones. On occasion, skeletal elements of other individuals also accompanied these burials (Hecker and Hecker 1992:39), including both child and adult crania (Hecker and Hecker 1992:46). Similarly, substantial skeletal elements such as crania, mandibles, and long bones are missing at San José de Moro in addition to disarticulation (Castillo 2000; figure 14; Nelson 1998). It seems unlikely that such large bones would somehow have become disassociated from the body, even if a corpse bloated and tore its burial shroud. Removal was likely intentional.

Secondary Burial

A third mode of living-dead interactions involves secondary burial, such as Huaca Sialupe Burial 01-1 (Figure 5.14). This complete, though fully disarticulated adult skeleton placed in a shallow burial pit. Inclusion of fragmentary grave goods (camelid toes, tiza, and copper alloy) strongly suggests reburial. The crania of two other distinct individuals – a subadult under the age of 5 and an old adult male – were commingled
with Burial 01-1. A large, heavy (over 30kg) section of a finished adobe block was placed gently atop the bones. Then, a small fire was lit atop the block which concluded the reburial. Enigmatic features in the Huaca Sialupe cemetery appeared to be burial pits, but only contained degraded shrouds or bones such as a human distal thumb phalange—signs of primary burials exhumed presumably for re-interment elsewhere.

In the current body of literature, secondary burial seems to be the rarest form of living-dead interaction. Such activities were not idiosyncratic to Huaca Sialupe. The earliest secondary burial, consisting of long bones and vertebrae in a textile bundle, was found in a refuse pit in at the Formative site of Pampa Gramalote, Moche Valley (Pozorski and Pozorski 1979). Other graves uncovered by Elera (1986) and Ravines...
(1982) are suggestive of Cupisnique secondary burials. At the Huaca Cao Viejo and the Huaca de la Luna, a handful of secondary burials associated with elite funerary contexts have also been documented (see Franco et al. 2001; Uceda 1997b).

Revisiting the Dead

Literal revisitation of the dead has also been documented. A Moche V (ca. 600-700 AD) subterranean adobe burial chamber in the Huaca Soledad cemetery had a short well-worn stairway indicating a history of pedestrian access (Shimada 1994: 241). Both entrances to the chamber appear to have had removable covers. The skeleton of the original burial had been disarticulated when it was pushed aside to make room for another body. This chamber was just a part of a complex of some dozen similar burials chambers, each with its own access stairway or shaft, which together may have served a lineage.

Castillo (2001:327) documented a similar situation at San José de Moro where a Transitional Period (ca. 800-900 C.E.) chamber tomb also had open access. When a new body was introduced or more space was needed, existing remains were pushed aside with their grave goods, resulting in up to 30 disarticulated skeletons. Whether there was a permanent access structure such as a stairway is not mentioned. At Túcume, a large (1 by 2.75 meter) niched, inferred elite tomb with an access ramp was built within a rectangular enclosure (Narváez 1996: 174, 177). Various features of this adobe burial chamber such as a long access ramp and perhaps a removable roof suggest that it was also designed for periodic visitation.
Revisiting the dead may have also served the purpose of obtaining grave goods and the possible recycling of earlier offerings. Such a practice seems reasonable given numerous documented cases of post-depositional alterations of primary burials. For example, Moche IV tombs E-I, V, and VII at Pacatnamú contained a “Moche I” ceramic bottle (Hecker and Hecker 1992:47; Ubbelohde-Doering 1983:52-81, 126, 128-9). Similarly, some provincial Middle Sicán burials excavated in the east face of the Huaca Cao Viejo contained Moche IV ceramic vessels together with imported, mold-made Middle Sicán black pottery and hand-made local imitations. Narváez (1995:174-175) reported a diagnostic Middle Sicán black ceramic bottle in an Inka-period grave at Túcume. Archaisms or artistic revivals are not parsimonious explanations but instead convincingly illustrate use of grave goods from earlier cultural phases.

CONCLUSION

Mortuary archaeology on the north coast of Peru has both a checkered history and promising future. In this chapter, the historic development of scholarly studies of north coast burials was first reviewed. Then, the evolution and characteristics of a north coast burial tradition maintained in the late pre-Hispanic era by the members of the Mochica ethnic group was defined. This tradition became an especially vital domain of the practice of local identity during times of intense interaction with the foreign Sicán, Chimú, and Inka ethnic groups. Third, the physical evidence of multi-modal living-dead interactions was examined in some detail.
The study of burials on the north coast of Peru must be cognizant of both the material and non-material components present in a grave. Such an approach is best forged in a long-term, interdisciplinary, and regional archaeological study structured by an explicitly defined research agenda (Shimada et al. 2005: 81-82). Potentially the most significant non-material element of burials are human biocultural patterns encoded in bones and teeth, to which attention now shifts.
CHAPTER 6

BIOARCHAEOLOGICAL CONTEXTS: SKELETAL BIOLOGY ON THE NORTH COAST OF PERU AND BIOLOGICAL RESPONSES TO CONQUEST

A bioarchaeological study of postcontact Peru intersects an immediate or regional bioarchaeological context of the pre-Hispanic north coast, as well as the hemisphere-wide biocultural phenomenon of European conquest and colonialism. Pragmatically, it is necessary to assess the previous living conditions of indigenous peoples before contact so comparison can be made (Walker 2001b: 276). Moreover, a precontact biohistory is essential to interpret historic impacts on local and diachronic patterns of health, microevolution, environmental change, and history. This chapter first summarizes the development, themes, and major findings to date on the bioarchaeology of the north coast of Peru. Then, discussion explores a summary of the current synthesis of the bioanthropology of European contact in the Americas, underscored as an adaptive transition of such significance that only the shift from foraging to farming may have played a greater role in shaping modern human biology and cultures.
The scientific study of human remains in Peru shared an inauspicious beginning with the rest of physical anthropology and Andean archaeology. Nineteenth century works, such as those by Blake (1863, 1869), Rivero and Tschudi (1855), and Wyman (1874) were crania-centric studies that aimed to discern the “racial” nature of ancient Peruvians, types of cranial deformation, and debate of the natural cranial shape of Peruvians. Even Morton’s (1839) *Crania Americana* included 28 Peruvian skulls. Universally, specimens were removed from looted coastal cemeteries including Pachacamac (described by Hrdlička [1911:5] as “a veritable Golgotha, or some great barbaric battlefield, with skulls and bones whitening on the ground”). Skulls reportedly from the Ancon, Chancay, Paracas, Santa, and Moche regions were represented in these early works.

While Hrdlička ushered in many modern paradigms of physical anthropology, his work in Peru also articulated with the past. Much of his efforts could be described as traditional crania hunting in looted cemeteries. His 1913 expedition to Peru aimed to gather pathological and surgical crania for the 1915 Panama-California Exposition. Hrdlička (1914) also picked out unusual or pathological postcranial elements from the surface of devastated cemeteries. In the Chicama valley alone, Hrdlička (1914: 45-46) described visiting some 29 cemeteries in 1910 and collecting over 1,200 crania. The 1914 monograph, however, did break new ground with the first descriptions, interpretations, and quantification of porotic hyperostosis lesions, auditory exostoses, dental caries, and
degenerative joint disease on the north coast. Sadly, these samples are forever disembodied from their contexts which severely limit their interpretive value.

Again, owing to a lack of physical anthropologists in the Virú Valley Project and that physical anthropology was a discipline centered in North America and Europe, scientific perception of the value of human remains languished. While Stewart (1943) included postcranial metric data in his study of Chicama, Moche, and Virú Valley remains, a cranio-centric approach considering cultural affiliation via skull shape still dominated. Study of skeletal remains lingered on in Peru as a doctor’s hobby and not part of the mainstream anthropological agenda.

Cabieses’s (1974) work on the paleopathology of ancient Peruvians was ahead of its time in some ways. This medical doctor surveyed multiple skeletal phenomena, such as treponemal infection, trauma, oral health, ancient surgical techniques, and trepanation within broad environmental and technological contexts. However, his specimens are completely decontextualized such that many “clear-cut” assessments of disease conditions clearly require differential diagnoses. Linkages to archaeology (specifically Moche art), ethnohistory, and ethnographic depictions of diseases and therapeutic techniques are so loosely drawn as to be vulnerable to strong criticism. Notation of skeletal pathological conditions by Donnan and Mackey (1978) was promising, but not systematic or meaningfully integrated on the level of interpretation. Allison (1979) focused on mummified bodies, and looked at a spectrum of multiple diseases including malaria, pneumonia, and identified the presence of typhoid fever by immunoassays.
Modern osteological and bioarchaeological research began in Peru in the 1980s with efforts led by Jane Buikstra, Robert Benfer, and John Verano, on the far southern coast, central coast, and north coast and regions, respectively. Buikstra and colleagues in the Moquegua-Ilo area continue to generate highly productive and insightful research (Blom et al. 1998; Buikstra 1995; Knudson and Price 2007; Lozada and Buikstra 2002). Benfer’s (1984, 1989) research has been critical to characterize early human biocultural adaptation at La Paloma. Likewise, Verano and colleagues initiated the study of pre-Hispanic north coast populations primarily in the Moche-Chicama stretch. New geographical areas and highly valuable research questions have been examined by Tiffiny Tung (2003) involving Wari sociopolitical dynamics.

Still, historical legacies persist, and broader trends in Andean skeletal research are only beginning to shift from purely descriptive case reports on specific diseases or pathological conditions such as trephinations or trauma (see Verano 1997a), and are evolving towards more holistic, diachronic, and biocultural population-level studies that could be called bioarchaeological rather than osteological in orientation. Still, we must be very mindful to balance attention on important topics such as trauma, sacrifice, or trophy-taking with broader visions of health outcomes, adaptation and evolution, ecological interplays.

**An Approximation of North Coast Biohistory**

During the 1990s, ever-increasing focus was paid to the north coast of Peru by physical anthropologists and bioarchaeologists. Research problems, methods, and
interpretative frameworks used by these researchers varied widely in the application of osteological, osteobiographical, and bioarchaeological approaches. Unfortunately, current skeletal samples are geographically and temporally uneven. Despite efforts towards standardization, different variables, terminologies, and coding schema still persist among some workers. Most skeletons have not been recovered via long-term and regional sampling strategies and are thus mostly composed of higher-status individuals or select groups from political or religious centers of the Moche-Chicama region. This means secure characterization of synchronic and diachronic trends in health status is essentially out of reach at the present. Lacking a spatially and temporally coherent sequence of skeletons prevents a reliable biohistorical vision. However, existing knowledge can be patched together in constructive and informative manner.

*Early North Coast Health Outcomes*

The six adult male Middle Preceramic (ca. 6500-2000 B.C.) individuals from Nanchoc of the Upper Zaña valley exhibit dentitions that feature advanced occlusal and lingual tooth wear along with a low frequency of dental caries (Rossen and Dillehay 2001:68). These patterns of oral health are not unlike what might be expected of a forager/gather subsistence economy. These six skeletons were free from other signs of morbidity including pathological conditions indicative of any kind of metabolic or nutritional deprivation.

The Cupisnique era is beginning to receive long-warranted attention. Gillespie’s (1998) master’s thesis dataset from Puémapo included 24 Early Cupisnique skeletons, 41
Classic Cupisnique skeletons, and 53 Salinar individuals. The diachronic strengths of this research is offset by univariate comparisons of pathological conditions, which did not control for age nor assess statistical significance, and may have produced misleading conclusions and interpretations.

Still, Puémape health outcomes are discontinuous with the earlier period. An increase of dental caries and abscesses may indeed reveal intensification of dietary carbohydrates. Though samples are small, iron stress and marine dietary contributions are inferred from porotic hyperostosis patterns from Early Cupisnique and Salinar periods, respectively. Gillespie (1998: 112) tentatively diagnosed one Salinar individuals with yaws-like lesion patterning. DJD was relatively common among adult individuals and probably reflect active lifestyles; adult male elbows appear most commonly affected. However, emphasis on specific etiologies (e.g., attempts to discern rheumatoid arthritis from psoriasis) drew focus away from biomechanical and behavioral inferences. Markedly increased traumatic injury during the Salinar era appears not related to interpersonal violence but probably intensified patterns of precarious physical activity instead. Gillespie has taken the first step in Cupisnique bioarchaeology, which needs to grow in geographical scope, sample size, and analytical strength to more fully assess the biocultural interplays that were likely foundational to later patterns of health.

Mochc Bioarchaeology

Mochc skeletal populations are neither well studied nor sampled despite corresponding archaeological attention to their burials. Mochc bioarchaeology could best
be described as temporally and regionally uneven. Those that have been examined are
socially and temporally skewed, usually corresponding to cemeteries or tombs associated
with major political-religious centers. Moche I and II skeletons have yet to be studied,
and despite the quantities of Moche V burials excavated at San José de Moro, the human
remains have not been described.

Among the earliest Moche remains to be examined to date were the nine skeletons
from Sipán Tomb I by Verano (1997b), vital in establishing a biological profile of a
group of Early Moche elites and their attendants. These individuals appear to have
experienced very light health burden marked by few dental caries. Only one retainer
(Skeleton 8) displayed enamel defects, and the principle personage of Tomb I suffered
from minor degenerative changes commensurate with his age. These high-status Moche
may have been a privileged group, well-buffered against stress, metabolic deprivation,
and infectious disease. By inference, they ate a diet based less on carbohydrates and more
on protein or other non-cariogenic foods.

Millones (2000, 2004) has begun the important task of analyzing skeletal remains
from the site of Moche. The majority of the 10 skeletons reported to date correspond to
Moche IV, and many human remains excavated from the urban zone await study. Future
research will help understand the biocultural interactions that underlined the functioning
of the site, as well as testing corollaries of social rank or mobility.

Verano’s (1994b, 1997c) study of 84 human skeletons and 590 isolated elements
from looted contexts proceeding from the H45CM1, S2, S20, and S24 cemeteries at
Pacatnamú broke new ground as the first multivariable, population-based study of north
coast populations. Population mortality (rather than fertility), artificial cranial deformation, diet, nutritional status, living stature, infectious disease, neoplasms, bone chemistry, physical activity, trauma, oral health, and developmental defects were each assessed. Verano (1997c: 203) characterizes this Late Moche population as having led a physically active lifestyle and enjoyed a nutritionally adequate and reliable mixed diet of marine and terrestrial foods. Despite nutritional adequacy of the diet at Pacatnamú, the greatest source of suffering was poor oral health stemming from soft starchy cultigens. Chronic infectious disease (i.e., periostitis, osteomyelitis) was nearly non-existent.

Samples of looted crania from earlier Moche and subsequent Late Intermediate (Transitional-era and Early Sicán) cemeteries at Pacatnamú appear to display greater frequencies of porotic hyperostosis among lower-status individuals. Verano (1992) interprets this pattern as increasing health burden among the non-elite. Simultaneously, it may signal intensified marine contribution to non-elite diets and the secondary effects of intestinal parasitism.

One of the only concerted studies of oral health and diet come from Gagnon’s (2006) study of Gallinazo and Moche period dentitions from Cerro Oreja, in the Moche Valley. She points to the changing nature of oral health in relation to agricultural intensification, *chicha* consumption, craft specialization, and coca use as inferred from the dentitions of 750 individuals. This study is particularly important as it presents the first data regarding oral health during for Gallinazo-era populations and tracing these patterns through a dynamic time of increasing social complexity. Gagnon makes the argument that by the Moche period, food had become a means for the southern Moche
state to consolidate power; in particular, men became the primary consumers of coca. Coca, in its ideological and economic, roles, may have linked men in particular to state-building projects.

Gagnon’s (2006) study can be critiqued, however, in its straightforward interpretation of bioarchaeological data accepting an *a priori*, centralized state typology of social organization and cosmology. This practice contains potentially misleading and fatal flaws (see comments by Dillehay 2001 and Shimada 2004). In fact, an entire body of critical literature suggests the southern Moche polity was a chiefdom-level society; it is unfortunate this is completely ignored. Future study could test these biological data against hypothesized correlates of chiefdom- and state-level organization. It is further possible that the lack of patterning Gagnon (2006) detects among multiple dental features might actually be best explained by chiefdom-level organization.

*Studies of Sicán, Chimú, and Inka-era Skeletons: Morbidity, Activity, and Diet*

The bioarchaeology of the late pre-Hispanic period on the north coast of Peru (Lambayeque in particular) is most coherently understood. Skeletons representative of all known social variation and ethnic groups have been studied from the Middle Sicán period (AD 900-1100) in the Lambayeque Valley Complex. At the present time there appear to be no striking discontinuities between late Moche biological patterns at Pacatnamú – very low frequencies of periostitis, moderately frequent dental caries, osteoarthritis (often more pronounced in the shoulder and elbow), relatively high rates of anemia, and a low
incidence of skeletal trauma are common over time and space (Figure 6.1). We may hypothesize similar sets of bio-behavioral outcomes were shared between valleys and over time.

Farnum (2002), Farnum et al. (2004), Klaus (2003), and Klaus et al. (2004a, b, c) have begun to systematically study Middle Sicán skeletons from a problem-oriented approach addressing biological patterning, social status, and identity. Farnum, whose multiple lines of health stress data (including histological assessment of growth arrest), examined the bones of the Huaca Loro East and West Tombs, HPBG, and a provincial population from Huaca Cao Viejo. She concluded that differences in developmental health varied most clearly by social group and corresponded to Shimada’s metals-availability criteria. Members of the inferred ethnic Sicán elite class appear to have consumed a diet divergent from the rest of the population. High status associated with superior oral health is linked by Farnum to limited consumption of cultigens and perhaps more meat.

Trauma was noted not among the commoner population but only with middle and high-status leaders, suggesting a regime of more perilous activities, including the principle personage of the West Tomb who featured a healing, massive penetrating wound in the left ilium. Again, evidence of systemic infection is very sparse among all groups and only one case of probable metastatic carcinoma was documented (Baraybar and Shimada 1993). Yet, Farnum’s quantitative analysis was limited to descriptive statistics and did not control for age. Patterns of oral health and osteoarthritis in particular require re-examination.
Figure 6.1: Examples of pathological conditions, late pre-Hispanic Lambayeque Valley Complex. Photos: Haagen Klaus.

A. Porotic hyperostosis (cribra orbitalia), Cascajales Unidad 1Z Burial 4.
C. Osteoarthritic lipping, right glenoid process, Huaca Sialupe Burial 01-1.
D. Osteoarthritic degeneration of ulnar head, Caleta de San José Burial 22.
E. Advanced dental wear, hyperruption, and antemortem tooth loss, Úcupe Burial 18.
F. Osteoarthritic degeneration, lumbar vertebrae, Úcupe Burial 1.
The 15 skeletons from Huaca Sialupe and the 25 best-preserved skeletons from Illimo also are consistent with the models of Farnum and Shimada. These Middle Sicán-period Mochica appear to have consumed a relatively sufficient though cariogenic diets. Developmental insults were relatively infrequent. The adult members of the sample bore markers of an active lifestyle, and trauma was limited to one broken nose (Sialupe Burial 01-7) and one individual with well-healed broken ribs (Illimo Burial 7a). Chronic periosteal infection was very rare. One individual from Illimo demonstrated probable tuberculosis lesions (Temple et al. 2005). The single greatest source of suffering was again poor oral health, and among some, dramatically destructive carious lesions and abscesses were observed (Klaus 2003). By far, the highest degree of health stress appears to be concentrated in the Cerro Cerrillos sacrifice sample, with over ninety percent of the skeletons manifesting enamel defects, porotic hyperostosis, or both. Given that these individuals may have been systematically drawn from the lower echelons of the local Mochica population, the prevalence of pathological conditions at Cerro Cerrillos is likely skewed in this manner (Klaus et al. 2004b).

Intriguing stable carbon and nitrogen isotope data have been derived from bone collagen and hair from eight individuals at Pacatnamú spanning Late Moche to Middle Sicán periods (White et al. 2005). Though sample size is almost untenably small, the results suggest a dietary shift by Sicán times, with $\delta^{15}$N values reflecting increased consumption of marine foods. If further study should confirm this observation, the hypothesis of post-Moche dietary shifts and the reasons behind such a change would represent an vital research question White et al. (2005) also examined isotope patterns.
chronologically, and found a high degree of interindividual variability consistent not with seasonal changes but geographical relocation instead. These data suggest the Pacatnamú burial population had been a pilgrimage site for the dead. Substantial vertical coast-highland interaction is also considered by White and colleagues but this interpretation is unlikely; well-established models of coastal horizontality are ignored.

Nelson et al. (2000) presented the osteobiography of an elaborate Middle Sicán burial at San José de Moro known as La Hilandera (The Weaver). This old adult woman was probably a part of the local nobility. She wore a copper Sicán-style burial mask and was placed in a seated position with a large quantity of grave goods including a simple copper-alloy tumi knife and weaver’s accoutrements. Isotopic analysis indicated a mixed diet of maize and fish. Hypertrophied finger enethses may reflect habitual weaving, and well-healed rib fractures indicate some kind of thoracic injury. Yet, the authors’ conception of Moche and “Lambayeque” ethnicity is cursory and as discussed shortly, her deformed cranium is likely not a meaningful marker of ethnic identity.

Chimú and Inka period skeletal material on the north coast are very poorly sampled and understood. This situation may begin to change with upcoming excavations at Huaca Chotuna in the Lambayeque Valley by the Brüning Museum and recent work at Farfán by Carol Mackey. The skeletons from La Caleta de San José are tantalizing. Almost 60 percent of observable crania feature porotic hyperostosis lesions as might be expected among a community of fishers. Two individuals appear to have suffered from tuberculosis while another individual (old adult male) may display lesions consistent with the dissemination of prostate cancer into the lumbar vertebral bodies. These cases will be
discussed in Chapter 9. Most notable is the high frequency of traumatic injury at La Caleta de San José: 50 percent of the 14 adults suffered broken ribs, all well healed at the time of death.

Bioarchaeological study of inferred higher-status individuals from the Chimú administrative center of Úcupe is plagued by poor preservation and data could only be collected from the 18 most complete skeletons (Klaus and Wester 2005). Of these, three males and seven females could be identified who as a group averaged 43.2 years (bias-corrected summary age values), but several rather elderly female individuals were present. Porotic hyperostosis and enamel hypoplasias were observed in less than one third of the sample. DJD was very minor which is unusual considering the age of individuals affected as well as far more severe and common expressions of DJD in similar samples. Klaus and Wester (2005) tentatively infer that the age and sex distributions are a product of non-random cultural selection and these individuals may have been differentially buffered from stress, especially habitually strenuous physical activity. The inferred higher-status women buried at Úcupe were indeed perhaps associated with the elite male rulers, but did not follow them to the grave in the same manner as female retainers in the Chan Chan burial platforms.

Unfortunately, most of the skeletons from Túcume’s South Cemetery excavated by Heyerdahl and colleagues have been either commingled or lost stemming from poor curation. Toyne’s (2002) ambitious and significant master’s thesis represents the only Inka-period data from the Lambayeque valley. Toyne’s thesis employed a multi-dimensional osteobiographic approach to determine if the 19 females interred at Huaca
Larga at Túcume were an aqlla of specialized Inka weavers as had been previously surmised. A wide range of macroscopic stress indicators were employed including non-metric skeletal traits that assessed biological distance. In particular, musculoskeletal stress makers (MSMs) were rigorously scrutinized to detect signs of habitual weaving based on detailed ethnoarchaeological models of weaving movements and muscle use.

Toyne’s results are intriguing. Rather than conforming to the model of a group of chosen, privileged members of an aqllawasi, the wide age range, marked developmental stress, interpersonal traumas, and MSM patterns are inconsistent with a group of “chosen” weavers. An alternative hypothesis – these were noble wives and servants might suggest these women originated from a variety of social backgrounds and acquired a high social status preceding or at the time of their death. Their health outcomes may reflect non-elite developmental health patterns, and are generally consistent with Middle Sicán Mochica commoners. Pertinent local sources and similar, antecedent patterns of elite burials such as at Sicán and Sipán suggest local precedent, not an Inka state institution, could have contributed to biocultural patterning at Túcume. These women may well have been the elite male’s female attendants, “widows,” gift brides, orphans, or captive females (Ramírez 2004). Thanks to Toyne, a window on human biology in Inka-period Lambayeque has been opened as valuable questions can now be engaged.

Growth on the Peruvian Coast

Studies specifically concerning growth are very few. Most consideration has been given to estimating adult stature (e.g., Verano 1997c), while the links between growth
and health are essentially unstudied. Gillespie (1998: 101-103) attempted to correlate subadult long bone length with dental age. Long bone development at Puémape (like other Native American groups) appears to lag behind dental calcification compared to European population-based standards; malnourishment is rejected as the reason for dental-skeletal growth differences. Still, terminal adult stature was not assessed, and this aspect of Cupisnique growth and stress remains to be examined.

Gaither’s (2004) dissertation represents a far more sophisticated study of pre-Hispanic coastal Peruvian growth and health patterns, utilizing subadults and adults from Moche-era Huaca Cao Viejo and Inka-period individuals excavated from Puruchuco-Huaquerones on the central coast (eastern outskirts of Lima). Dental calcification schedules as defined by Moorrees et al. (1963) were recorded as well as maximum diaphyseal lengths and skeletal pathological conditions. Descriptive statistics, cross-sectional growth curves, and brachial and crural indices were calculated while Bonferroni alpha-protected $t$-tests compared population differences.

Gaither’s results indicate that pre-Hispanic Peruvians grow differently than standard reference samples: (1) accepted dental methods may $\text{over}$-age Peruvian subadults by 1.5 to 2 years; (2) long bone lengths tend to $\text{under}$-age Peruvians by nearly as much; and (3) nearly identical stature and sexual dimorphism between the two samples separated by space, time, and microenvironmental settings may reflect highly genetically canalized expression of stature among coastal Peruvians. Gaither also provides population-specific standards for aging that have much to recommend to them. There was also no observed correlation between skeletal stress and growth. However, the selection
of variables marking disease among subadults may be somewhat spurious: chronic conditions are cumulative and require longer periods to manifest in bioculturally significant patterns.

Though virtually nothing has been published on the Dos Cabezas Moche skeletons, Cordy-Collins and colleagues (2006) have lectured widely on what they are convinced represent “pathological giants” buried in the tombs, whose average stature was 10 to 20 centimeters greater than the average Moche male. Unfortunately, a difference of 20 centimeters does not constitute a giant or giantism in any way, and the criteria used to diagnose Marfan’s syndrome as the most plausible cause (“thinner” bones, an indented sternum, and longer fingers) is too impressionistic. These data need to be quantitatively compared to other members of their population. Body proportions must be further shown to be abnormal (e.g., bracial and crural indices, trunk-to-limb ratios). It is yet to be seen if the Moche “giants” alternatively represent a synergism of natural human variation, founder effect, inbreeding among Moche elite lineages, light biomechanical loading, and superior elite diet and nutrition that promoted greater growth.

Ritual Killing and Human Sacrifice

Extensive windows on cultural patterning of violence, ritual, and traumatic skeletal injury have been opened by the remarkable human sacrifices of Moche period (Verano 1998, 2001a, b, 2006). Osteological study of the victims of ritual killing at the Huaca de la Luna’s Plaza 3A and 3C have elucidated much about sacrifice programs. More than 70 adolescent and young adult males were found in Plaza 3A. Frequent healed
and healing parry and nasal fractures point indicate they may have shared a specialized warrior status in life (Verano 2001b). Perimortem trauma revealed most died when their throats were slit or a mace-like object imparted massive cranial trauma. Taphonomic observations indicate the bodies were protected and allowed to decompose in the open plaza as the remains were manipulated and repositioned (Bourget 1998 2001a; Verano 1998). The skeletal biology of the victims indicates they were healthy, physically active individuals who experienced normal growth, and little evidence of chronic infection, porotic hyperostosis lesions, or enamel defects were observed (Verano 1998:161). In sum, the Huaca de la Luna victims may have come from a privileged social background.

In nearby Plaza 3C, a similar sacrifice program seems to have played out, except that postmortem processing of the dead involved defleshing, decapitating, and dismembering at least 15 victims who may have been displayed in a butchered state before deposition (Verano 2006). Elsewhere in the urban sector adjacent to the Huaca de la Luna, two modified young adult male crania, prepared from fleshe headed, were described by Verano et al. (1999). These may have been a kind of trophy head, and their modifications closely resemble open-topped ceramic skull jars made by Moche artisans. At Dos Cabezas, Cordy-Collins (2001b) describes 18 decapitated heads deposited in a small temple. Many skulls still had attached cervical vertebrae with cut marks on the anterior aspects of the bone indicating associated throat slitting.

Physical evidence of human sacrifice resurfaces some 600 years after the last known Moche ritual killings at Cerro Cerrillos in the Lambayeque Valley Complex. While a basic emphasis remains on throat slitting following the basic Cupisnique-Moche
template, many innovations are clear. While young adult males are present, the majority of the victims were children under the age of 15. Throat slitting is accompanied by chest opening in at least seven complex variations of victim mutilation. Five individuals experienced semi-decapitation as well (Klaus et al. 2004b, c). Following a period of curation or delayed primary burial, each victim was afforded a formal and interment in an unprecedented overlap between funerary and sacrificial ritual domains.

A Late Intermediate Period (ca AD 1100-1375) mass grave consisting of 14 young adult males were found outside the walls of Huaca 1 at Pacatnamú. Perimortem trauma consisted of deep stab wounds, chest opening, and mutilation involving forcible removal of body parts from some of the victims (Verano 1986). On a Huarmey valley beach (far southern north coast) over 170 young and middle adult males were discovered in a mass grave (Verano and Walde 2004). These victims also had slit throats and were mutilated, and it is hypothesized these individuals of fighting age may have resisted Chimú imperial expansion and were executed for their efforts. The Pacatnamú and Punto Lobos killings however highlight an important divergence from earlier Moche killings: the former cases may involve a more secular form of ritualized execution than religiously inspired human sacrifice.

Body Modification

Even before Hrdlička, scholarly interest surrounded artificially deformed crania from Peru. Cranial deformation was by far the most common form of body modification practiced in the Andes. Blom (2005) and Buikstra (1995) argue that intentionally
modified head shapes correlated to sociocultural boundaries separating discrete populations inside the Tiwanaku culture. Many lines of evidence, including some early colonial sources, indicate intentional head shaping was widespread in the south-central Andes (Verano 1997a).

The other manner in which crania may be deformed is via childcare practices— inadvertent, prolonged low-grade chronic pressure is applied against the skull by contact to a device such as a cradle board or a hard sleeping surface (Ortner 2003). Direct evidence of cradleboarding is known from the north coast of Peru, including a Late Intermediate Period device found in the Virú Valley (Stewart 1944; Verano 1997c). Corresponding head deformation is present since at least Cupisnique times in the form of fronto-occipital binding. Pressure was exerted by cloth strips that bound an infant’s head to the board itself, creating bulges posterior to the coronal suture and laterally on the parietal bones. Such a bilobate cranium is characteristically wider and with a shallower base, wider vaults and a shorter facial region (Anton 1989).

During most of north coast prehistory, bilobate fronto-occipital deformation are ubiquitous, cross cutting all cultures, social classes, and ethnic groups (Klaus 2003; Klaus et al. 2004b; Shimada et al. 2004), contra Nelson et al. (2000) and Lichtenfeld (2001). Assertion by the latter authors that variation in cranial deformation on the north coast was used to permanently ascribe social roles in an ayllu is doubly untenable as ayllus did not exist on the north coast. Unlike the south-central Andes, deformed crania on the north coast relate to conservative childcare practices. Modified crania almost certainly do not communicate social identity but show limits of lo-andino analogies instead.
Surgical intervention in the form of trephination is osteologically well-documented in many parts of the Central Andes (Verano 1997a), but not on the north coast. Surgical modification of the body is however documented among three Moche individuals from the Chicama valley who experienced surgical removal of their feet (Verano et al. 2000). These cases of foot amputation illustrate well-developed Moche surgical methods remarkably similar to European techniques developed a millennium and a half later. Reasoning for the practice of amputation may have been driven by therapeutic motivations, or conversely, corporal punishment for misdeeds.

*Biodistance Analyses and Kinship Structures*

An area experiencing marked growth and promise in north coast bioarchaeology are studies of biodistance, population structure, and population history. Hrdlička (1914), who stated coastal Peruvians were all of the same “physical type,” would be first challenged over 70 years later in a dissertation by Verano (1987). His study of craniofacial microvariation using canonical discriminant function analyses suggested that the four Moche cemeteries at Pacatnamú each represented biologically distinct groups. In other words, kinship ties were seen as the primary factor in determining burial placement (*sensu* Saxe 1970). Later, Verano and DeNiro (1993) creatively combined craniofacial variation and stable isotope analyses to determine if the individuals in the Huaca 1 mass burial were of local or foreign origin. Dietary data are suggestive of coastal diets, and cranial variation places the victims among Jequetepeque or Chicama populations. As a note of caution, it is important to state the cranial traits selected by Verano (1987) are
generally assumed to be the least altered by the biomechanics of the craniofacial complex. Still, facial and cranial form is linked directly to the mechanical environment and subsistence (Carlson and VanGerven 1977; Larsen 1997: 268) and this consideration must seriously temper the above findings.

Sutter and Cortez (2005) and Sutter and Verano (2007) analyzed seven non-metric tooth cusp and root traits among the Moche sacrifice victims of Huaca de la Luna Plazas 3A and 3C. Using mean measure of divergence and measures of uniqueness, Sutter and Cortez (2005) found the victims of Plaza 3A were not part of the local population. Also, close inter-valley relationships appear between the Huaca de la Luna Platform burials and those at Pacatnamú. Sutter and Verano’s (2007) follow-up study on the Plaza 3C individuals involved comparison of dental traits to matrix correlation models predicting relatedness patterns for local versus non-local origins of the sacrifice victims. They find again evidence for non-local origin, as well as the closest biological affinities of the Plaza 3C individuals are shared with Plaza 3A. Additional dentitions from inland Cerro Orejas populations spanning Salinar, Gallinazo, and early the Moche period are all very similar, highly suggestive of little external genetic influence and in situ sociopolitical developments during the Early Intermediate Period (Sutter and Cortez 2005: 531).

Still, inferences on Moche population history and biological distances between archaeologically inferred social groups are far from secure. Extremely close relationships between the Moche individuals at the Huaca de la Luna (inferred nobility interred in the platforms and urban zone and the Plaza 3A sacrifice victims) all pertain to haplotype A,
pointing to sacrifice victims drawn from the local population – in other words, highly select, elite Moche warriors engaged in ritual combat and were sacrificed. Differences between dental trait and mtDNA findings may well owe to the different maternal/paternal genetic signals they measure. Very small sample sizes, selection of restricted and few non-metric traits, exclusion of dental metric data, and statistical issues including the lack of inter-individual analyses (Shimada and Corruccini 2005) and aspects of the matrix correlation method itself may have significantly biased these results. On an even larger scale, Shimada and colleagues (2005:81) detect significant genetic differences between the Moche valley lords, Chicama valley leaders, and the Lambayeque Sipán elites which are dissimilar enough to indicate they represented distinct breeding groups.

Elsewhere, Nelson et al. (2000) sampled the mtDNA of a Moche-era skeleton, a Transitional period burial, and a Sicán individual at San José de Moro. Though the full accounting of methods have yet to be published, relatively high measures of homogeneity among these three individuals point to local continuity and adoption of Sicán culture rather than a population replacement

Corruccini and Shimada (2002; also see Corruccini et al. 2003) examined dentitions from the Middle Sicán Huaca Loro East and West Tombs and the North Trench in a sophisticated study of intra-individual biodistance. Estimations of Euclidian distances were calculated from 21 inherited dental traits among 29 individuals. Statistically significant variation of biological similarities and dissimilarities were observed to correspond to distinct spatial patterning, and the Huaca Loro tombs appear to represent a planned elite cemetery. The principle personages of the tombs share a
mutually closer relationship than any other individuals and may represent a second-order relation (such as uncle-nephew). Closest biological similarity in West Tomb corresponds to the South group females and the principal personage, consistent with the model of Sicán ethnic group membership and history (a small endogamous elite breeding population that recently coalesced). The North group women display the highest heterogeneity, and are inferred as members of the local Mochica population.

Shimada and colleagues (2005) also examined patterns of mtDNA inheritance among the Sicán tombs, as well as earlier Moche individuals from the Huaca de la Luna, El Brujo, and Sipán. From the Huaca Loro tombs, dental genetic inferences of ethnic group membership described above appear are generally consistent with mtDNA haplotype distributions. Also, relatively high frequencies of haplogroup A and low frequencies of haplogroup C at Sicán are inconsistent with a Central Andean origin but with the northern Andes instead (Shimada et al. 2005: 77). As the Sicán and Sipán tombs yielded only one shared haplotype between them, a major discontinuity between Lambayeque Valley elite lineages is evident.

Klaus et al. (2004a) adapted part of Corruccini and Shimada’s (2002) methods in an inter-individual study of all Middle Sicán burials from the La Leche drainage including the sites of Sicán, Illimo, and Huaca Sialupe. As in the current study, Euclidian distances were calculated using doubly-normalized c-scores and submitted to hierarchical Unlike Nystrom’s (2006) indications of more fluid interbreeding among the northern highland Chachapoya ethnic formations, boundaries of ethnic groups of the late pre-
Hispanic Lambayeque region appears to be biologically discernable. The results (Figure 6.2) help to distinguish phenetic dissimilarity between members of the inferred intrusive Sicán and local Mochica ethnic groups. These findings are consistent with archaeological patterning and closely replicate several relationships between individuals in the Huaca Loro tombs. It also supports the interpretation of the north side women of the West Tomb were drawn from the local Mochica.

Toyne’s (2002) inter-individual study using non-metric cranial and postcranial traits of the “Weaving Women” at Túcume indicates a biologically heterogeneous group of people, and spatial organization of the burials does not correlate well with patterns of phenetic similarity. In other words, the Túcume women may have originated from a
number of populations and factors beyond kinship may have been responsible for their
tomb placement in the Stone Temple.

**BORN TO DIE? A BIOARCHAEOLOGICAL REASSESSMENT OF CONTACT**

Contact, as plainly defined by Dobyns (1983), is the indigenous acquisition of
European pathogens. Bioarchaeological studies on the interchange between the Eastern
and Western Hemispheres beginning the in the late fifteenth century reveal a far more
complex reality. In light of the last 10,000 years of human history, perhaps only the
transition from foraging to farming had greater impact on human configurations of
culture, relationships with the environment, and economy. Contact was however
unsurpassed in its global scale, degree of violence, and speed. In less than 400 years, the
biological structure of virtually every human population had been transformed in a
myriad of intricate ways.

European contact in the Americas received renewed attention with the
quincentenary of Columbus’s landfall (e.g., Crosby 1972; Thomas 1989, 1990, 1991;
Viola and Margolis 1991, among many, many others). Traditionally, historians,
demographers, and epidemiologists envisioned contact led to a cataclysmic indigenous
depopulation accompanied by a non-mutual cultural interchange (Crosby1972; Dobyns
1966, 1983; Ramenofsky 1987; Haladane 2002; Zubrow 1990). In essence, the New
World was a disease-free paradise wrecked by alien European pathogens (Sale 1990).
Perceptions of indigenous ethnocide were assumptions often based on Europeans mission
records or other biased or incomplete sources.

In the 1990s, the first generation of bioarchaeological contact studies emerged as part of this broader trend (Baker and Kealhoffer 1996a; Larsen 1994, 2001a; Larsen and Milner 1994; Verano and Ubelaker 1992). Much of the resulting picture of postcontact Native American population biology is however skewed towards North America (Figure 6.3). Still, the resulting biocultural model is compelling.

In most contexts, first contact was initiated by a multiplicity of European pathogens, such as smallpox, mumps, influenza, typhus, rubella, scarlet fever, measles, anthrax, or pertussis that indeed devastated indigenous peoples. Native mortality was the tip of a profoundly more complex phenomenon. The survivors of depopulation and their descendants existed in states of dynamic biocultural challenge and adaptation. An unavoidable consequence of European interaction was depopulation at least circumstantially related to a decline in indigenous health. Yet, the mode, magnitude, and tempo of contact outcomes differed immensely throughout the New World, shaped by
Europeans’ economic ambitions, precontact relationships between health, social complexity, population density, ecological settings, and local biocultural adaptations to conquest and subsequent marginalization.

Secondarily, bioarchaeology has shown – beyond the shadow of a doubt – that the prehistoric New World was not a disease-free paradise. Indigenous Americans co-evolved with a wide range of bacterial, viral, and fungal infections as well as other maladies in isolation from the Eastern Hemisphere (Larsen, 1994; Merbs 1992). Health patterns prior to contact set various preconditions for postcontact experiences.
Comparatively, northeast North America is underrepresented in contact studies, partially because the northeast was not a center of contact. Baker’s (1994) examination of human remains from Massachusetts reveals no clear evidence of epidemics ravaging the sixteenth century northeast, (contra Dobyns [1983]) but disease struck later during the seventeenth century. Survivors were forced to aggregate in villages and realign political alliances. Concerted colonization and missionization led to the foundation of ‘praying towns’ to convert and subjugate the natives. Disjunction of demographic patterns indicates a complicated postcontact population structure; a preponderance of males in at least two cemeteries probably reflects the costs of wage labor or conflict. Possible tuberculosis lesions are noted in several individuals. Trauma is not highly prevalent, but those observed are attributable to both accidental and intentional causes. At the site RI1000, some 60 percent of females are affected by DJD, while only 36 percent of males are osteoarthritic, suggesting a greater work burden for women, though the contribution of age to this pattern was not evaluated. Baker (1994) suggests the general continuity of caries prevalence indicates persistence of traditional diets in the postcontact setting.

To northwest, Pfeiffer and Fairgrave (1994) characterize Iroquoian cultures at the time of contact as a complex tribal society numbering some 30,000 people subsisting on horticulture, fishing, and hunting who were decimated by Old World diseases beginning in 1634. Studies of Iroquoian remains are clearly both facilitated and complicated by their mortuary program: the dead were disposed of in ossuaries containing up to 500 commingled, roughly contemporaneous individuals. This formation process is ideal for
demographic and epidemiological reconstructions, but the lack of coherent individuals hinders accurate aging and sexing of skeletons and diagnosis and differential diagnosis of skeletal lesions. Concordantly, the authors effectively employ element-by-element data gathering and comparison.

Carbon isotope values suggest maize consumption peaked ca. AD 1300, and declined through time into the contact period. Pfeiffer and Fairgrave (1994) note that as maize consumption decreased, non-specific infections did as well. Tuberculosis may have been present in pre- and postcontact populations. Chronic nonspecific infection increases in postcontact times likely exacerbated by epidemics and greater stress. Cribra orbitalia frequencies suggest precontact children may have been under greater hematological stress than their postcontact counterparts. While dental caries and abscesses seem more frequent over time, there is no clear-cut disparity between pre- and postcontact samples. Overall, Iroquois health was declining throughout the precontact period and was greatly exacerbated by contact.

Agency and Accommodation on the Central Plains

Reinhard et al.’s (1994) assessment of 123 postcontact and 40 precontact Ponca and Omaha Native Americans from 1780-1820 reveals a unique response to conquest. These Central Plains groups were indeed devastated by epidemic diseases, but the survivors and their descendants were able to capitalize on increasing Euro-American commerce dominated by the fur trade and emerged a major political and economic force. It is suggested diet may have actually improved in the postcontact period. The
introduction of firearms and horses increased hunting efficiency and access to protein while iron implements contributed to more effective foraging and cultivation.

Reinhard and colleagues (1994) also illuminate specific postcontact changes experienced by men and women. Vertebral pathology suggests females experienced differences in the mechanical loading of their spines. While inferring specific activities from patterns of DJD or other so-called activity markers can be fraught with problems, Reinhard et al. (1994: 68-69) argue men were primarily horseback riders while women rode horses in addition to other economic activities. The habitual riding hypothesis is supported by a suite of concordant auricular surface changes (e.g., DJD of the first metatarsal related to the use of toe stirrups) and hypertrophied leg muscle insertion and attachment points.

DJD was often more pronounced among Omaha and Ponca women, suggesting greater levels of habitual labor than men. Oral health among women was also poor, and increased levels of anterior tooth wear suggest extramasticatory behaviors related to processing goods for the fur trade. Levels of lead isotopes in these remains indicated trade in lead objects and use of lead-based cosmetic pigments lead to bioabsorption the substance probably in debilitating, rather than deadly, levels. Despite whatever gains made, female health suffered.

Kelley et al. (1994) examined skeletal manifestations of respiratory disease among Protohistoric and early Historic Plains Native Americans. Periosteal inflammation of the visceral surfaces of ribs was documented in six percent of 740 individuals from four South Dakota sites. Clinical data suggest lesions consistent with pulmonary
tuberculosis, though Streptococcal pneumonia or bronchopneumonia are other diagnostic options but rarely result in osseous reaction. While this report does not necessarily resolve the debate over the antiquity or origins of tuberculosis, it does bring attention to yet another significant mode of morbidity in postcontact North America.

Delayed Contact on the Pacific Northwest

European impact on Native Americans has long been cast as rapid and uniform, such that native demography, health, and disease patterns on the northwest Pacific coast following a transient first contact in the eighteenth century would have declined automatically. Cybulski’s (1994) examination of nearly 600 historic skeletons, written records, and modern health data reveals another outcome. Significant contact-related changes on the northwest coast were contingent upon sustained interaction with Euroamericans that only began during the mid-to late nineteenth century, and these were the last native North Americans to experience contact.

While demographic histories are difficult to reconstruct, particularly with very poor representation of infants and regionally disparate representation of females, depopulation and increased postcontact mortality and morbidity are inferred from historically known waves of epidemic disease, introduction of firearms in intertribal warfare, alcohol, and venereal disease. Tuberculosis was likely present in the postcontact era, while treponematosis was present prehistorically. The prevalence of porotic hyperostosis is regionally variable, but overall frequencies do not change meaningfully following contact and may reflect successful adaptation to local pathogen and parasite
load. Stature was also minimally impacted and began to increase by the 1970s. The pattering of dental caries, however, represents one major change. Carious lesions are remarkably less frequent than other any postcontact group (between 0.3 and 0.8 percent), but by the twentieth century, carious lesion frequencies skyrocketed as high as 49 percent as non-native foods rich in carbohydrates and sugars were adopted.

*Life and Death in the Borderlands of New Spain*

While the northern regions of North America were under the jurisdiction of the British and the French, much of the remainder fell under the authority of the Spanish. The Spanish followed a highly structured approach to colonization that sought three related aims: (1) extract whatever extant wealth from the natural and human resources of an occupied area, (2) establish a military presence to prevent other competing colonial powers from controlling Spanish territory, and (3) convert the indigenous people into Catholic and taxable members of the Spanish empire (Walker 2001b). While skeletal evidence may indicate some initial encounters such as the DeSoto *entrada* may have resulted in violent confrontation (Hutchinson and Norr 1994), the myth of the so-called Black Flag belies a far more complicated and dynamic interchange.

Some of the first contacts and colonies established by the Spanish were on the southeast coast of the United States – the Georgia Bight. The consequences of Spanish colonialism on native human biology and well-being in the *La Florida* region has been extensively investigated by Larsen and colleagues using multiple lines of data making this region the most thoroughly studied contact-period population of the New World.
Largely summarized in Larsen (2001a) and Larsen et al. (2002), this multidisciplinary research detailed patterns of health and adaptation across two major adaptive shifts experienced by the indigenous Guale peoples: adoption and intensification of maize agriculture following hunting and gathering lifeways, and the arrival of Europeans and establishment of Roman Catholic mission society. Larsen and colleagues (2002) identify both trends of continuously declining health initiated in the precontact time frame as well as contact-related increases of morbidity and mortality:

1. A slight increase in female fecundity (precontact agricultural) was followed by decrease in fertility (late contact) likely stemming from chronic biological stress.
2. Reduction in femoral growth velocity (following precontact agricultural) was apparently exacerbated by mission society conditions.
3. Reduction in terminal adult height (precontact-early contact) was followed by an increase in height (late contact).
4. Reduction in enamel defects, especially in late contact, perhaps owed to increased acute forms of stress.
5. Tooth sizes increased as depopulation and genetic drift altered the Guale gene pool. 6. Increased dental carious lesions and antemortem tooth loss during late contact correspond to stable isotope data documenting less-nutritious, maize dominated diets that replaced earlier, more varied foods.
7. An increase prevalence of iron deficiency anemia is correlated to the maize-based diet spanning early to late contact.
(8) The population prevalence of infection increased (precontact thru late contact).

(9) Decreases in DJD prevalence (precontact) was followed by dramatic postcontact increase likely related to Spanish labor extraction.

(10) Increased subperiosteal diameter and long bone strength are consistent with a more active postcontact lifestyle.

(11) No changes were detected in hazards or lifestyle due to accident or violence.

Elsewhere, at Tatham Mound on the central Gulf Coast of Florida, Hutchinson’s (2006) comprehensive study found negative health changes arose there as well during the early contact period. A rise in carious lesion frequency and alveolar infection indicated increased consumption of cariogenic foods. The frequency of enamel hypoplasias appears to nearly double. A drop in porotic hyperostosis frequency from nine to one percent either reveals a biased sample or remarkably low postcontact iron stress at Tatham. Hematogenous osteomyelitis and treponemal infection appear to have had considerable negative role in shaping health burden at Tahtam as well. The low frequency of DJD may owe to age-related structures in the sample. Traumatic injuries included those from metal weapons demonstrate hostile interactions with the Spanish. However, straightforward use and comparison of descriptive statistics and a small and unbalanced precontact skeletal sample may well have produced some questionable patterns and interpretations.

Stojanowski’s (2003, 2004, 2005a, b) studies of pre- and post-contact genetic variation among the native peoples of La Florida illustrate unprecedented changes to
local genetic structuring. Analysis of tooth size using Relethford-Blangero residuals and \( F_{ST} \) values indicate that in the Early Historic period, populations were aggregated in reducciones which increased genetic microdifferentiation and gene flow between inland and coastal Guale populations, previously isolated from one another. Late Historic populations experienced less external gene flow and were ultimately composed of remnant interior and coastal groups.

Stojanowski (2004) also noted an increase in tooth size over time. Since diachronic changes in human tooth size are clearly negative (e.g., Brace et al. 1987) gene flow with an outside population, selection via acute stress are considered but the most parsimonious explanation involves stochastic effects of genetic drift, in combination with environmental factors, that lead to increased tooth size as phenotypic variability decreased.

Conversely, study of precontact Apalachee dental genetic structuring in northern and central Florida indicates a completely different outcome (Stojanowski 2005a). There, limited precontact genetic heterogeneity (endogamy) was related to partial linguistic and reproductive isolation from their neighbors who engaged the Apalachee in episodic warfare. Following Spanish rule, extralocal gene flow and mating patterns were altered dramatically, and after 1650, the Apalachee were integrated into a more expansive mating network that may have included Spaniards and other immigrant Native American groups. The Apalachee appear to have maintained higher population numbers into the seventeenth century and avoided aggregation, resettlement and extinction, serving as a striking contrast to the experience of the Guale.
Further west along the Spanish borderlands, incursions into the Pueblo southwest were not as successful as in other regions. The economic potential of the Southwest was disappointing to the Spanish who were further dissuaded by seventeenth century droughts and other disruptions (Stodder 1994, 1996). The first demographic disturbances were probably smallpox-related, spreading northward along trade networks from Mexico with further population decline driven by subsequent epidemics, warfare, migration, population aggregation in missions, and famine. Skeletal data proceeding from postcontact Hawikku, San Cristobal, and Pecos adults indicate clearly that the prevalence of infectious disease, porotic hyperostosis, enamel defects, and traumatic injury (particularly cranial fractures resulting from Pueblo-Spaniard-non-Pueblo violence. Female fertility appears to decline following contact as well.

In the American west, California was a principle node of European contact beginning in 1782. Unfortunately, mission-period Chumash Indian skeletons are few in number, largely owing to poor preservation, small sample size, provenience control issues, and only one mission cemetery has been studied (Walker et al. 1989). Major dietary changes were in store for newcomers to mission life who consumed primarily terrestrial (C3 pathway) foods that contrast with evidence of a marine-centric late-precontact diet. Femoral midshaft dimensions are smaller postcontact, possibly reflecting a decrease in mechanical loading consistent with increased sedentism.

Despite any bioarchaeological limitations, anthropological study of contact in California is aided by extensively detailed mission records, and to a lesser extent archaeological data (Kealhoffer 1996; Walker and Johnson 1992, 1994). The Chumash
who survived initial introduction of Old World disease relocated (sometimes forcibly) to mission settlements where they experienced greater exposure to infectious agents including venereal disease, Spanish violence, and a less nutritious terrestrial diet. An exceptionally high infant death rate is reconstructed from mission records with few Chumash children surviving the first four years of life. A decrease in births over time further compounded demographic stress. Kealhoffer (1996) also describes changes to Chumash mortuary patterns, indicating a gradual evolution of burial patterns from the prehistoric to protohistoric patterns by the 1700s, and strongly suggests direct Spanish presence was the engine behind social collapse.

A critical point is derived from mission records that indicate while smallpox had multiple opportunities to be introduced into the Chumash population, there was no single, massive wave of epidemic disease, again contra Dobyns’ (1983) hypothesis of epidemic waves sweeping through the Americas in the 1600s. When epidemic disease did strike, some California missions were affected while neighboring missions were not. The first case of smallpox was reported among the Chumash in 1844, and even then was an isolated phenomenon affecting mostly the northern Chumash (Walker and Johnson 1994: 118). Kealhoffer (1996) indicates that the breakdown of rules governing marriage patterns and reduction of mate choices, child rearing, administrative policies of the Franciscans, altered methods of agriculture and economy, environmental transformation, intra-indigenous raiding, and the decline of Spanish power synergistically contributed to the consequences of contact in California. In fact, demographic collapse was only one form of depopulation, and was probably not that common.
Contact Consequences in Central America

Following the decline of the Classic Maya state ca. AD 1100, the Maya reorganized into smaller-scale, Postclassic societies encountered by the Spanish in the sixteenth century. Perhaps nowhere else in New Spain was resistance and rebellion as organized and successful. In 1697, 200 years after first contact, the last independent Itzaj Maya were conquered at Noj Petén in Guatemala. Study of five Classic and three Colonial Maya populations spanning the last 1000 years indicates these populations were plagued by a high prevalence of chronic stress especially marked during periods of social disruption (Storey et al. 2002). Maya health appears to have been deteriorating since the early history of their civilization. Enamel defects, porotic hyperostosis, and infection appear quite prevalent during the Late Classic period. This trend seems to have been worsened by contact and the nature of biological stress that shifted from chronic stress originating from social and environmental instability to acute stress stemming from introduced epidemic diseases.

Cohen et al. (1994, 1997) find evidence of colonial-era stress at the colonial Tipu visita mission in west-central Belize. Episodic childhood metabolic deprivation appears to be endemic, with 70 percent of incisors and 90 percent of canines exhibiting hypoplastic defects at Tipu. The visible lack of chronic adult stress markers (e.g., periostitis) may be a reflection of acute epidemic disease exacting a heavy toll on the Tipu Maya.

While not as mathematically sophisticated as Stojanowski’s work in Spanish Florida, Jacobi’s (1997, 2000) exhaustive study of the Tipu Maya dentitions shed light on
both mortuary ritual and population genetic patterns in colonial Belize. While the population appears genetically quite homogenous, several rare phenotypic traits appear to cluster among some Tipu burials. At least some of the Tipu cemetery organization involved family groups. Analyses of metric and non-metric dental traits indicate while a high frequency of Carabelli’s Trait was present among the Tipu Maya, there is no other evidence to indicate any of the nearly 600 Tipu skeletons were Europeans. Meaningful or widespread admixture between Mayans and Spaniards did not transpire. Dental variation does point to admixture with Itzá Maya populations from the northern Yucatán and Petén regions. Yet, mean measure of divergence analysis reveal the Tipu peoples are rather phenetically divergent from other Postclassic and postcontact Maya groups. This finding could reflect greater degrees of admixture elsewhere, or a greater degree of reproductive isolation of the more remote Tipu population.

Examining stable isotope, oral health, porotic hyperostosis, and enamel defects at Lamanai, White et al. (1994) infers the postcontact setting did not relate to a significant dietary shift, perhaps due to environmental constraints. The traditional maize diet was supplemented by some terrestrial and marine resources, and was not dissimilar to modern Maya foodways. The increase in skeletal markers of stress at Lamanai must proceed from other causes, such as epidemiological stress resulting from Spanish-Maya contact and intensifying trade in the northern Yucatan. These broad, diachronic studies of Maya health provides a vision of a population burdened by chronic stress – likely strongly impacted by the tropical environment – but was able by most standards to maintain a coherent, complex culture despite these stressors and European conquest and conversion.
Contact in the Andes

The South American Andes represent the region least studied in terms of the bioarchaeology of contact. Just one bioarchaeological study proceeding from the Northern Andes of Ecuador emerged from Douglas Ubelaker’s sustained research since 1973. His data provides an opportunity to assess the patterns of mortality and morbidity in Ecuador over the past 9000 years based on a sample of nearly 1500 skeletons from 20 highland and coastal localities. These data are unique in Latin America for its completeness, size, and geographic coverage. As Larsen and colleagues’ did in the Georgia Bight, Ubelaker provides one of a handful of true New World biohistories.

Overall, Ecuadorians some 9000 years ago enjoyed the best health. Beginning with the first sedentary populations, a general trend of decreasing health over time was set into motion. Precontact coastal Ecuadorians appear to have shared superior better health outcomes than their highland counterparts except with the exception of a greater prevalence of non-specific infection (Ubelaker and Newson 2002). Ubelaker is of course keen to articulate that changes to health and nutrition due to contact are difficult to identify in the skeletal record, as sample size and origin is restricted (all historic skeletons come from but two churches in Quito), and that many life history events of significant interest do not leave skeletal correlates.

Sampling issues (such as preservation and a postcontact sample derived from just two churches – San Francisco and Santo Domingo in Quito – complicate Ubelaker’s (1994) demographic reconstruction, but life expectancy at birth appears to have dropped sharply during late precontact. Contact further drove life expectancy to its all-time nadir,
but a recovery may have been underway in the Late Historic Period. Adult periostitis increased by 50 percent in postcontact individuals. Traumatic injury increased by the Late Historic, probably related to a shift to an urban setting and a more physically hazardous environment. Carious lesion frequencies initially decline in the Early Historic period, but increased nearly five times in the Late Historic period. Precontact abscesses were likely related to attrition that penetrated the pulp cavity, but in historic times, abscesses appear caries-induced. Antemortem tooth loss increased four fold from early precontact to Late Historic times. Interestingly, hypoplasias declined in the historic period as in *La Florida*. Female stature showed little variability through time, but increased slightly through the Late Historic. Male stature decreased only to later regain its average value.

In Ecuador, well-being steadily declined over time and increasing social complexity. Declining health may have been one precondition that predisposed these populations to even more comprised health outcomes following contact (Alchon 1991). New diseases, social upheaval, urban conditions, and poor sanitation led to rapid and harsh consequences for all involved, but an unprecedented health crisis already in progress among the indigenous peoples that contributed to their vulnerability to postcontact world.

*Stress and Extinction in the Pacific*

Some of the last regions of the world to be effected by European contact were dispersed Pacific islands of Polynesia. In numerous cases, contact resulted in
significantly negative outcomes, foreshadowed by violent conclusion of Captain James Cook’s landing in 1778 in Hawai‘i. Pietrusewsky and Douglas (1994) statistically assessed postcontact changes among native Hawaiians using multiple skeletal and dental indicators. Some biological indicators, such as oral health related to dietary composition, appear to have changed little if at all over time. Postcontact decreases in dental wear patterns correspond to a less-coarse diet or lessened reliance of the dentition in extra-masticatory use. Clear increases in childhood stress are inferred from the patterning of enamel hypoplasias. Postcontact prevalence of DJD is also elevated. Slightly increased postcontact frequencies of porotic hyperostosis and traumatic injury are not statistically significant. Both tuberculosis and treponemal infections were present in precontact Hawai‘i, but data on non-specific infection are not presented.

Prior to contact, indigenous peoples of Easter Island (Rapa Nui), numbered some 9000 inhabitants and had engaged in endemic warfare related to conditions of environmental degradation sparse resources. Nearly 50 years after first contact, Spanish, English and French ships began to stop briefly at the island. Historic accounts describe violent conflict, trafficking of indigenous women in exchange for European goods, the introduction and spread of sexually transmitted diseases, and the kidnapping of 1,400 islanders from 1862-3 by Peruvian and Spanish slavers.

Osteological analysis of human remains from Easter Island carried out by Owlsey and colleagues (1994) clearly correlate with historically documented population stress, and include cranial fractures, shotgun wounds, and possible skeletal manifestations of tertiary syphilis. Biodistance analysis of craniometric traits suggests at least one
individual of mixed descent, again consistent with documented sexual contact between passing sailors and Rapa Nui women. In the end, European contact resulted in the near complete extermination of the population and effective destruction of indigenous culture (Owlsley et al. 1994: 175).

**CURRENT SYNTHESIS ON CONTACT: PROBLEMS AND PROSPECTS**

*Health in the Wake of Contact*

By the time Columbus reached the West Indies, most indigenous New World populations had experienced a long-term decline, particularly in the millennia contact, as social complexity, agricultural intensification, and urbanism decreased human well-being (Steckel and Rose 2002a). Data from the first generation of bioarchaeological studies of contact indicate biocultural stress indeed affected Native Americans in northern North America who fell under the purview of the commercially and entrepreneurial-minded British, French, and Dutch. In the Pacific Northwest, disruption was only noted in the nineteenth century as Europeans and Euro-Americans saw the region with little to offer. The agency of at least two groups of Plains Indians involved active manipulation of postcontact economic opportunities but also bore negative consequences for their health.

However, such cases contrast sharply with the experiences of peoples under Spanish rule. In *La Florida*, the Guale endured extraordinarily negative lifestyle shifts. Health declined to the point of population extinction (Larsen et al. 1992). Data from Central America still remain very incomplete but general increases in skeletal stress
markers are widely inferred among the Maya despite the varied intensity of Spanish interactions. South America still remains a virtual unknown.

A major lacuna in contact studies involves the health of the colonizers and other non-indigenous groups. While historic skeletal series have been reported (Grauer 1995), only a handful has considered the direct implications of contact on biological configurations and health outcomes. Some examples include King and Ubelaker’s (1996) study of an early colonial farmstead cemetery at Patuxent Point, Maryland, and Craig and Larsen (1993) and Larsen et al.’s (1995) examination of health on the mid-nineteenth century rural Illinois frontier. Extremely difficult lives were inferred from the patterning of metabolic stress and activity pattern markers. Oral health merited the adjective “horrific” (Larsen 2002:222). Similar high-morbidity lives are inferred from skeletons buried in poorhouses (Grauer and McNamara 1995; Higgins and Sirriani 1995; Sutter 1995) and the experience of American soldiers that “turned relatively healthy young men into physical wrecks, unless they perished in combat first” (Sledzik and Sandberg 2002:185). As continuous westward expansion increased so did opportunities for interbreeding. European cranial morphologies in historic Native American cemeteries (Gill and Gilbert 1990) are though to be signs of limited Euro-American admixture with Native Americans on the Great Plains.

Several bioarchaeological studies of African-American skeletons provide a tentative glimpse of the well-being of slaves and their descendents. Skeletal remains of slaves in Barbados, (Corruccini et al. 1982, 1985, 1987; Handler and Lange 1978; Handler et al. 1986; Jacobi et al. 1992), South Carolina (Rathburn and Steckel 2002) and
the south-central U.S. (Davidson et al. 2002) reveal correlates of a consistent high morbidity lifestyle, including high mortality, low life expectancy, high prevalence of enamel defects, poor oral health, strenuous physical labor, elevated infection, inadequate nutrition, lead poisoning, and congenital syphilis. Overall, America was not only biologically stressful as an inherently maladaptive setting for indigenous peoples, but for the non-indigenous as well.

Many other unresolved issues remain. Regarding methods, there has been inconsistent usage across case studies. If we sideline concerns of interobserver error or the use of non-standardized of data collection prior to the mid-1990s, an incomplete picture still emerges. Sometimes, skeletal sample are insufficient, and may lead to a primarily emphasis on ethnohistoric records, such as with the contact-era Chumash. In other cases, key data such as periostitis may not be reported, for example (Baker 1994), or DJD data are absent (Cohen et al. 1994), and so forth. The goal of a robust regional comparison of contact has been compromised in this regard.

Given that contact studies are fundamentally diachronic and comparative, Tipu Maya or Rapa Nuians samples, for instance, lack corresponding precontact comparisons. Gauging the impact of contact therefore is far more problematic. Regarding a number of thematic issues surrounding the bioarchaeology of contact, one exceptionally important and persistent question involves if disease and depopulation really are related. Long assumed as locked in a simplistic association, evidence from California missions and elsewhere indicate biological stress and depopulation were separate phenomena only loosely linked in the postcontact milieu (Baker and Kealhoffer 1996b). Biotic and genetic
exchange between the pathogens and peoples of the New and Old Worlds presented new evolutionary opportunities and selective pressures. The extent to which disease, such as tuberculosis and treponemes interacted and were modified by these exchanges is just beginning to understood.

An equally important component of the bioarchaeology of contact must consider continuing consequences contact including continued impacts of tuberculosis infection, influenza, obesity, and non-insulin-dependent (type II) diabetes (Larsen 1994:141-2). Civil war in 1980s Guatemala led to widespread state-sponsored killings and displacement of still vulnerable Maya peoples. Chronic undernutrition continues to retard growth in many Maya communities. Perhaps the last human populations to experience contact were the Waorani of Ecuador during the 1950s and Brazilian Tupí Mondé groups spanning the 1930s to 1960s. Their fate echoes other indigenous New World populations, as increased morbidity, mortality, social disruption, violence, and population reduction was exacerbated by environmental degradation in the Amazonian basin.

Many issues and geographical areas, such as Andean South America, have yet to be examined. There is still no consensus on the modes and extents of demographic and cultural change, the heterogeneity of contact-era social organization and distribution, disease-depopulation linkages, or the ability to recognize and measure the influence of epidemic disease (Milner 1996). The osteological paradox notwithstanding, health data can be challenging to work with and interpret. The majority of past research on contact relied on simplistic univariate comparisons of pathological condition frequency between pre- and postcontact populations. This is untenable. Neither multivariate evaluation nor
statistical significance testing based on age categories have been widely carried out and leads to major questions regarding the accuracy of reported “patterns.” In sum, the bioarchaeology of contact is a barely charted field of scholarship which holds significant promise as it grows in scope and sophistication via the combined efforts of bioanthropologists and archaeologists (Milner 1996: 205).

**Burial in the Postcontact Americas**

Mortuary archaeology has the potential to directly complement the bioarchaeology of contact. It is evident from the preceding review that almost all postcontact studies focused exclusively on skeletal biology. Mortuary data, when infrequently described for indigenous historic populations, could be characterized as descriptive (Cohen et al. 1997; Hill 1996; Jacobi 2000; Kealhoffer 1996, Larsen 2001b). Emphasis is usually placed on variations in burial pit size and shape, positioning of the corpse, and grave goods.

In *La Florida* or the Tipu mission, findings of indigenous peoples buried in a church have been interpreted effectively to illustrate ideological change. Indigenous mortuary patterns replaced by European Catholic customs appears to correlate to an authentic shift in belief and practice among the Guale (Larsen 2001b). Some status marking is noted through the differential use of items like beads, elaborated domestic items, and body placement near the church altar. At only two rural sites did precontact mortuary traditions endure. In Belize, the Tipu Maya were universally buried in the Christian style divergent from Postclassic customs. Since Tipu was a *visita* mission with...
only sporadic clerical presence, European burial practices seem to have been embraced by these Maya. Even after the 1638 rebellion when the Spanish were cast out and the Tipu church was desecrated, Christian burials continued.

In-depth study of postcontact indigenous agency, ethnic identity, the symbolic construction of the burial as a representation of real or desired social situations, or relationships between health status, social status, and mortuary ritual remains largely untapped. Some first steps were taken by Baker (1994) who demonstrated precontact burial rituals persisted at seventeenth century Narragansett sites, but included European grave goods. At least ten contexts at the Burr’s Hill site were multiple interments suggesting numerous contemporaneous deaths possible due to acute disease. Indigenous burials at the praying town of Ponkapoag conformed to European mortuary style, but traditional burial orientation was reproduced at the same time. In this region, local responses to contact created a situation where some native peoples accommodated European encroachment while others quite successfully resisted, the latter expressed through mortuary archaeological data and oral health markers of diet that indicate a degree of local autonomy. To the north of Tipu in northern Belize, at least two biologically Mayan adult males were buried at the long-abandoned center of Chau Hiix. However, these graves reflect a syncretism between Maya and Catholic conventions. The maintenance of the Mayan tradition and burial location appear to have embodies an act of symbolic resistance (Wrobel 2007).

Hutchinson’s (2006) bioarchaeological study of Tatham Mound serves as the most detailed and theoretically informed example of post-conquest mortuary archaeology
synthesized with skeletal biology to date. Careful and systematic study of grave goods, corpse positioning and location, and comparisons of age and sex groups contributed to an interpretative stance envisioning the mortuary space of Tatham Mound as a cyclically dynamic, socially negotiated place; burials themselves are just a snapshot of a complex and protracted ritual cycle. Tatham Mound was abandoned little more than a decade after contact, and it is not surprising that indigenous mortuary rituals persisted there. However, objects of European manufacture were interwoven into indigenous burial patterns in a way that suggests their use as prestige goods but exactly why these items tended to be buried with women in particular remains to be examined.

CONCLUSION

This chapter first reviewed the bioarchaeology of the north coast of Peru, providing an incomplete, through tantalizing biohistory of this region. The late pre-Hispanic period and Middle Sicán developments in Lambayeque are indeed best understood. While health outcomes are unequally distributed among social classes, the society as a whole appears to have enjoyed sufficient diets, low levels of interpersonal violence, and minimal infectious disease loads. This pattern probably did not change substantially until European conquest as Chimú and Inka imperial policies did little to change the biocultural variables that contributed to health outcomes. However, this inference needs to be tested carefully in the coming years.
The dichotomous relationship between mortuary archaeology and physical
anthropology expressed in Andean studies is clear in the wider survey of the literature.
This division must be broken down and reformulated. Work by Knudson and Price
(2007), Lozada and Buikstra (2002), Sutter (2005), (Shimada et al. 2004) and Toyne
(2002) represent valuable progress towards establishing a formal fusion between these
two fields. Population-based studies of skeletons can and should follow a template that
call for minimally examination of all standard bioarchaeological variables (if not
especially) biomechanical data, stable isotopes, and aDNA.

Investigations of postcontact indigenous populations of the New World shed light
on a process of exceptional systematic complexity involving dynamic interplays between
environments, historical trajectories, disease, politics, and socioeconomic processes
among a myriad of other variables. The need for an attendant level of analytical
sophistication is clear. Postcontact bioarchaeologies require an approach that sets
biological, archaeological, ethnographic, and historic variables within a context-
embedded approach (Palkovich 1996). This approach is well-illustrated by the La Florida
Bioarchaeology Project which produced a highly nuanced, internally consistent tapestry
of knowledge built from multiple lines of independent data reconstructing the evolution
of a human population in the face of unprecedented social change. In other words, contact
must be rigorously framed in terms of local biocultural and historic processes.
Accordingly, let us shift attention to the ethnohistory of the Colonial Lambayeque Valley
Complex.
CHAPTER 7

THE ETHNOHISTORY OF SPANISH COLONIALISM
IN THE LAMBAYEQUE VALLEY COMPLEX

Contact between Native Americans and Europeans embodied a watershed event in world history. Beyond the profound biological interchange of contact, European colonialism in the New World involved unparalleled disruptions and transformations of indigenous societies. In this chapter, the history and context of colonial Peru is explored, which provides the contextual bridge between the study of pre-Hispanic society, population biology, and the aftermaths of conquest.

First, an overview of colonial Peruvian society establishes the setting for this chapter. Then, the focus narrows to characterize the historic Lambayeque Valley Complex as understood from available ethnohistoric accounts. Broad and nuanced changes in demography, social organization, political economy, and religion in the Lambayeque region resonated in the life of every colonial indigenous person. These lines of data are the most proximal keys to interpret local postcontact bioarchaeology. The colonial history of Mórrope itself concludes this chapter, highlighting the long-term and
unique demographic, sociopolitical, and religious consequences of European contact in
the northwest corner of the Lambayeque Valley Complex.

**COLONIAL PERU: AN OVERVIEW**

The study of Peruvian history involves a fundamental dichotomy. While empirical
archaeological approaches are applied to the pre-Hispanic past, studies of the historic
period have been based on ethnohistoric documentation which represents a completely
different set of methods, data sources, and even epistemology used to access the Peruvian
past. Much of this knowledge is based on European transcription of indigenous oral
histories and chronicles, treasury accounts, government and church correspondence, trade
records, judicial documents, wills, and testimonies that are today scattered throughout
Spain and the Andes (Andrien 2001:5). Moreover, archaeology has almost never been
used to study historical Andean developments, as the ethnohistoric record has long been
relied on to understand colonial Peru.

Surviving sources provide priceless windows on Andean politics, social
organization, and religion, but are biased in a number of ways, not the least of is a
geographic focus on the South-Central Andes. Even civil records and documents belie
their apparent empiricism but instead represent the changing perceptions and priorities of
metropolitan, colonial, and local administrators – Andrien (2001:5) cautions these
sources must be seen through a “double filter” cognizant of limited understandings,
agendas, and biases of European observers and later Andean authors. Ramírez (1996:152)
further states ethnohistoric sources are distorted artifacts, affected by “layer after layer of
European ethnocentric veneer, bias, misdepiction, and misunderstanding of indigenous ideas and concepts” that requires an extensive effort on the investigator’s behalf to access original emic meanings and ideas. In this way, a constructive and cautious approach to ethnohistoric reconstructions of the Andes can proceed.

*From First Contact to the Early Colonial State*

The Spanish invasion of Tiwantinsuyu represented the climax of the Spanish expansion into the New World. First contact was actually made by European pathogens. An epidemic of smallpox swept through Andean South America in the late 1520s, probably introduced from Panama and spread rapidly along trade routes (Cook 1992). Hundreds of thousands if not millions perished. By December 1530, Francisco Pizarro and 168 soldiers landed on the coast of western South America. Less than two years later, they encountered the sapa Inka and his army in the northern highlands of Cajamarca. The ensuing battle on 16 November 1532 was one of the most significant turning points in Andean history (Guilmartin 1991; Silva 2005). By 15 November 1533, Cuzco had fallen and the Spaniards began to consolidate their power. Spanish abuse and violence led the puppet emperor Inka, Manco Inka, to unite previous factions and revolt. Cuzco and the newly founded port of Lima, the “City of Kings,” came under siege. Though winning several battles, Manco Inka was unable to dislodge the Spanish, and retreated to Vilcabamba where an independent Inka kingdom was maintained until 1572.

The early Spanish dominion was disorganized and volatile, largely owing to greed, competition, intrigue, and other internal divisions that quickly manifested among
the conquistadores (Andrien 1991). Around the same time, economic activity was shifting away from melting down Andean wealth to the extraction of natural resources following discoveries of silver in Potosí and mercury in Huancavelica. The colonial Peruvian economy emerged with a mining-centric orientation revolving around the *encomienda* system which provided the right to collect taxes and labor services in return for militarily protection and instruction in Catholicism.

In the 1550s, royalist Pedro de la Gasca ended the era of civil war. Still, the Spaniards could not maintain order in the Andes. The *encomienda* system began to break down. Indigenous slave labor proved unreliable as it became “clear that no one in Peru could maintain his Indians” (Zárate 1968). Continuing affliction by European diseases among Andeans further destabilized the tenuous labor pool (Andrien 2001: 45-48). Though an embryonic state began to emerge by the 1560s with the first *audencia* of Lima, political crisis only deepened. Native hardships intensified. Coherent resistance movements in the south Highlands emerged. Spanish policies of (1) extracting natural and human resources, (2) establishing a military presence to deter competing colonial powers, and (3) converting indigenous peoples into Catholic, tax-paying, and economically productive members of the empire were in danger of catastrophic failure.

**Toledan Reforms and Emergence of Bad Government, 1569-1765**

In 1569, King Phillip II dispatched Don Francisco Toledo to Peru to end the crisis. He was faced with key problems involving control of indigenous labor, taxation, and centralized governmental power. Following a five year *vista general*, Toledo ordered
indigenous communities resettled into large, Spanish-styled towns, or *reducciones*. Later, in the seventeenth century, these were placed into one of 614 administrative districts, or *repartimientos*. Some 1.5 million Andeans were resettled in this massively disruptive program. *Repartimientos* were headed by a local Andean lord, or *curaca*, but local political concepts, balances, and interactions were transformed to serve the Crown (O’Phelan Godoy 1997:14). Under this notorious system, Spanish officials forced indigenous peoples to buy clothes, food, mules, and other items provided on credit from merchants in Lima (Burkholder and Johnson 1998: 87).

Spanish magistrates, or *corregidores de indios*, acted as the political and economic agents of the state and gained control of the countryside from *encomenderos* (Andrien 1991). Following extensive migration and depopulation, a new census aimed to recalibrate tax assessments as Toledo set concrete procedures for the collection and disbursement of tribute (Andrien 2001: 51). Toledo addressed the labor problem at the strategic Potosí by instituting a massive system of compulsory labor, and though called *mita*, was a transformed pre-Hispanic *m’ita* that held no provisions for real socioeconomic reciprocity. The last stroke was to terminate the exiled Inka regime in Vilcabamba, and in June 1572, the city-fortress had been taken by force. Emperor Tupac Amaru was captured and by September he was beheaded in a gruesome public spectacle in the Cuzco.

Toledo’s reforms, no matter how ambitious, were doomed from the start (Andrien 1991, 2001). The entire effort revolved around retaining already unstable systems of production, labor, and wealth as the colonial state had to operate at an unparalleled level
of efficiency and honesty. Reforms began to fail by the early seventeenth century as corruption, “bad government,” and indigenous resistance unfolded. Economically, reducciones were often impractical and inefficient: they removed peoples far from their labor sites, undermined indigenous social fabric and economy, and promoted disease stemming from dense population aggregation.

Saignes (1999: 68-9, 77-86) describes how some curacas in the late sixteenth century South-Central Andes adopted the trappings of European material culture, including lavish dress and housing. They meant to compete with and surpass even the wealthiest Spaniards, highlighting a struggle for local social control. Working conditions in the mines of Potosí and elsewhere were inhumane, and mining enterprises were actively undermined by various forms of indigenous resistance to the point where in 1632, the number of mitayo and yanacona laborers had dropped some 75 percent (Andrien 2001: 64). Tax revenues declined sharply in the 1660s especially as silver deposits were increasingly depleted.

By the mid-eighteenth century, state revenues were at a historic nadir as corruption and rebellion (notably those of Tomás Katari, Tupac Amaru II, and Tupac Katari from 1780 to 1783), characterized the Viceroyalty of Peru (O’Phelan Godoy 1988). Antonio de Areche, Special Investigator of the Viceroy, stated in 1777: “Peru is being ruined by a lack of honest officials, forced Indian labor, and the forced trade (repartimiento de comercio) conducted by district judges. The corregidores are concerned solely with their own interests…[H]ow close we are to loosing everything here, unless these disgusting abuses are corrected…Here everything is private interest,
nothing public good” (cf. Andrien 2001: 67) The Bourbon Reforms which included the intendancy system followed from 1765 to 1825 aimed to once again rejuvenate royal authority, but ultimately served to create an even greater groundswell of oppression and concomitant resistance. These reforms too failed, and Peru then was set firmly on the path to independence between 1808 and 1825.

Colonial Demography, Social Organization, and Settlement

Colonial Peruvian society was highly complex and constantly evolving from interplays between political developments, an emerging global economy, and changing demographic patterns.

Demographic change in its various forms had significant consequences for the sociopolitical and economic landscape of the colonial Peruvian state. Despite the lack of rigorous or systematic sources, a reconstruction of the epidemic disease in the Andes is tenable. In past attempts to gauge the nature of the demographic shift, early estimates of indigenous population size and depopulation ratios (Dobyns 1963, 1966) were fraught with potential sources of error (Cook 1981: 41-54). Cook (1981:114) ultimately suggests the 1520 indigenous population between 5.5 to 9.4 million; introduction of European epidemic diseases around 1520 was disastrous, and by the 1620s the native population had been reduced an estimated 93 percent to its historic nadir of 610,000 individuals. Accurate identification of diseases are problematic when drawn from colonial descriptions, though smallpox and measles appear by far the most destructive and were
accompanied by a web of influenza, bubonic plague, typhus, yellow fever, tuberculosis, and other acute infections (Cook and Lovell 1992).

However, depopulation was neither synchronous nor regionally even. In the two decades preceding the 1585-1591 epidemic series, Peru was relatively disease free which underscores the episodic nature of Andean pandemics (Cook 1992). Following subsequent outbreaks, Andean populations began to stabilize in the eighteenth century and slowly rebound despite further precipitous losses during epidemics from the 1690s to the 1730s. Regions such as the Lambayeque Valley Complex and Aymaya near Potosí (Evans 1992) may have escaped free-fall catastrophic depopulation due to a variety of factors. Depopulation was not always an artifact of disease, as flight and forced migrations contributed as well. Social strife and working conditions among the miners of Potosí represented another pattern of mortality (Cook 1981: 239-242). The counterpoint to indigenous depopulation involved European populations that generally expanded in colonial Peru, and perhaps the greatest growth was seen among mestizo populations.

Colonial Peru featured a relatively rigid, hierarchical social structure intimately linked to the economy – in essence, it featured elements inherited from European feudal society and an emergent, proto-capitalist economy based on maximizing profit (Crow 1992: 255). A small, relatively heterogeneous urban elite class fueled by tribute income was composed of bureaucrats, powerful clergy, and businessmen. Membership was largely determined by wealth, influence, family, and other social connections (Burkholder and Johnson 1998:171-172). In ‘racial’ terms, Spain or the American-born white españoles were at the apex of the hierarchy. Merchants in Lima were nearly as
dominant as they actively integrated themselves with the economic activities of the elite and the repartimiento monopoly secured their power. The elite clearly enjoyed superior diets, dominated by quantities of protein, carbohydrates, and other nutrients while poorer native diets represented a jarring contrast (Burkholder and Johnson 1998: 219-223).

Rural European elites sprung forth from the early days of the encomiendas to the maturation of the hacienda system, with power derived from agricultural and ranching profits. Despite the unequaled quantities of natural and human resources under their control, massive subsistence demand, and price gouging, hacendados were structurally subordinate to the urban and merchant elite (Burkholder and Johnson 1998:175). Rural elites were also adept at manipulating labor, depressing costs by exploiting workers, and using debt peonage. Low wages in turn reinforced low demand, minimal consumption, and poverty among laborers (Ramón 1991).

Middle tiers of colonial Peruvian society were sparsely occupied but began to fill with casta or mestizo children of Spanish-Andean-African unions. Discriminatory laws treated mestizos harshly. Adoption of Spanish language, religion, and customs by this group eventually fostered their assimilation by the 18th century as they functioned in the middle socioeconomic strata as artisans, retail merchants, skilled laborers, and even mid-level bureaucrats (Burkholder and Johnson 1998:204-207). Political and economic goals led some Spaniards to marry high-ranking Andean women to gain access to traditional tribute and land, and eventually led to the biocultural hybridization of a mestizaje curaca class whose administrative roles were manipulated in many ways to make the labor and fiscal systems work (Spalding 1991).
The majority of the society was composed of an indigenous poor – skilled journeyman, market people, peddlers, farmers, servants, unskilled and other low-wage laborers, soldiers, beggars, thieves, prostitutes, and invalids (Burkholder and Johnson 1998:179). Much of indigenous population movement flowed from the countryside to urban areas, and ultimately was linked to native assimilation that created poor working classes. Despite these and other alterations to the fabric of indigenous life and society, native populations were able to retain elements of pre-Hispanic culture, but the economic demands of the colonial reality led to impoverished and powerless indigenous villages which still exist today. In many ways, the Spanish envisaged a corporate society living in a fictive República de Indios with different laws, tax and labor obligations, and rights.

The poor in colonial Latin America and Peru in particular highlight massive inequality and astonishing disjunctions in the distribution of wealth. In urban areas, few people worked year-round, but instead experienced extensive periods of unemployment. As their services were a commodity that was bought and sold, vulnerability of the poor to fluctuating market demand for labor often led to destitution in a hand-to-mouth existence (Burkholder and Johnson 1998:179, 201). When employed either in mining, agriculture, ranching domestic service, oppressive quotas extended long hours and the struggle to survive consumed the energies of the people.

African slaves were also imported into Peru due to cheap labor demand and plummeting indigenous labor pools (e.g., Bowser 1974). Colonial Peru was a society highly racialized in terms of skin color and “blood” (Descola 1968: 25). Spanish racism and labor demands contributed to a colonial outcome shared by slaves in Peru as
elsewhere in the Americas, but eventual access to urban economies began to grow a less marginalized, free black community.

Colonial Peru was a male dominated society, and women of higher castes were notionally barred from labor. Conversely, poor and indigenous women contributed intensely to production in the household or in textile mills. As tribute demands increased, women bore the brunt of taxation (Silverblatt 1987: 129). In Guaman Poma’s 1980[1615] opinion, the clergy were the most active force in the dehumanization of women (Silverblatt 1987: 139-142). Legally, indigenous women were defined as minors.

Ethnogenesis was a basic feature of colonial Peru involving dialectical interchanges between indigenous groups and the intrusive European culture (e.g., Abercrombie 1991; Osario 1999). However, Spanish invention of a new identity – *el indio* – was part of the colonial socioeconomic program intimately linked to the indigenous poor throughout Latin America (Stern 1982). The construction of *el indio* had many consequences, including breaking down pre-Hispanic identities and ethnic boundaries and served to sharply limit potential native political and economic power.

Women in colonial Peru tend to be overlooked in many studies, but Osario (1999) makes a forceful argument for women as a locus of agency and ethnogenesis.

Settlement patterns involved European models that were both alien and overlapped with pre-Hispanic patterns. Urbanism was common to both worlds, but city grid layout, a central plaza, and sheer size of urban centers were unmatched by Andean developments. The monumental core of Lima functioned as the center of religious and political life, asserting the power of the elite. Distance away from the core was
proportional with social rank, and neighborhoods were racially segregated. Cities elsewhere in Peru, such as Trujillo or Chiclayo, reproduced this pattern. Most settlements in colonial Peru could be however classified as rural. Often, rural settlements were tied to large estates, \textit{haciendas}, and \textit{estancias}, with the owner’s house dominating the residential core. Many towns were born as a \textit{reduccion} and, as one of the most radical ruptures from the past. Each \textit{reduccion} condensed hundreds of indigenous rural settlements into a handful of nucleated settings (MacCormack 1991; Saignes 1991).

\textit{Colonial Economic Order}

The socioeconomic formation of colonial Peru differed in key ways from political developments. In a global and historic view (\textit{sensu} Wolf 1982), European expansion into the New World involved fundamental economic motivations – initial short-term, “get rich quick” goals of the conquistadores were also accompanied by longer-term plans and expansion of market economies. Initially, \textit{encomiendas} attempted to merge a European mercantile mode of production.

Profits from early \textit{encomiendas} were used to acquire land for crops and livestock production, found mines and textile mills, and connect Andean laborers to expanding regional markets throughout Latin America and Europe (Andrien 2001:77). Yet, \textit{encomiendas} were inherently unsustainable (Davies 1984). As they declined, \textit{encomenderos} levied increasingly heavy taxes and labor extraction as social tensions worsened. Indigenous peoples were ill-organized for intense and long-term production of goods demanded by a rapidly increasing European populace. By 1600, indigenous
peoples especially in coastal regions resisted market participation as entire kin groups fled from production and tribute demands (Ramírez 1996). In the wake of the *encomienda*, the *hacienda* system took root (Keith 1976), itself flourishing for a time and then fell into decline by the end of the eighteenth century.

Despite the early legal and religious prohibitions against mistreatment of Native Americans spurred on by Bartolomé de las Casas (1995 [1552]), slave labor, brutality, exploitation, and injustice, were embedded *de facto* features of the colonial political economy. Stern (1982: 138-139) argues the “insidious” secret of exploitation in the Andes involved not just force but the subtle coercion of dependence in Andean colonial economies. Pressures of necessity drove people to volunteer themselves for exploitation.

Asymmetrical power relationships, the legal system, and religion were used by colonial elites to coerce tribute and labor from an economically independent indigenous peasantry – illustrated by Stern’s (1982) study of sixteenth-seventeenth century Huamanga. Toledan reforms and associated policies created structural relationships where the exploited “needed” their exploiters to subsist and survive. For instance, rural landed estates that did not receive *mita* laborers attracted and retained local workers using a variety of means. Promises of low wages for seasonal laborers were enough for local workers to earn cash and pay out of the iniquitous tribute labor system. Full-time laborers on the 1620s central coast would be recruited by estate owners, offered a cash advance, a small plot of land, and shelter from *mita* service. With excessive tribute being exacted from their low pay, many indigenous peoples fell into debt and became legally bound to their employers until the debt was paid off (Andrien 2001: 87).
Installation of a market economy in the Andes was inevitable. From the 1620s, indigenous Andeans began to play a more direct role as laborers and consumers. The decline in silver and transatlantic trade stimulated a reorientation of the Peruvian economy towards regionalism, diversification, and self-sufficiency (Andrien 2001: 84-95). Many Andean peoples also creatively responded to the shifting economy by adapting kinship and social institutions, such as the Lupaka who found ways to profit from the *trajine* caravans linking highland mining towns with the Peruvian trunk line (Andrien 2001: 85-87). Other Andeans had come to own small shops, own city property, or functioned as petty merchants on the urban margins (Andrien 2001: 88).

By the 1730s, new waves of disease, natural disasters, political instability, and declines in mining revenues had undermined the colonial economy, but mining and transatlantic trade rebounded as the Bourbon Reforms unfolded after 1765. Integration of Andean subsistence and production economies helped lend the late colonial economy greater flexibility but Andeans never prospered from the interchange. Instead, they were constructed into an exploited peasantry, increasingly marginal to the sociopolitical life of the newborn Peruvian state of the 19th century (Andrein 2001: 9).

*Religion, Resistance, and Syncretism*

The Roman Catholic Church joined the Spanish Crown bureaucratically and financially to form the central expression of institutional force in colonial Latin America. This variety of transplanted Roman Catholicism contained both old standards of regional popular Spanish Catholicism and new elements that would emerge in the colonial context
The Church permeated every dimension of colonial life, functioning as the primary cultural vehicle for native acculturation and assimilation as they drew indigenous peoples into the cultural orbit of the Europeans (Burkholder and Johnson 1998: 92). Religious interaction in the Andes resulted in a multilayered confrontation between two total systems in a cross-cultural exchange – what Herskovitz (1949) calls transculturation – and the two were forever altered in the process.

The colonial Church throughout Latin America was intimately involved in imposing western beliefs, social practices, organization, and political ideals as they “educated” local peoples. Explicit religious teaching was accompanied by a wider agenda: enforcing European standards of dress, hygiene, marriage patterns, inheritance, and legal rights, attending to the sick, and organizing residence patterns (Farriss 1984: 91-92). The Church was a self-sufficient and sometimes competitive economic entity as it extracted compulsory tithes, fees, and other monies from natives for basic services such as baptisms, marriages, funerals. While closely allied with the state, early Latin America mission churches manipulated their inherent tension with the *encomiendas*. As the priests could not defend natives from economic exploitation, it was in protest they sought to undertake assimilation in their own way. Early missions attempted to portray themselves as a symbolic sanctuary from secular labor and strain to draw in and maintain converts (Crow 1992: 207).

The so-called “spiritual conquest” of the Andes began at Cajamarca in 1532, and soon after, Dominicans, Franciscans, Mercedarians, Augustinains, and later Jesuits began to flood into Peru. However, the intensity of evangelization documented in Mexico was
not reproduced in early Peru. One factor may have been the inferior quality and inadequate numbers of priests that arrived in the Andes (Burkholder and Johnson 1998:95), exacerbated by cultural and linguistic barriers, civil wars, and unreceptive *encomenderos* who were interested in profit rather than souls. Andean peoples quickly understood the links between evangelization and exploitation (Saïgnes 1999: 115).

Paralyzing divisions among the clergy emerged as how to carry out conversion in the first place. For the Dominicans and Augustinians, conversion required finding a mix between Catholic and Andean beliefs, and using that common ground as a means of ‘gentle persuasion’ away from demonic influence and religious error (Andrien 2001; Duviols and Itier 1993). On the other side of the debate, Jesuits such as José de Acosta called for the destruction of the simple-minded and brutish Andean peoples’ idols, pagan rituals, and the imposition of rigid Catholic orthodoxy (MacCormack 1991:261-263).

Three Lima Provincial Councils from 1551 to 1583 attempted to reach a compromise. The first two Councils, which encouraged priests to learn native languages and allowed natives to pray in their own tongues but demanded pagan idols destroyed and indigenous religious specialists and practices (especially ancestor worship and other clandestine rituals) stamped out of existence. The Third Council (1582-83) reflected some of the reforms of the recent Council of Trent and emphasized the “childlike” nature of native Andeans such that only “moderate” punishment should be meted out for religious infractions (Andrien 2001; MacCormack 1991).

By the crisis years of 1560s, most Andeans incorporated some basic European cultural and religious precepts into their cultural consciousness. In 1564, a priest of the
repartimiento of Parinacocha in the diocese of Cuzco stumbled across a messianic religious-political revitalization movement that emerged a few years earlier and was already widespread in the southern Andes. Called Taki Onqoy (dance of disease), this hybrid ideology held that an impending resurrection of pre-Hispanic huacas would destroy the Europeans, their God, and usher in a glorious second coming of the Inka and reestablishment of indigenous rule (MacCormack 1991; Saignes 1999; Stern 1982). Taki Onqoy was a direct political and religious threat to Spanish hegemony. It was also impregnated with both European and Christian ideals, even calling its followers indios, the homogenizing term used by the Spanish (Andrien 2001:171). A two year anti-idolatry campaign followed and destroyed Taki Onqoy with the arrest and punishment of over 8,000 takiongos and the public confessions of the movement’s leaders.

Partly in response to the Taki Onqoy, a New World version of the Spanish Inquisition was instituted – the extirpation of idolatries – which was nothing short of a war against indigenous religion and identity. While important differences existed with the European inquisition (Gareis 1999), the extirpators aimed to completely reform indigenous practices using force. The first of three sustained and intense waves of extirpation spanned 1608-1627, and was headed by Francisco de Avila. This corrupt clergyman was able to divert attention from charges against him of slave labor, extortion, and gross sexual impropriety by claiming his Huarochirí parishioners were pagans who, seeking revenge, falsely accused him. In a dramatic public auto de fe in Lima’s central square, Avila denounced idolatry, burned native religious objects, and had an Andean religious specialist lashed and exiled. Riding a wave of momentum from his performance,
the Archbishop of Lima named the ambitious Avila as Judge Inspector of Idolatry in

Operating within the boundaries of the Archdiocese of Lima, Avila and his teams
systematically searched villages, destroyed shrines, ancestor mummies, and all manner of
huacas resulting in an immeasurable loss of cultural goods, artifacts, and heritage. Public
punishments such as death, lashings, or imprisonment were also carried out. Less severe
transgressions were punished by public humiliation, servitude to a priest, or religious
instruction (Andrien 2001: 175). In other autos de fe, natives were compelled to burn the
mummies of their ancestors, often the remains of parents or close kin (Gareis 1999:236).
Interrogations of local peoples aimed to acquire names of supposed idolaters or
confessions, and torture was not an uncommon tool. By 1621, a manual was even
published for extirpators, and though each extirpation trial procedurally differed, a
general template of detection-punishment-education was carried out. Despite the
enthusiasm of its proponents, the violent extirpation was widely unpopular in the
Viceroyalty, and in 1627, the first campaign ended as abruptly as it started with the loss
of its clerical and lay patrons (Andrien 2001: 177).

In 1641, the appointment of Pedro de Villagómez as archbishop of Lima ignited a
second wave of extirpation that lasted thirty years. In the provinces, the new idolatry
inspectors found “error” was even more persistent than before some 110 years following
conquest. Andean peoples practiced unpredictable mixes of Christian and local dogma;
Andean religious specialists and curanderos still held strong sway over communities
such as Cajatambo (Duviols 2003). The feast of St. Peter was merged with a local
agricultural rite, and offerings of llama blood, guinea pigs, *chicha*, and coca were made to various *huacas*, ancestors, and saints. Fear, Andean and European political intrigue, and religious zeal enveloped many of these second-generation idolatry trials, and local communities often resisted using every means at their disposal, including suing abusive inspectors in Spanish courts. Ultimately, withdrawal of political support in Lima led to the evaporation of this campaign as well.

The final stages of extirpation unfolded between 1671 and 1750. Idolatry trials became far less frequent and were moved to Lima where they could be centrally controlled. Indigenous defendants made effective use of Spanish trial lawyers in securing lighter punishments or acquittals, and judges accepted religious error as a defense. Corporal punishments became less brutal. Still, after nearly two hundred years of evangelization, Andean religions persisted, embedded within outward expression of Christian piety. Popular religion following the last of these trials was far more tolerant of religious blending. Emerging popular icons with Andean overtones, such as the highland Virgins of Copacabana and Chiquinquira, or the Cruz de Motupe on the north coast, were exploited by the clergy for the connection to Catholic faith (Andrien 2001: 185). As long as parishioners paid their salaries, many later priests were ambivalent to idolatry. Roman Catholicism even provided a degree of social unity and security.

In the end, the “spiritual conquest” of the Andes achieved little more than a religious decapitation (Garies 1999; Saignes 1999). The official state religion of the Inka elite was actively attacked and purged while local and regional practices were beyond the scope of the early religious attacks which allowed them to grow and entrench in the
colonial setting (Griffiths 1996:8). Instead of victory for the Church, a dynamic compromise seems to have emerged throughout indigenous Peru after a 300 year struggle. On the other hand, the extirpation was a defeat of the Spanish which failed to transform Andeans into archetypal Catholic subjects (Garies 1999: 245).

In addition to all the other reasons cited for the failure of evangelization in the Andes was the ability or nature of Andean religions to synthesize and accommodate different faiths, whereas the European ethos could not understand or agree to such a spiritual compromise. A highly syncretic Andean Christianity emerged throughout colonial Peru, taking different forms through time and space (e.g., Albó and Calla 1996; Arnold 1996; Cánepa 1996; Griffiths 1996; MacCormack 1991; Saignes 1999). As Arriaga wrote (1968[1621]): “A common error [among Andeans] is their tendency to carry water on both shoulders, to have recourse to both religions at once… Most of the Indians have not yet had their huacas taken away from them… nor their abuses and superstitions punished so they think their lies compatible with our truth and their idolatry with our faith.”

In the Quechua-Aymara heartland, some had constructed a dualistic Christianity, with Christ, the Virgin, the saints (as splinters of the sun) as one half and the chthonic mountain divinities as the other (Saignes 1999:120). Others conflated tripartite Andean spirits with the Holy Trinity interpreted as the Fruit of the Sun-God and the Virgin-Moon who procreated the Sun-Christ, who was either younger or older brother of the devil (Saignes 1999:114; also consider indigenous art depicting three-headed or tripartite Christs [MacCormack 1991:272, Figure 31]). Christian feast days were integrated into
indigenous ritual calendars. Statues of saints were understood to be *huacas*, repositories of sacred energy. Perhaps one of the best-known syncretisms involved the blending of the pre-Hispanic Pachacamac cult with the Señor de los Milagros (Rostworowski 1998).

Christianity made some sense from an Andean perspective as it appeared based on an event of crucifixion, death, entombment, and resurrection. Bridges with Andean mortuary cults could be easily made (Saïgnes 1999: 117). While the dead buried in the churchyard kept the dead close to the living, struggles over the relationships between the living and the dead ensued which evoked a particularly intense set of native adaptations. Enduring bonds between the living and the dead persisted into the late 1600s as mummies were still buried in caves and *chulpas* especially in highland regions where visits and surveillance by clergy was minimal (Doyle 1988; Salomon 1995). Worship of ancestor mummies and other human remains (broadly termed *mallquis* in highland traditions) persisted in mid-eighteenth century Arequipa, for instance.

Underground burial was widely thought to suffocate the dead, and Andean peoples did not hesitate to rescue them for reburial in traditional locations while others attempted clandestine burials outside the church (Griffiths 1996: 199). Into the colonial era, remains of the baptized and non-baptized alike were placed in mortuary caves and worshipped. In Cochabamba, the dead were disinterred, the skulls removed to individual households, and affines beseeched their ancestors in a series of masses, vigils, and novenas for life-giving rains before reburial (Saïgnes 1999: 118).

Religious transformations eventually conferred widespread conflation of the devil and demons with the dead (imparting to Satan a positive aspect and the dead a negative
one). Demons incarnating the spirits of the dead, sometimes aided by the moon, were seen as the source of fertility (Saignes 1999: 118-119). Indigenous Andean death ceremonies thus began to shift away from guiding the deceased into the world of the ancestors to protecting the living from the dangerous and repugnant dead. Today, distant and pre-Hispanic forbearers are often regarded in a highly negative manner (Salomon 1995). Human remains are no longer the focus of ritual, and few remnants of documented colonial-era ancestor worship exists today as the dead have been constructed as antithetical to the living (Griffiths 1996: 272).

It is valuable here to highlight Griffiths’ (1996:15-16) argument that a careful distinction must be made however when assessing colonial religion: the term “syncretism” is probably only applicable in the broader sense of the term “synthesis” rather than in the narrower sense of “fusion.” Instead, a Catholic-Andean continuum may be a more useful conceptual vision. Much like the social milieu of the day, Andean religion was subordinate but not obliterated (Griffiths 1996: 7). Griffiths (1996: 15) also states the most common configuration of colonial Andean Christianity could be described as “nepanlistic,” where a person or group remains suspended between a lost or disfigured past and a present that has not been fully understood or assimilated. As such, many Andeans experienced most commonly (1) states of incomplete conversion (Christianity believed but misunderstood), (2) less widespread overt conversion (neither believing nor understanding Christianity but participating nonetheless) and most rare of all, (3) complete conversion (Christianity both believed and understood) (Klor de Alva 1991).
However, syncretism may also be described as a type of acceptance characterized by conscious adaptation of an alien form or idea in terms of indigenous counterparts. The dynamic native religious matrix was subordinated by alien elements while mutual, though not equal, accommodation and dialectical synthesis emerged rather than a simplistic fusion (Griffiths 1996: 16). Further, ritual served as a “transmission belt” of new meaning and a point of articulation and interchange between Andean and European faiths: Andeans could accept Christianity by attributing native meanings to European practices. Andeans also conserved their own rituals by grafting new meanings onto preexisting frameworks (Griffiths 1996:17). Regarding the extirpations, temporary indigenous concession allowed for long-term survival of Andean beliefs in a sophisticated use of clandestine obstruction and deceit (Griffiths 1996: 189).

Also, reinterpretation was fundamental to religious adaptation. Andean beliefs neither disappear nor persisted in a pristine state – Andean ideas were instead redeployed in new configurations in response to the new religious order (Griffiths 1996: 18). Especially in the later colonial era, a new Christian synthesis also emerged. As Griffiths (1996:18-19) states, “the two religious systems were like streams, constantly converging [and] intermingling…to the present day, without ever flowing into one large river, the elements of each system folding over one another incessantly until there was no part of one that had not been touched by the other, in the manner of a “chamber of mirrors reflecting each stream’s perception of the other.””

Another key dimension of colonial Peruvian religion was its use as a tool of the subordinated as an embedded ideological weapon of long-term group conflict. The Taki
Onqoy revival was the most unmistakable intersection of hybrid religion, political consciousness, and resistance in the early colonial Andes. Many other examples are worth discussion. The practice of magical curing (especially when it was driven underground) not only affirmed connections between the living, the dead, and pre-Hispanic cosmos, but was a highly symbolically subversive act (Saignes 1999: 121-123). Consumption of associated materials such as coca and hallucinogenic cactus was equally an act of resistance. Many shamans decreed themselves to be important Christian figures (Saignes 1999: 122-127). Predictably, shamans or curanderos were actively hunted down (Griffiths 1996, 1999).

Leaders of small-scale resistance and millenarian movements in the Quechua-Ayamara heartland took names of Christian saints. The Christ of Tacobamba in the 1580s preached with his female apostles to drink chicha beer as the blood of Christ and eat the psychotropic San Pedro cactus, which Sainges (1999) interprets as signs of deep and intense discontent. Barred from any other participation beyond attending mass, indigenous southern Andeans internalized the power of the sacred, and created their own avenues in which to participate in the new faith. To Andeans, true Christians became the native peoples, not corrupt Spanish clergy and laity.

THE COLONIAL EXPERIENCE IN THE LAMBAYEQUE VALLEY COMPLEX

The Lambayeque Valley Complex was paradoxically a peripheral region far from colonial centers and an economic center and focus of activity. Attention to the region
began with Pizarro’s 1532 passage through Olmos (27 September), Motupe (28
September), Jayanca (2 October) Túcume and Llampeyec (Lambayeque) (3 October), and
Zaña (5 October) (Mendoza 1978: 178-179). The city of Trujillo was founded in 1534 as
the north coast administrative center, and in the same year, Pizarro issued the first
encomienda land grants that began to divide up the Lambayeque region. Under the
Crown, more complex administrational divisions followed. Lands north of the pueblo of
Lambayeque were administered as part of the corregimiento of Zaña, with the
repartimienetos of Cinto y Chiclayo, Chuspocallanca, Reque, and Collique managed
under the larger though more distant corregimiento of Chicama.

Lamentably, north coast ethnohistoric documentation is very limited. The north
coast never had a dedicated Spanish or indigenous chronicler unlike the southern
highlands (e.g., Cieza de León 1998 [1553]; Cobo 1990 [1653]; Guaman Poma de Ayala
1980[1615]). Comparison with the southern highlands shows the north coast is
historically, linguistically, socially, and ethnically distinct. North coast colonial outcomes
cannot be predicted from a priori or lo-andino analogies with southern highland
ethnohistory. In other words, the colonial north coast requires its own particularistic
study. Fortunately, pertinent information exists, but is highly dispersed.

In his study of Chimú ethnohistory, Rowe (1948) perceptively argued for the
persistence of ancient religious custom, farming techniques, ceramic production, and
technology in the seventeenth century north coast (Figure 7.1). Subsequent analyses of
legal documents, census data, wills, and other non-systematic accounts by historian Susan
Ramírez has been vital in reconstructing the colonial Lambayeque region in particular.
Figure 7.1: Colonial ceramics, though unprovenienced, assumed to have originated in the Lambayeque Valley. The syncretic nature of the subject matter and production technology is evident. The king of Spain is represented on the vessel at center while the ceramic at right is covered by a glaze of European origin. Photos by Analise Polsky and courtesy of the Brüning Museum.

From this corpus of work, it is certain that unprecedented changes rapidly unfolded within 50 years of conquest in the Lambayeque region, contrasting with the slow, indirect groups (Ramírez 1996: 39-40).

Demographic Transformation

One of the principle factors contributing to the indigenous socioeconomic disarticulation of the colonial north coast of Peru was depopulation. It is logically assumed the immediate contact-era generation in Lambayeque was ravaged by disease which initiated demographic collapse in the Lambayeque Valley Complex. In 1540, Spanish visitador Sebasitián de la Gama arrived in the encomienda of Jayanca (which
incorporated Mórrope in its territory) where in one town 12 of the 20 dwellings were abandoned and collapsed; further along, he arrived in other small indigenous hamlets described as demolished, fallen, and ruined towns that had been thriving just eight years before (Ramírez 1996:27-29). Census data developed from a variety of archival sources examined by Cook (1981) and Ramírez (1996) documents clear and sometimes extreme population reduction in sixteenth century Lambayeque (Figure 7.2; Table 7.1, 7.2). While these data almost certainly reflect broad demographic realities, specific data must be approached with caution. For example, curacas complained that following the visita of Cuenca (1566-1567), over-numeration included the counting of children, the elderly, and the dead to increase the amount of mandated tribute (Ramírez 1996:33). Conversely, local Spanish authorities were also periodically guilty of deflating population counts so as to retain greater proportions of tribute for personal profit while clergy had a vested interest in embellishing the number of souls they saved.

Still, depopulation is clear. The worst hit appears to have been the encomienda of Jayanca whose native populations fell by 81 percent from 1575 to 1602 (Cook 1981: 131, Table 31). Some of the overall population losses were obviously disease-related. In many ways, the narrow and circumscribed coastal river valleys were ideal disease reactors with high population densities (Lambayeque with the highest) which provided ideal conditions for maximum mortality from introduced pathogens (Cook 1981:143). On the north coast,
typhus or plague hit resulting in heavy mortality in 1546, and was followed by an epidemic series including measles, smallpox, and “el peste” from 1558 to 1561 (Cook 1981: 135-136). Corresponding population pyramids reconstructed by Cook for 1572 indicate few individuals over the age of 59 (that is to say, few surviving members of the generation born before 1513) and far fewer children than required to maintain a stable population (1981: 136).

However, some argue population decline was not due solely to postcontact disease but was initiated in the Lambayeque region before contact. Cabello Balboa (1586 [1951]) described a major “war” between the polities of Jayanca and Túcume that had just concluded as Pizarro arrived. Still, citing this conflict as a prime mover in precontact population decline.

Figure 7.2: North coast population, 1520-1630 (Cook 1981). The 1520 total population size is an estimate.
depopulation would be unwarranted. These were two of only several major local polities, and the chronicler may have misinterpreted the wider Andean concept of “war” which seems to have included ritualized combat and general lack of rampant destruction and bloodshed (e.g., ritual *tinku* combat in the highlands).

Demographic change throughout the sixteenth and seventeenth century Lambayeque Valley Complex was also fueled by migration. Cook (1981: 131) describes heavy migration of working men in the 1590s with highly unbalanced sex ratios in *repartimientos* of Chiclayo, Chuspocallana, and Reque as males flooded willingly or otherwise into the vineyards, cotton plantations, and olive orchards between Lambayeque and Collique. Loss of males further afield as they met *mita* labor requirements would have taken additional tolls. It was also not uncommon for natives to relocate from one *encomienda* or *repartimiento* to another within the Lambayeque region as they attempted to flee excessive labor or tribute demands. A secondary effect of these population shifts resulted in newborn and uncharacteristic competition and conflict between *curacas* over their subjects.

Still, demographic changes were neither uniform nor consistently descending throughout the Lambayeque Valley Complex. Some *repartimientos* with strong economic foundations and those managed by the Crown rather than individuals were demographically stable (Cook 1981: 143-144) (Table 7.2). For instance, the Crown *repartimiento* of Olmos on the northern fringes of the Lambayeque Complex was a large
<table>
<thead>
<tr>
<th><strong>Encomienda</strong></th>
<th><strong>Year</strong></th>
<th><strong>Tribute Payers</strong></th>
<th><strong>Total Population</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuspo-Callanca</td>
<td>1572</td>
<td>716</td>
<td>2,972</td>
</tr>
<tr>
<td></td>
<td>1578-80</td>
<td>624</td>
<td>2,244</td>
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<tr>
<td></td>
<td>1592</td>
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<td>1593</td>
<td>358</td>
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<td>1593</td>
<td>250</td>
<td>2,131</td>
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<td></td>
<td>1597</td>
<td>356</td>
<td>---</td>
</tr>
<tr>
<td>Collique</td>
<td>1570</td>
<td>582</td>
<td>2,325</td>
</tr>
<tr>
<td></td>
<td>1570-82</td>
<td>518-582</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1581</td>
<td>577</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1582</td>
<td>518</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1596</td>
<td>381</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1597</td>
<td>386</td>
<td>1,189&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Eten</td>
<td>1593</td>
<td>96</td>
<td>937</td>
</tr>
<tr>
<td>Ferreñafe</td>
<td>1532</td>
<td>---</td>
<td>Approximately 2,000</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>398</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>535</td>
<td>1,985</td>
</tr>
<tr>
<td></td>
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<td>1575</td>
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<td>---</td>
</tr>
<tr>
<td></td>
<td>1591</td>
<td>398</td>
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</tr>
<tr>
<td></td>
<td>1593</td>
<td>214</td>
<td>2,261</td>
</tr>
<tr>
<td></td>
<td>1599</td>
<td>260</td>
<td>---</td>
</tr>
<tr>
<td>Illimo</td>
<td>1541</td>
<td>300</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>834</td>
<td>3,335</td>
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<td></td>
<td>1593</td>
<td>357</td>
<td>2,762</td>
</tr>
<tr>
<td></td>
<td>1593</td>
<td>390</td>
<td>---</td>
</tr>
<tr>
<td>Jayanca (incl.</td>
<td>1540</td>
<td>680&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4,000 (maximum)</td>
</tr>
<tr>
<td>Mórrope)</td>
<td>1558</td>
<td>1,362</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1566</td>
<td>1,700</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>1,248&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6,068</td>
</tr>
<tr>
<td></td>
<td>1567-89</td>
<td>530</td>
<td></td>
</tr>
<tr>
<td>Lambayeque</td>
<td>1572</td>
<td>---</td>
<td>8,000-9,000</td>
</tr>
<tr>
<td></td>
<td>1575</td>
<td>1,584</td>
<td>5,854</td>
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<td>1591</td>
<td>1,453</td>
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<td>4,070</td>
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<td>Mocupe</td>
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<td>317</td>
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<td>1593</td>
<td>190</td>
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<td>1593</td>
<td>176</td>
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</tr>
<tr>
<td></td>
<td>1597</td>
<td>230</td>
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</tr>
<tr>
<td>Reque</td>
<td>1566</td>
<td>Approximately 700</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>650</td>
<td>2,572</td>
</tr>
<tr>
<td></td>
<td>1582-88</td>
<td>530</td>
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</tr>
<tr>
<td></td>
<td>1591</td>
<td>536</td>
<td>3,506</td>
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<td></td>
<td>1593</td>
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<td>---</td>
</tr>
<tr>
<td></td>
<td>1597</td>
<td>360</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1599</td>
<td>318-24</td>
<td>1,928-34</td>
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</tbody>
</table>

Table 7.1: Lambayeque Valley Complex population, mid-late sixteenth century. These data are based on Ramírez (1996: 27-28, Table 1), compiled mostly from local-level sources rather than viceregal reports.
Table 7.1 Continued.

<table>
<thead>
<tr>
<th>Encomienda</th>
<th>Year</th>
<th>Tribute Payers</th>
<th>Total Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zaña (town)</td>
<td>1532</td>
<td>3,000</td>
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</tr>
<tr>
<td></td>
<td>1549</td>
<td>1,300-1,500</td>
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</tr>
<tr>
<td></td>
<td>1563</td>
<td>400-600</td>
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<td>1563</td>
<td>500-900</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1566</td>
<td>Approximately 300</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>320</td>
<td>1,223</td>
</tr>
<tr>
<td></td>
<td>1591</td>
<td>219</td>
<td>---</td>
</tr>
<tr>
<td>Sinto</td>
<td>1572</td>
<td>644</td>
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</tr>
<tr>
<td></td>
<td>1572-75</td>
<td>714</td>
<td>2,373</td>
</tr>
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<td></td>
<td>1579</td>
<td>613</td>
<td>2,247</td>
</tr>
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<td>1583</td>
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<td>1590</td>
<td>---</td>
<td>2,431</td>
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<td></td>
<td>1593</td>
<td>770</td>
<td>5,502</td>
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<td>Túcume-Mochumí</td>
<td>1540</td>
<td>1,190</td>
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<td></td>
<td>1566</td>
<td>1,935</td>
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<td>5,579</td>
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<td>1576-1604</td>
<td>744</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1581</td>
<td>528</td>
<td>1,400-1,440</td>
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<tr>
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<td>1591-92</td>
<td>820</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1593</td>
<td>381</td>
<td>1,246</td>
</tr>
<tr>
<td></td>
<td>1593</td>
<td>330</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1597</td>
<td>400</td>
<td>---</td>
</tr>
</tbody>
</table>

a Both Sinto and Collique.

b Not counting 118 mitimaes absent or sick within two leagues of Jayanca.

c Approximately 300 natives were moved from Jayanca to Pacora.

d Without mitimaes.

e With mitimaes.

f Excluding 219 mitimaes of Zaña.

h Including Eten.

i Including tributarios of Eten (96 individuals) and Farcap (67 individuals).

j Aggregate population figure for Sinto (4,160), Eten, (937), and Farcap (405).

k “Married Indians.”

l Túcume only.

m Túcume only.
settlement (ca. 1,595 inhabitants in the 1570s) and a hub on the north-south transport route which was converted into a major center for mule breeding for Piura-Lima trade. From 1572 to 1602, the total population of Olmos dropped 0.2 percent annually. Cook (1981: 132) contrasts Olmos with the nearby private encomienda of Copiz, the population of which fell by nearly 25 percent in the same time. Fleeing tributaries were likely responsible for the loss. On a more regional scope, the same principle appears to apply: depopulation was markedly less pronounced in coastal areas with economic potential and economy (Cook 1981:131-132). Thus, unlike the Piura region to the north which declined approximately 90 percent in the 55 years following contact, demographic decline of the Lambayeque Valley Complex was nowhere near as severe. Following the epidemics of

<table>
<thead>
<tr>
<th>Repartimiento</th>
<th>1575 Population</th>
<th>1602 Population</th>
<th>Average Annual Rate of Change</th>
<th>Percent of Population Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cinto y Chiclayo</td>
<td>2,373</td>
<td>No data</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Chuspocallanca</td>
<td>2,972</td>
<td>1,339 (1600)</td>
<td>-3.2%</td>
<td>54.9</td>
</tr>
<tr>
<td>Collique</td>
<td>2,325</td>
<td>1,869 (1595)</td>
<td>-1.1%</td>
<td>37.1</td>
</tr>
<tr>
<td>Ferreñafe</td>
<td>1,985</td>
<td>746</td>
<td>-3.6%</td>
<td>62.2</td>
</tr>
<tr>
<td>Illimo</td>
<td>3,335</td>
<td>1,149</td>
<td>-3.0%</td>
<td>55.7</td>
</tr>
<tr>
<td>Jayanca</td>
<td>6,686</td>
<td>1,753</td>
<td>-4.9%</td>
<td>81.3</td>
</tr>
<tr>
<td>Lambayeque</td>
<td>5,854</td>
<td>5,794</td>
<td>0.0%</td>
<td>1.0</td>
</tr>
<tr>
<td>Motupe</td>
<td>2,320</td>
<td>998</td>
<td>-3.2%</td>
<td>42.6</td>
</tr>
<tr>
<td>Olmos</td>
<td>1,598</td>
<td>1,521</td>
<td>-0.2%</td>
<td>4.8</td>
</tr>
<tr>
<td>Pacora</td>
<td>945</td>
<td>364</td>
<td>-3.5%</td>
<td>61.7</td>
</tr>
<tr>
<td>Penache (Salas)</td>
<td>793</td>
<td>730</td>
<td>-0.3%</td>
<td>8.0</td>
</tr>
<tr>
<td>Reque</td>
<td>2,572</td>
<td>1,934 (1599)</td>
<td>-1.2</td>
<td>24.8</td>
</tr>
<tr>
<td>Túcume</td>
<td>5,779</td>
<td>3,176</td>
<td>-3.0%</td>
<td>45.0</td>
</tr>
</tbody>
</table>

a relatively large precontact population that was able to adapt to the colonial political
the 1630s, Lambayeque populations appears to have stabilized and a slow demographic
rebound initiated.

Alterations of the Sociopolitical Landscape

Sociopolitical changes were probably quite minimal during the first decade or so
following conquest. Interactions were through the filter of the encomienda, where native
Mochica continued to work under the direction of foreign officials, built the
encomendero’s house, and farmed his fields (Ramírez 1986: 27). Native agricultural
practices did not change. Principle social disruptions probably stemmed from
depopulation. Lambayeque was a frontier: it did not receive many royal visitas and was
outside the purview of constant attention. As the Spanish population increased, so too did
native labor extraction. Native labor was ‘free,’ and as time went on, increasingly
burdensome tribute quotas were mandated. By 1540, the stress of the colonial reality
began to assert itself among the Mochica. Unregulated encomenderos emerged as a
powerful elite class firmly established at the apex of this new society (Ramírez 1986: 33).
Ramírez (1996) describes in detail ramifications of the socioeconomic transformations
experienced in the early colonial Lambayeque Valley Complex. One of the most
significant involved altering the traditional curaca from a paramount lord to a tribute
collector and cultural broker. Late pre-Hispanic curacas were authentic dueños de indios,
who held power over life and death, served as arbiters of social justice, and functioned as
the focal point of articulation of redistributive economies (see Ramírez 1996: 22, Figure
1). The power and rank of a curaca was likely directly correlated with the number of subjects he controlled. Wealth was measured in terms of human resources, not land or other material holdings. The second in command, conozeque, glosses as “lord of 1,000 Indians,” while lesser lords, principales, mandones, and mandoncillos oversaw less and less of the population to the point where historically-known mandoncillos held sway over as few as five households (Ramírez 1996: 15).

The organization of these lordships in the early colonial Lambayeque Valley was still based on the principle of the parcialidad (meaning “part of a whole”) (Netherly 1984, 1990) (Figure 7.3). The indigenous Muchik word for this system of organization has though been forever lost. As mentioned in Chapter 3, this form of dualistic, segmentary, and bounded corporate group organization is solidly inferred as far back as Moche V (AD 550-750) (Shimada 2001a). Reconstruction of early colonial indigenous irrigation management systems indicates parcialidades survived relatively unscathed into the 1540s. They continued to integrate social, economic, and religious functions and created ethnic identity (Netherly 1984: 231). At their most basal levels, parcialidades were organized according to kinship and economic specialization (fisher, farmer, and craftsman). The successively higher levels of nested organization associated with increasingly ranked pairs of principales provided that no one ruler, not even the curaca, ruled alone. The efficacy of the long-lived parcialidad system owed partly to its flexibility (the system was infinitely divisible), ability to mobilize labor, and self-sufficiency such that large bureaucratic oversight was not required (Netherly 1984: 233).
Figure 7.3: A simplified schematic representation of late pre-Hispanic and early colonial sociopolitical and economic organization on the northern north coast of Peru based on ethnohistoric and archaeological data (Netherly 1984, 1990; Ramírez 1996; Shimada 2001a).

As communities grew, they fissioned and each new half chose a new leader (Rostworowski 1961).

Under this system, curacas entrusted their lands to lesser lords and households. For lack of a better English word, commoners were obliged to pay “rent” for their land and irrigation water in corn, cloth, and human labor to the curaca in recognition of his hegemony (Ramírez 1996: 18-19). Curacas also allowed subjects of neighboring peer polities to use their resources in a manner that was beneficial to both parties. This explains how subjects of the lord of Jayanca were living in the polity of Túcume.
following a concept of territorial jurisdiction very different from Western thinking.

*Curacas* provided for their people large-scale festivities, feasts, and *chica* beer, the latter of which was used especially as a ritualized medium of social solidarity. Obligations between rulers and subjects were mutually reinforcing and interdependent. As Ramírez (1996:21-22) states, “good governance” could be summed up by:

“The better a curaca’s organization, coordination, and direction, the greater the productivity, the larger the surplus, the more abundant the feasts, the more frequent and richer the gifts, the higher standard of living of the populace, and the larger the community. The curaca delegated authority to the lesser lords to aid him in organizing the communal labor force and in redistributing goods. The more the curaca gave away, the greater was his subjects’ obligation to reciprocate with labor service and the easier it was to “request” aid and manipulate, coax, and cajole them into obeying his commands.”

Should a *curaca* fail to live up to his obligations, the citizenry had the recourse to remove him by rebellion and murder (Ramírez 1996; Rostworowski 1961).

The transformation of the *curaca* in the postcontact Lambayeque region and the north coast in general was swift and beyond their control. Depopulation represented a very real loss of social capital and power. Granting of *encomiendas* gave Spaniards the “right” to appropriate native labor which displaced and fragmented local political organization. Spanish division of *parcialidades* led to rank inflation as lesser lords ambitiously made themselves *curaca* of the *encomienda* such that they quickly outnumbered “old-style” *curacas* (Ramírez 1996: 29-30). *Reducciones* congregated and mixed previously separate *parcialidades*, many of which had been depopulated and were collapsed upward into higher level categories (Netherly 1984: 230). Decrees made by Cuenca in the 1560s forbade *curacas* to practice many of the functions of their office
while the further cutting of personal services damage ruler-subject obligations. Defiant and outspoken and curacas of the old order, such as don Juan, curaca of Collique, was tried and executed on unrelated charges (Ramírez 1996: 12).

Spanish authorities began to replace uncooperative lords and to appoint someone who would carry out their policies, such as with removal of Pacora’s curaca don Cristóbal with a more pliant boy (Ramírez 1996: 34). In order to maintain their office, curacas began to sacrifice the well-being of their subjects which eventually spiraled into mistreatment and abuse. Increasingly, commoners were made to work by fiat of the colonial administration and not for the well-being of their community. Curacas Xancol Chumbi of Reque was seen as excessively subservient to the Spanish and lacked legitimacy; he, like a few other Lambayeque lords, was murdered by his subjects (Rostworowski 1961).

Another option open to local Mochica was to flee. Inhabitants of Pacora left for Túcume to avoid their annual tribute of 600 pieces of cloth; similarly. Túcume lost population to Motupe, Reque peoples fled into Collique, Chuspo, and Lambayeque, Ferreñafe residents were documented in Raco, Reque, and Chuspo. (Ramírez 1996:35-36). The “wandering Indian” phenomenon was made worse by curacas who sought swell their numbers by enticing those disembodied from their parcialidad. The curaca of Jayanca, Jayanque, may have begun this process as early as 1539; a sense of the competition and disorder is gained from the lord of Túcume who usurped an entire town from Ferreñafe, and in 1566, the curaca of Ferreñafe attempted to regain subjects from
don Diego Mocuhmi of Túcume while *curaca* don Martín of Lambayeque accused don Antonio of Sinto of stealing several of his *principales* (Ramírez 1996: 37).

While Rowe (1948) comments that the dynasties of Lambayeque had survived into the later eighteenth century, they had been fundamentally transformed some two hundred years before. The role had been carefully crafted by the Spanish as *curaca* was transformed into a tribute collector and pawn. *Curacas* were able to indeed increase their prestige and power but only in Spanish eyes. Rebellion became less of a threat to the colonial lords whose office was protected by Spanish force (Ramírez 1996: 41). The result of the transformation of the *curaca* in Lambayeque was nothing less than the collapse of the indigenous system of socioeconomic reciprocity and well-being.

*Economic Restructuring and Resettlement*

In the 1560s, systematic European settlement of north coast Peru began which held additional deep repercussions for indigenous peoples regarding the transplantation of European agribusiness, labor, and land tenure. In many ways, a postcontact environmental disaster resulted. Early *encomiendas* awarded trusteeship of discrete groups of people under a paramount lord surprisingly similar to the local system and opened the door to grander economic change (Table 7.3).

Part and parcel to the initial growth and expansion of the *encomiendas* on the north coast was the policy of population resettlement. *Reducciones* were informally instituted in the Lambayeque Valley as early as 1534 (Mendoza 1985) well in advance of the Toledan reforms. This profound rupture in settlement patterns involved condensing
the many scattered Mochica hamlets and villages consisting of three or four extended families and into large aggregate settlements (Table 7.4). The *encomienda* of Jayanca in 1540 consisted of over 250 settlements that were condensed into a handful of towns that still exist today. In 1560, the entire town of Firruñap was resettled from the relatively remote Pampa de Chaparrí to a location some 10 kilometers east of Lambayeque where it became Ferreñafe (Zevallos 1975). While there is some debate as to the creation of Chiclayo, documentary evidence suggests it was officially established no later than 1578 (Saenz 1988:82).

Indigenous population nucleation benefited the Spanish as it facilitated control over labor manipulation, tax and tribute collection, and religious catechism. However, Ramírez (1996:31) points out that *reduccion* programs in Lambayeque involved a hidden agenda. Mochica farmers were moved into the lower valley as their rich farmlands further inland were opened up to livestock and production of cash crops such as wheat and sugar cane. The farmlands given to the resettled natives were usually close to the sea, plagued by high water tables, salinity, fog, and clouds that contributed to a marginal growing season at best, and some were even chased from their fields by ranchers (Ramírez 1996:30, 73-74). Access to both cosmologically vital ancestral lands and economically vital microenvironments were at once severed.

Some *reducciones* were doomed to rapid failure. One community of bewildered Lambayeque fisherfolk (Callanca) was resettled inland and expected to farm. Not
<table>
<thead>
<tr>
<th>Encomienda</th>
<th>Year</th>
<th>Net Value (Pesos)</th>
<th>Founding Encomendero, 1536</th>
<th>Named Curacas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collique</td>
<td>1548</td>
<td>2,702</td>
<td>Luis de Alcántara</td>
<td>Chanda Huamán (1532)</td>
</tr>
<tr>
<td></td>
<td>1559-63</td>
<td>7,279</td>
<td></td>
<td>don Juan (1563)</td>
</tr>
<tr>
<td></td>
<td>1568</td>
<td>4,963</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>1,894</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1581</td>
<td>1,444</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1591</td>
<td>1,814</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chuspo/Callanca</td>
<td>1548</td>
<td>1,444</td>
<td>Luis de Alcántara</td>
<td>don Alonso (1563)</td>
</tr>
<tr>
<td></td>
<td>1559-63</td>
<td>4,053</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>2,261</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>1582</td>
<td>2,187</td>
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</tr>
<tr>
<td>Ferreñafe</td>
<td>1548</td>
<td>2,162</td>
<td>Alonso de Osorno</td>
<td>don Felipe (1559)</td>
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<td>4,665</td>
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<td></td>
<td>1572</td>
<td>1,831</td>
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<td></td>
<td>1591</td>
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</tr>
<tr>
<td>Illimo</td>
<td>1548</td>
<td>901</td>
<td>Juan Roldán de Avila</td>
<td>Cristobál Chumbi (1561)</td>
</tr>
<tr>
<td></td>
<td>1559-63</td>
<td>1,357</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>2,694</td>
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</tr>
<tr>
<td>Jayanca</td>
<td>1548</td>
<td>7,206</td>
<td>Francisco Lobo</td>
<td>Caxusoli (1532)</td>
</tr>
<tr>
<td></td>
<td>1565-70</td>
<td>9,926</td>
<td></td>
<td>Francisco Caxusoli (1565)</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>3,985</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1589</td>
<td>2,750</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lambayeque</td>
<td>1548</td>
<td>3,603</td>
<td>Juan Barbarán</td>
<td>Secfuinspsian (1532)</td>
</tr>
<tr>
<td></td>
<td>1559-63</td>
<td>5,542</td>
<td></td>
<td>Pedro Cuzco Chumbi</td>
</tr>
<tr>
<td></td>
<td>1570</td>
<td>9,099</td>
<td></td>
<td>Martin Farrochimbi (1564)</td>
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<td></td>
<td>1574</td>
<td>11,374</td>
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</tr>
<tr>
<td></td>
<td>1591</td>
<td>5,091</td>
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</tr>
<tr>
<td>Reque</td>
<td>1548</td>
<td>1,144</td>
<td>Miguel de Velasco</td>
<td>Xancol Chumbi (1532)</td>
</tr>
<tr>
<td></td>
<td>1559-63</td>
<td>3,640</td>
<td></td>
<td>Edeco</td>
</tr>
<tr>
<td></td>
<td>1575</td>
<td>3,309</td>
<td></td>
<td>Miguel Efquen Zula</td>
</tr>
<tr>
<td></td>
<td>1591</td>
<td>1,179</td>
<td></td>
<td>Diego Chimoy (1579)</td>
</tr>
<tr>
<td>Sinto</td>
<td>1559-63</td>
<td>3,805</td>
<td>Deigo de Vega</td>
<td>Gabriel Martin Yalan (1595)</td>
</tr>
<tr>
<td></td>
<td>1572</td>
<td>2,180</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1583</td>
<td>1,156</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1591</td>
<td>2,264</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Túcume</td>
<td>1548</td>
<td>2,162</td>
<td>Juan Roldán de Avila</td>
<td>Conoceque (1532)</td>
</tr>
<tr>
<td></td>
<td>1559-63</td>
<td>5,741</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1569</td>
<td>9,265</td>
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</tr>
<tr>
<td></td>
<td>1591</td>
<td>2,696</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.3: Selected sixteenth century Lambayeque Valley *encomiendas*, compiled from Figueroa and Idrogo (2004), Ramírez (1986), and Rostworoski (1961). Most reported values, especially those for 1548, should be considered a minimum and were probably only a fraction of their total worth.
Pre-Hispanic Settlement(s) | Reducción | Encomienda or Repartimiento | Incorporated Towns and Reducciones
---|---|---|---
Callanca | Callanca | Callanca | Callanca, Chuspo, Monsefú, Serrep
Chacchacalla | Llomonte | Collique | Alcopón, Chicalyo
Collique | Chicalyo | Chicalyo | Eten, Imanasa, Lo Monte, Molluc, Pololo
Collud | Chicalyo | Reque | Reque
Coroñan | Lambayeque | Reque | Jayanca, Mórrope, Papo, Pacora
Firrñap | Ferreñafe | Jayanca | Jayanca, Mórrope, Papo, Pacora
Licapa | Licapa | Reque | Leviche, Mocupe, Oyotún, Sarrapo, Zaña
Mayna | Reque | Zaña | Zaña
Moclla | Pololo | Zaña | Zaña
Payta? Felam? | Mórrope | Lambayeque | Lambayeque
Pololo | Chicalyo | Sinto | Sinto, Farcap, Pisci
San Miguel de Picsi | Lamayecue | Illimo | Chanante, Fanupe, Illimo, Raco, Viti
Sinto | Three unnamed pueblos | Illimo | Illimo, Raco, Viti
Repartamiento de San Salvador (Jayanca) | Various unnamed pueblos | Túcume | Colchuc, Faquel Cocho, Muchumi, Mullup, Paisasima, Potutpe, Túcume
Zaña (mitimaes) | Various unnamed pueblos | Túcume | Colchuc, Faquel Cocho, Muchumi, Mullup, Paisasima, Potutpe, Túcume

Table 7.4: A partial list of reducciones and incorporated territories in the Lambayeque Valley to ca. 1600, adapted from Ramírez (1996:32, Table 2) and Fernandez (2004: 106-107, Cuadro N° 1).

surprisingly, they abandoned their new homes, scattered, wandered, and returned on the shore again. Similarly, another group was moved to “sickly” terrain where an encomendero complained some 200 of his natives died (Ramírez 1996: 31). The Spanish also failed to perceive the absence of traditional settlements in the floodplains where many early reducciones and towns were founded. Remarkable devastation followed in the 1578 El Niño floods as Túcume Viejo was wiped off the face of the earth. Regionally, thousands of native inhabitants perished.

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Initially, many Spanish encomenderos saw little opportunity in the countryside beyond ranching which became the central economic activity. By 1537, major ranches were established in Zaña, Pacora and Pici that quickly became centers for the raising of many thousands of cattle, pig, sheep, and goats that intensely fed on natural vegetation (Ramírez 1996: 62-64). In the early colonial Lambayeque Valley, the vast majority of these animals were not raised for food, but were slaughtered for the production of soap and leather exported to Lima, Guayaquil, and Panama (Ramírez 1974: 7). By the early to middle seventeenth century, emphasis began to shift from soap manufacturing and tanning to sugar, and the agricultural potential of Lambayeque began to be tapped once again as the sugar boom began its bloom. By the 1720s, sugar was the dominate commodity (as it is today) as six major sugar cane plantations or haciendas had been established (Table 7.5).

All were located in the fertile alluvium of the Valle Viejo and were privately owned except for the hacienda of Tuman, which was operated by the Catholic Jesuit

<table>
<thead>
<tr>
<th>Hacienda</th>
<th>Year Founded</th>
<th>Approximate Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calupe</td>
<td>1704</td>
<td>433</td>
</tr>
<tr>
<td>Luya</td>
<td>1727</td>
<td>200</td>
</tr>
<tr>
<td>La Punta</td>
<td>1717</td>
<td>433</td>
</tr>
<tr>
<td>Pomalca</td>
<td>1711</td>
<td>325&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Sipán</td>
<td>1709</td>
<td>4100</td>
</tr>
<tr>
<td>Tuman</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

<sup>a</sup> In fanegadas (one fanegada ≈ 2.89 hectares).
<sup>b</sup> Pomalca’s size may have been as large as 400 fanegadas in 1701.

Table 7.5: Primary haciendas of the late colonial Lambayeque Valley (Ramírez 1974:11). established (Table 7.5).
order (Ramírez 1974:9). These estates encompassed vast tracts of land that within its core was the production nucleus: the owner’s mansion, processing houses, trapiches (grinding mills), warehouses, workers living quarters, and a church. Industrial sugar cane production in colonial Lambayeque was technologically primitive, labor intensive, and environmentally unfriendly (Ramírez 1974:14-16). Sugar cane growth and production were intensely water-hungry affairs which lead to the outright appropriation of irrigation water by the hacendados (Ramírez 1996: 74). Large numbers of draft animals were used for plowing, powering the trapiches, and transportation of finished sugar for sea shipment. The only materials sold in quantity in the local Lambayeque markets were molasses and low-quality sugar (Ramírez 1974: 25)

Labor on the sugar cane estates was primarily extracted from imported African slaves. Ramírez’s (1974:16-17) study of available slave demographic data suggests highly imbalanced sex ratios (as high as 15 males to one female in 1697 Calupe) indicating these were not tenable populations. As such, Mochica peoples increasingly supplemented hacienda labor pool by 1700, often recruited though their curacas acting as middlemen (Ramírez 1974: 18, 31-32). Until the mita system was more or less abolished in the 1720s, indigenous peoples served on the Lambayeque haciendas as mitayos and hired peons; later, natives from as far away as Piura were employed as unskilled wage laborers in Lambayeque in both occasional and emergency projects such as canal construction, cleaning, and repair (Ramírez 1974: 18). Sometimes specialized tasks required skilled artisans, some of whom evidently were indios. Outlays of indigenous labor were also indirectly linked to Lambayeque haciendas which were not self-
sufficient: surrounding communities constantly supplied the estates with corn, beans, chickpeas, yerba mate, medicinal herbs, and lime (Ramírez 1974: 25). The sugar estates of the Lambayeque region had become a vital component of local, regional, and viceregal economies, with their sugar eventually consumed even as far away as Buenos Aires.

From 1720 to 1800, the global sugar market collapsed. In Lambayeque, prosperity gave way to stagnation, decline, and ruin. Decreasing prices, increasing production costs, and natural disasters (catastrophic El Niño floods of 1720 and 1728) contributed to the downturn. During the 1720 floods, herds of livestock drowned, entire crops of cane and alfalfa were uprooted, and irrigation networks were severely damaged (Ramírez 1986: 213). Cayalti was completely destroyed. Not a single house remained in Zaña, which had become the urban hub between Trujillo and Piura and a symbol of colonial prosperity. Zaña was abandoned as its residents relocated to Chiclayo and Lambayeque (Ramírez 1974: 33). Lambayeque haciendas accumulated paralyzing debts. The bankrupt estates were sold to new owners as the landed local elite crumbled. The new eighteenth century entrepreneurs experimented more diverse cash crops including indigo in Pomalca, tobacco in Chiclayo, lye in La Punta, and cane alcohol (aguardiente) production reoriented for local markets (Ramírez 1974: 41). In sum, the last 80 years of colonial Lambayeque was marked by severe economic and social dislocation.

Environmental Transformation

Much like the shift from foraging to farming that entailed fundamentally negative changes in human-environment interplay (Larsen 2006b), European contact in the
Americas can be similarly seen as resulting in environmental degradation. Indigenous camelids were completely eliminated by about 1600. European dietary preference for pigs and export emphasis on soap and leather production (cattle) strongly contributed to extermination of camelids on the north coast. Pragmatically, camelids would compete for resources and land with introduced livestock. Ethnohistoric sources indicate widespread slaughter of coastal camelid herds transpired during the early Spanish civil wars, and plagues (*carache*, or llama mange) from 1544-1545 helped complete the regional extinction (Shimada and Shimada 1985: 21). The large numbers of European livestock adapted quickly to the scrub and *algarrobo* forests (Rostworowski 1981), and large-scale grazing may have at least cyclically denuded extensive areas.

Considering indigenous dietary outcomes, little direct information exists. However, the protein of pig and cattle meat was probably not shared or redistributed among the local peoples. During the 1566-1567 visita of Cuenca, ordinances were issued prohibiting the raising of *cuy* and dogs as food sources as well as consuming *algarrobo*-based products (Figueroa and Idrogo 2004: 119). Crops had to be raised first for tribute quotas, and subsistence came second. Herding became a major source of conflict between the native Mochica and the Spanish. The Spanish allowed their animals to roam freely into unfenced indigenous farms to graze and swine became notorious for uprooting and eating subsistence crops by the 1540s (Ramírez 1986: 44).

The extant Poma forest is likely a remnant of a once expansive desert forest microenvironment destroyed during the colonial period. Demand for grazing pastures and an ever-increasing market for firewood in Trujillo and Lima contributed to this effect.
(Rostworowski 1981). With the transformation of indigenous labor systems, ritualized maintenance of pre-Hispanic canals suffered such that some networks filled with silt, other debris, and were abandoned or decayed (Netherly 1984). Livestock destroyed canals by crossing the irrigation ditches and breaking down canal walls. It is quite likely fields far removed from the *hacienda* canal networks were reclaimed by the desert.

*Haciendas* likely had a meaningful ecological footprint. They consumed large amounts of natural resources including massive volumes of water. Sugar cane and other introduced crops like alfalfa were so water-hungry that Mochica farmers often had little water for subsistence farming, and in dry years, the Mochica even lacked drinking water (Ramírez 1996). *Hacienda* monoculture ensured soils were exhausted after one or two planting/cutting cycles. The boiling and purifying stages of sugar production also required large and continuous quantities of firewood (Ramírez 1974: 15), and would have been another contribution to deforestation, erosion, and desertification in the valley.

**Anti-Colonial Resistance**

Unlike the various uprisings and millenarian movements of the south-central Andes, open revolt did not characterize the colonial north coast. In Lambayeque in particular, this outcome may have been directly preconditioned by nearly three centuries of foreign Chimú and Inka rule, where it had been advantageous to accommodate the foreign political economies. Lambayeque populations endured relatively high tribute quotas (Table 7.6). Yet, Lambayeque peoples did not passively experience the colonial reality. Various forms of resistance were mounted. When the bonds of reciprocity were
Described as loads of beans, fish, salt and chili peppers.

Table 7.6: Various items and quantities extracted tribute from early colonial Lambayeque communities, compiled from Ramírez (1996:107, Table 14; 109, Table 16) and Figueroa and Idrogo (2004:94).

<table>
<thead>
<tr>
<th>Town</th>
<th>Year</th>
<th>Corn</th>
<th>Fowl</th>
<th>Sheep</th>
<th>Beds, Mattresses</th>
<th>Blankets, Ponchos</th>
<th>Tribute Cloth</th>
<th>Other</th>
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<tr>
<td>Ferreñafe</td>
<td>1565</td>
<td>880</td>
<td>880</td>
<td>56</td>
<td>44-50</td>
<td>128</td>
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<tr>
<td>Jayanca</td>
<td>1540</td>
<td>880</td>
<td>880</td>
<td>56</td>
<td>44-50</td>
<td>128</td>
<td>1,145</td>
<td>24-30</td>
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<table>
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<tr>
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<th>Year</th>
<th>Silver (Pesos)</th>
<th>Suits of Clothes</th>
<th>Fowl</th>
<th>Wheat</th>
<th>Corn</th>
<th>Tribute Cloth</th>
<th>Other</th>
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<td></td>
</tr>
<tr>
<td></td>
<td>1566</td>
<td>976</td>
<td>2,581</td>
<td>2,406</td>
<td>87</td>
<td>875</td>
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<td>Zaña</td>
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<td>1,520</td>
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</tbody>
</table>

| a       | Described as loads of beans, fish, salt and chili peppers. |
| b       | in fanegas (one fanega ≈ 58 kilograms or 130 pounds). |

broken by a curaca with his subjects, deposition by murder was practiced. Xancoll Chumbi of Reque, the lord of Sinto, Moochco Chumbi, and the lord Chalcochima were deposed in this manner (Figueroa and Idrogo 2004: 65). Interestingly, such acts of resistance were channeled into the paramount lord, and not the Spanish.

Poorly documented examples of violent resistance were noted in the first decade following contact, including a major uprising on the coast in 1538 (possibly coincident with Manco Inca’s siege of Lima). During the 1540 visita of Jayanca by Sebastián de Gama, a lower-level lord named Sequipo protested abusive tribute demands, and consequently was executed on 26 July 1540 (Figueroa and Idrogo 2004: 95-97). Such
stereotypical Spanish violence was rare and the Spanish were never intent on
destroying the native population. Depopulation was instead a constant threat to their
economic program.

Beyond labor extraction and the omnipresent threat of coercive force, there are
very few references to institutionalized violence in Lambayeque. However, some
references noted by Figueroa and Idrogo (2004) indicate that ‘offending’ natives were
commonly scourged in a public spectacle and tied to a post in the central plaza for a
number of days. By the early eighteenth century, some indigenous Lambayeque peoples
had become increasingly adept at the Spanish legal system, personified by the published
memorial of curaca Vincente Morachimo de Chimo y Chica who provided a blunt
exposition of corruption, abuses, and other major malfeasances by bureaucrats and clergy

However, non-violent forms of resistance were apparently most common. From
the 1540 visita, descriptions exist of Mochica peoples who attempted to hide resources or
goods (e.g., beads, cotton) from tribute collection or open theft by the Spaniards.
Elsewhere in the encomienda of Jayanca, others had tore down their dwellings and
systematically attempted to hide the remains as they resettled some distance away
(Figueroa and Idrogo 2004: 95).

Religion in Colonial Lambayeque

Unlike the economic and administrational records, knowledge of religion in the
colonial Lambayeque region is very minimal. Partly, this lacuna owes to the fact that
scholars such as Rostworowski and Ramírez primarily focused on questions of political-labor organization and land tenure. A lack of studies of pertinent sources may also be responsible.

Among the first churches were those established by the Franciscan order as early as a pair of small *ramadas* in 1536 at Mórrope and Pacora. Comparatively massive churches soon followed, such as Santa Lucia in Ferreñafe (1552), San Pedro in Lambayeque and a Franciscan convent in Chiclayo (1555), Nuestra Señora de Collique (1559) and the church of Santa Maria in Chiclayo (Mendoza 1985). An earlier (apparently pre-1555) and poorly described *iglesia matriz* of La Veronica may have been the first in Chiclayo (Saenz 1988:22). Examples of religious oppression appear infrequently in the ethnohistoric record. Passages in his *Ordenanzas de Jayanca* produced from the 1566 *visita* of Gregorio Gonzales de Cuenca strictly forbade indigenous religion and its practice, and focused particularly negative attention towards its practitioners (Figueroa and Idrogo 2004: 117-118).

An example of one relationship between north coast priests and natives was recorded in a 1732 listing of complaints. In the Chicama Valley town of Santa Mária Magdelena de Cao, the Dominican friar Félix de Moncada forced his indigenous parishioners into slave labor on his sugar cane plantation, diverted community irrigation water, and grazed his goats on native lands (Andrien 2001: 186). Another an instructive anecdote on religious resistance can be found in the conquest-era death of the Chimú lord Caja-çimçim, who became a Christian and took the name Don Martín. He was buried in the Church of Santa Ana de Trujillo. During the night following his burial, his subjects
clandestinely exhumed him and spirited the body away for a Chimú burial; the Spaniards never discovered his final resting place (Rowe 1948: 55).

Heyerdahl and colleagues (1995: 212-213) relate modern Túcume lore describing how the early colonial Spanish would terrorize the local people into converting to Christianity by riding in at night on horses and wagons dressed as demons. Spaniards also were said to have periodically set large bonfires – visible for miles around – atop the huacas at Túcume, and decreed the grand pre-Hispanic precinct as the physical gateway to hell, lending it its modern name “El Purgatorio.” Further, it is told Túcume residents who resisted conversion or persisted in pre-Hispanic ritual life were dragged from their homes and burned alive in the nocturnal conflagrations. Among archaeologically documented masses of charcoal, carbonized wood, and vitrified glass atop Huaca Larga were quantities of calcined human remains. This finding is intriguingly coincident with the oral histories.

Other traditions and local lore seem to have incorporated Christian discourse. In Eten, a series of three apparitions including the Christ child and Mary Magdalene were said to have occurred in 1649. Other miracles and events, such as the origin of the Cruz de Motupe and the miracle of flowing water in Mórrope in 1752 all appear to include both elements of pre-Hispanic beliefs and myths blended into a Christian framework.

One remarkable manuscript describes the succession of priests, their deeds, and other major events in regional history. The subject of this writing is very significant. The unfinished narrative of the late eighteenth century clergyman don Justo Modesto Rubiños
y Andrade (1782 [1936]) – described a history of the small town of Mórrope – to which we now turn.

MÓRROPE: ETHNOHISTORIC CONTEXT

Mórrope was a rural colonial town in a part of Peru that itself was something of a frontier, far from the centers of Lima, Cusco, or Potosí. Yet, its isolation did not equal that of many highland areas, and the interaction with the Spanish world was a fact of daily life. Mórrope is located 803 kilometers north of the modern capital of Lima. The town is found in the northwest corner of the Lambayeque Valley Complex at the edge of the expansive Sechura Desert, one of the driest places on earth. Afternoon winds commonly blow fine desert sands into Mórrope. The Sechura Desert was once an extensive, submerged marine embayment, but during the Tertiary era (60 to 2 m.y.a) this embayment was uplifted and silted in by a series of intermittent rivers and formed extensive deposits of gypsum, salt, and phosphate just to the north of Mórrope (Delavaud 1984). While the area is populated with dispersed hamlets and communities, Mórrope is the only major settlement northwest of Lambayeque.

Survey by the Sicán Archaeological Project and Manuel Tam and Klaus indicate continuous population in the Mórrope area since at least Moche V (AD 550-750). At first glance, the region might seem reminiscent of the Poma Forest, but Mórrope is strikingly marginal by contrast. Located past the termini of the seasonal Hondo and Motupe Rivers,
the zone suffers from frequent water shortages, poor drainage, and high salinity. Growth is largely limited to dispersed clusters of *algarrobo*, *zapote*, and *vichayo* trees.

The most detailed (and for all intents and purposes, only) source on colonial Mórrope was written by the priest Don Justo Modesto Rubiños y Andrade (hereafter, Modesto Rubiños) who left his tome unfinished, perhaps cut short by his death. Fortunately, the 1782 manuscript was rediscovered and reprinted in 1932.

Caution must be used when approaching this document. In fundamental ways, the manuscript is colored by what Ramírez (1996) has referred to as layers of European ethnocentrism, bigotry, and misperception. Some passages are propaganda-like, exalting the triumphs of priests who brought Christianity to a land of pagans. Some dates (especially pre-Hispanic and early colonial ones) may be dubious. Still, it contains a wide spectrum of observations highly pertinent to a bioarchaeological reconstruction of colonial Mórrope.

*Mórrope to 1600*

Modesto Rubiños (1782 [1932]) begins with a description of the local eighteenth century mythology of the region’s ancient history. Virtually all the past attention this manuscript received was for its independent recording of the Naylamp legend, still known to the Mochica peoples of Mórrope in the late eighteenth century. The founding of Mórrope is depicted as a pre-Hispanic event, which Modesto Rubiños dates to AD 1125 in a place called Félam. Mórrope’s origins were portrayed in terms of a water myth, not surprisingly. Three children, who were later sacrificed in gratitude to the water divinity,
discovered a water hole later named *Murrup*, or iguana in Muchik (Modesto Rubiños (1782 [1932]: 292-293). The settlement of Félam thus came to be known as Muerrepe and was pronounced Mórrope by the Spaniards.

The selection of Mórrope as a site of habitation and early evangelization may have been strategically minded. The Mórrope region served as one end of the pre-Hispanic route between Lambayeque and Piura. During the colonial period, Morropanos served to transport by mule various goods, information, and people across 150 kilometers of open Sechura Desert. Transport was likely one of the economic pillars of colonial Mórrope such that historian Victor Peralta refers to the people of Mórrope as “desert walkers” (Figueroa and Idrogo 2004: 131).

Still, much remains to be known about the origins of Mórrope. In one source (Saenz 1988), it is said Mórrope came into existence as a colonial *reduccion* of a town or territory called Payta during the 1560s. In another (Gómez 2003), the date 21 November 1566 is given as when the settlement Colchuc was reduced into the preexisting town of Muerrepe via an ordinance issued by the *visitador* Cuenca.

At least at the site of the Capilla de San Pedro de Mórrope, there is no physical evidence of a pre-Hispanic occupation (see Chapter 9). Furthermore, in 2004, Klaus had the auspicious opportunity to examine trenches dug some 20 meters south of the Chapel and Church of San Pedro. These trenches, approximately 2.5 meters wide, 50 to 70 meters in length, and 3.5 meters deep, were part of a sewage system upgrade. Examination of the north and south profiles of the trench along its length revealed no
deep or pre-Hispanic cultural stratigraphy, nor did workers uncover any pre-Hispanic material remains. These observations are consistent with Mórrope as a colonial creation.

In 1536, less than four years after the Spanish invasion, Mórrope had a population of 698 people (Figure 7.4). That year the town received its first of many Catholic priests (Table 7.7). At this time, Mórrope and Pacora appear to have been at least politically linked. A priest served both towns, and Modesto Rubiños indicates the construction of a chapel in both Mórrope and Pacora occurred more or less simultaneously. The construction of the chapel in Mórrope was overseen by the *curaca* Caxusoli. By 1536, he appears to have taken a Christian name and is referred to as José Caxusoli. Caxusoli is described as

![Colonial Morrope Population Size](image)

*The second figure for 1536 given by Modesto Rubiños appear to reflect an informal *reduccion* implemented at that time.*

*Unlike other years, Modesto Rubiños does give the total population size of Mórrope in 1645, but only states there were 102 *tributarios* residing in the town. If this number of tribute payers was relatively proportional to earlier total population sizes, I estimate the 1645 Mórrope population at a maximum of 900.*

Figure 7.4. Population of Mórrope, 1536-1784. Data for 1784 are from Gómez (2003).
<table>
<thead>
<tr>
<th>Priest</th>
<th>Years</th>
<th>Religious Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don Francisco Marqués de Charcas y Atavillos</td>
<td>1536-</td>
<td></td>
</tr>
<tr>
<td>Maestro Don Diego de Avendaño</td>
<td>1548-</td>
<td>Augustinian (?)</td>
</tr>
<tr>
<td>Don Diego de Zúñiga Velasco Conde de Nieva</td>
<td>1561-</td>
<td></td>
</tr>
<tr>
<td>Doctor Don Gerónimo de Loyaza</td>
<td>1570-</td>
<td>Predicatores</td>
</tr>
<tr>
<td>Doctor Don Lucas Manuel Centeno</td>
<td>1585-1600</td>
<td></td>
</tr>
<tr>
<td>Don Luis Velasco Marquez</td>
<td>1600</td>
<td></td>
</tr>
<tr>
<td>Don Melchor de Venegas y Zúñiga</td>
<td>1644-1646</td>
<td></td>
</tr>
<tr>
<td>Don Benito Barreda Carvajal</td>
<td>1648-1654</td>
<td>Augustinian</td>
</tr>
<tr>
<td>Don Gerónimo Valderas y Terán</td>
<td>1656-1658</td>
<td></td>
</tr>
<tr>
<td>Don Augustín Fernández Degadillo</td>
<td>1658-1663</td>
<td></td>
</tr>
<tr>
<td>Don Diego Benevites de la Cueva</td>
<td>1664-</td>
<td></td>
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<tr>
<td>Don Ramón de Alcocer y Valdivieso</td>
<td>1667-1676</td>
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<tr>
<td>Don Alonso Banses de León</td>
<td>1677-1685</td>
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<tr>
<td>Don Francisco de Rivera Tamariz</td>
<td>1687-1689</td>
<td></td>
</tr>
<tr>
<td>Don Joesf Francisco de Vidauurre</td>
<td>1691-1721</td>
<td>Holy Trinity (?)</td>
</tr>
<tr>
<td>Don Francisco Cartavio y Roldán</td>
<td>1722-1733</td>
<td></td>
</tr>
<tr>
<td>Don Justo Modesto Rubiños y Andrade</td>
<td>1750(?)-1784</td>
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Table 7.7: Named Mórrope priests in the Modesto RUBIÑOS manuscript.

organizing labor and resources such that “con todo, padeció en Mórrope grandes trabajos
(that all in Mórrope endured heavy labor)” in the building of the chapel, associated
buildings, and other unnamed ‘great works.’ The chapels were referred to guayronas
where the native Mochica ostensibly congregated to hear Christian doctrine. After two
years passed, the priest Araujo attempted to actively destroy pre-Hispanic doctrine.
adoritorios (huacas?) in Pacora that resulted in a violent uprising that nearly cost the
priest his life. José Caxusoli was apparently responsible for ending the insurrection and
may have apparently executed its leaders: “[cacique José Caxusoli]… pues degolló los
yndios cabeza del motín” (Modesto RUBIÑOS 1782 [1932]: 299). Around this time, the
Spaniard Manuel de Santiestiban married the daughter of José Caxusoli, which appears to
have been a political marriage that gained for the Spanish access to land and privilege (e.g., Ramírez 1986).

Given the date 29 June 1536 associated with founding of the guarones of Mórrope and Pacora, they appear to be the first documented and permanent Catholic outposts in the Lambayeque Valley. However, 29 June 1548 is provided subsequently as the date when the Chapels were named (San Pedro de Mórrope and San Pablo de Pacora) and the first day that the natives heard the word of God and received the sacraments. It is highly unlikely that 12 years of labor were required to complete these modest structures. Perhaps the 1548 date refers to a re-opening or dedication of the original structure that had been modified or renovated.

In 1548, Modesto Rubiños (1782 [1932]: 299) describes Pacora as a decadent town while “incredible” growth and development transpired in Mórrope. Mórrope’s population appears to have more than tripled (Figure 7.3). Two parcialidades of Pacora were evidently absorbed along with an unspecified, though apparently a considerable quantity of people from Eten (“muchas familias de Eten”) (Modesto Rubiños (1782 [1932]: 300). Regarding the latter movement of peoples from the very southern edge of the Lambayeque Valley Complex to its far northern margins, it is said they were out of favor with their curaca, but these individuals may have equally been fleeing “bad government” just as well. Given the presence of the surname Llontop in the historic Reque area adjacent to Eten (Rostworowski 1963) and in modern Mórrope, it is possible to conjecture that some Llontops could have been transplanted into Mórrope at this time.
By 1561, evangelization seems to have been in full swing. Efforts to reform indigenous marriage patterns were underway to eliminate the “brutal use” of women as carnal sisters” (polygamy?) and enforce Christian marriage to a single woman (Modesto Rubiños (1782 [1932]: 301). The priest also commented that during this time, the local extirpations of brujería, or shamanism, was initiated, but shamanism plague him in the 1780s. Indeed, failure to eliminate shamanism was made quite clear. In 1586, it seems Mórrope may have absorbed an unspecified number of curanderos and shamans were exiled to Mórrope from the highlands; under the priest, they were sentenced to laboring in the salt mines (Modesto Rubiños 1792 (1936:303-4). The first of several recorded conflicts over water erupted in 1566 between Mórrope and its neighbors, partly as a result of colonial socioeconomic disruption. In this first event, Cuenca himself intervened in a dispute over irrigation water between Jayanca and Mórrope; Morropanos had fabricated a barrier to divert water away from their salt mines, which was seen as an unjustifiable waste of water. Still, Cuenca ruled in favor of Mórrope and their mineral resources (Gómez 2006).

**Mórrope in the Seventeenth Century**

By 1600, colonial Mórrope was entering a particularly dynamic period. A third, minor chapel may have been founded around 1600 for special masses celebrating the priests and people of Mórrope. No other details are given and no remains of this structure have been found. The priest seems to have controlled his own grazing land for a substantial herd of 326 goats. Also, beginning in 1644, the term “cura propio de Mórrope
y Pacora” is used to describe the priest. Previous to this time, priests’ presence may have been more ephemeral in nature. Indigenous tension with Christianity still persisted. In one episode in 1647, blasphemies spoken by a zamba (a person of indigenous and African descent) was said to have caused a carving of Christ to repeatedly sweat blood; the “miracle” was authenticated by ecclesiastical authorities. The deeper interpretation of these blasphemies however is rooted in the probable expression of syncretic beliefs or resistance to Christianity.

In 1648, an event revealing tension between the state and church was also noted. Gabriel de Barceda, of the Audiencia Real de Lima entered Mórrope to sell some 200 mules to the Morropanos. The priest Barreda, depicted as protecting his “flock,” was opposed not only the large number of mules being sold but also the price gouging (each sold for 55 pesos but originally purchased for 12 pesos). The magistrate assaulted the priest, and the altercation is depicted with each man beating each other to a bloody pulp in full public view. Later trial vindicated Barreda, but Morropanos were manipulated and bribed to provide favorable testimony in favor of the magistrate.

In 1654, another conflict over water erupted involving Túcume and Mochumí who accused Pacora, Jayanca, and Mórrope and their curaca Don Gerónimo Cupuniconsoli of wasting water. Gómez (2006) infers this conflict may have been directly related to Mochumanos making a move to permanently secure more water following temporary access to other sources during the 1649-51 drought. Authorities ruled in favor of Mochumí who received partial water rights shared with Mórrope. Many Morropanos viewed this as illegal theft of their rightful water sources.
Despite 122 years of an active evangelical presence in Mórrope, many religious “errors” or “absurdities” were still committed. In 1658, Modesto Rubiños (1782 [1932]: 315) describes how the priest Degadillo was able to extract an apparent deathbed confession from a Mochica named Pedro Queyedo, who despite being one of the most “rational” ladinos of Mórrope, understood the Holy Trinity as a union of three separate gods; this and similar “misunderstandings” were said to be nearly universal in Mórrope. Another example of “absurdity” was recorded in 1664. One night, the priest Benevites ministered extreme unction to a sick individual, leaving the blessed oils in their silver containers in an unlocked ranch house. The paraphernalia was “stolen” by a shaman named Manuel Socupe who attempted to use the oils with indigenous curing rituals. He was arrested and was sent to Lima for trial.

In 1664, one of two events regarding the significance of the dead and burial was related. The priest Benevites fell ill on the road between Pacora and Mórrope and suffered what appeared to be a near-death experience. After recovering, he returned to the spot on the road where he became ill and made his Mochica helpers dig. They soon found a skeleton (presumably pre-Hispanic) which was exhumed and reburied in Mórrope in a coffin with full Christian rights. The spirit of the exhumed then came to the priest to thank him for making it possible to be so close to God (Modesto Rubiños (1782[1932]: 319). This narrative seems to embody a struggle for control over the dead and the cosmos in general; human remains in this episode were actively negotiated and re-appropriated artifacts of spiritual and worldly authority.
In 1685, the priest Banses fled to Pacora with the news that the British pirate Edward David was proceeding north after killing the priest of Casma and sacking the town of Zaña. Mórrope was without a priest for over three months. Following mass celebrating the early December feast of the Immaculate Conception, Banses fell ill and was dead four hours later. At midnight, a number of Morropanos clandestinely entered Pacora and stole the corpse which was buried as soon as it arrived in Mórrope. The burial was facilitated by the Mórrope funerary specialist (described as the ayudante del difunto), Don Pedro de Arriola. This episode especially highlights how the body (in this case, a priest) became a politicized object in a struggle for legitimacy between the two towns.

Continuation of pre-Hispanic activities prompted a new Mórrope priest to wage war against local tradition in 1667. Morropanos and Pacoranos were forbidden to consume wine, cane alcohol, and especially chicha beer and tumbado (chicha mixed with honey). Considering that chicha consumption was a cornerstone of identity, social solidarity, and associated ritual, this decree would have had substantial impact. Further, Modesto Rubiños (1782 [1932]: 321) alludes that these prohibitions were imposed with a degree of force short of killing the offenders, and “fugitives” were actively hunted down. A renovation of the Chapel is mentioned, as well as the initiation of construction for the Church of San Pedro which utilized wood imported from Guayquil, Ecuador.

Resistance to the colonial order and traces of Mochica agency sometimes can be perceived in the Modesto Rubiños manuscript. Significant tension existed between the priest Tamariz and the people of Mórrope such that several “bloody debates” ensued, though specific details are not given. In 1688, legal complaints were made against
Tamariz to the Corregimiento de Zaña and the Bishop of Trujillo; the protest of the Morropanos even went as far as Lima. Little improvement though seems to have resulted.

In 1691, another change for the Morropanos was initiated by the next priest, Viadurre. He invoked the authority of God’s rule to redraw property lines and limit the indigenous peoples to only one league of land and had no right to ask for more.

Viadurre’s land grab backfired. Following protest by the Morropanos, rights were granted to the marginal *monte* zone, desert, and deserted towns. Though seemingly an empty victory, Morropanos also gained some access to the gypsum and salt mines that up to that point been mined by the Church for their direct profit.

*Móorrope in the Eighteenth Century*

A third recorded water dispute transpired in July 1709. Túcume and Mochumí accused Mórrope and Illimo of illegally opening one canal and blocking another to siphon water away. This dispute ended with a ruling against Mórrope who appear to have been quite desperate to maximize their irrigation water (Gómez 2006). By 1722 – the last dated entry in the Modesto Rubiños manuscript – it is indicated that the Chapel of San Pedro de Mórrope was nearly destroyed by age, and the Chapel of San Pablo de Pacora was quite possibly in ruins. While the Church of San Pedro de Mórrope was to be inaugurated 29 years into the future, the Chapel may have been abandoned by this time. It would not be unlikely that religious activities were transferred to what would have been a relatively finished and much larger Church. Under Modesto Rubiños, the Church of San Pedro was officially dedicated on 12 May 1751.
A fourth water conflict was recorded in 1762 between Túcume-Mochumi and Mórrope. While a palpable tension and hostility is noted from the legal documents of the earlier water disputes, the language used in the 1762 complaint is plainly antagonistic: Mórrope is referred to as a false or illegitimate town populated by loose and lazy people who wasted water and failed to clean their canals. Again, Mórrope was on the losing end of this legal battle.

Later that year, Francisco Cajusol of Mórrope beseeched local authorities for water. So urgent was the plea that Cajusol stated that not only were Mórrope’s small farms, orchards, and herds of mules, cattle, and sheep in danger, but the people themselves were without drinking water and would die of thirst if nothing was done (Gómez 2006). Interestingly, local lore contains a story of a miracle attributed to Our Lady of Mercy that transpired on 11 March 1752, where a stream of crystal clear water was said to have flowed to Mórrope for nine years and seven months during their time of need (Gómez 2006).

Discord continued in 1780 as Modesto Rubiños accused the mayor of Mórrope, Maurico Llontop, and one of his officials, Pedro Felipe Suclup, of promoting drunkenness (perhaps related to clandestine chicha consumption) and Satanic dances. Four years passed after this accusation, it was in the temporary absence of Modesto Rubiños that Suclup attempted to oust the curaca Cususoli and reclaim communal land. Upon his return, Modesto Rubiños had a pretext for action and used “military force” to capture Llontop, Suclup and others who the priest had sentenced to life imprisonment and forced labor on a hacienda in highland Huamachuco (Peralta 1998: 155-157).
Figueroa and Idrogo (2004) suggest that the priests of Mórrope were a particularly oppressive group. Modesto Rubiños also appears to have carried out his own local and disruptive extirpation of idolatries during his tenure in Mórrope (1750? - 1788). His actions signify that indeed, by the late eighteenth century, Mochica beliefs and customs clearly persisted and were probably so deeply entrenched that no amount of force could remove them. Additionally, Late Colonial demographic data from 1784 indicates the population of 1,402 was rebounding. Mórrope contained one priest, four Spanish, 1,317 “Indians,” 67 “Mixed,” and 13 Africans (Gómez 2003).

MODERN MÓRROPE

Today, Mórrope is a town of some 4,000 people comprised of approximately 20 extended families. It is the capital of the District of Mórrope, populated by 35,055 inhabitants mostly living in approximately 45 dispersed or small settlements throughout the District’s 130,121 square kilometers (Capuñay 2004; Gómez 2003). Since 1784, the population has steadily grown into the 1990s (Gomez 2003). The region is presently watered by the La Leche River via the San Isidro drain.

A scant 8.1 hectares (or 1.87 percent) of land surrounding Mórrope were under cultivation in 2003. Dispersed tropical forest covers 193.2 hectares (or 28.8 percent), while two types of deserts (sandy dunes the southwest and clay, plaster, and salt deposits to the west and northwest) cover some 244.2 hectares (or 56.6 percent); other features, such as contiguous mineral deposits including limestone, red slate, clay, potash, sulfur,
and salt, comprise the remainder (Gómez 2003). The region’s high-quality gypsum (between 98.3 and 99.5 percent pure), may represent at least 70 million metric tons of material waiting to be mined (Gómez 2003).

Mórrope remains rural. The 1972 El Niño floods destroyed much of the town north and northwest of the central plaza. Consequently, much of “new” Mórrope was rebuilt on the eastern side of the settlement. Until recently, running water, electricity, and sewage were either unavailable or accessible for a limited time each day. Most of the local farmers earn about $3.00 USD per week. Mórrope’s priest in the late 1990s, Jorge Arbanil, rebelled against the Catholic Church, offering mass in the cemetery and in the streets as well as openly admitting to breaking his vow of celibacy and fathering two sons (Krauss 1999). The acrimony came to an end when Arbanil was replaced by the current priest, Pedro Vasquez. Still, the Church of San Pedro receives very little financial support from the Dioceses of Chiclayo.

Today, only Spanish is spoken in Mórrope. Yet, it is widely recognized among local scholars as being the one of the last bastions of the now dead Muchik language, which slipped into extinction in the late nineteenth or early twentieth century. Still, ethnically Mochica surnames are very common in Mórrope and its environs including the Cajusol (changed from Caxusoli), Chapnoñan, Chancafe, Esquen, Facho, Inoñan, Ipananque, Farroñan, Llauce, Llontop, Peche, Piscoya, Puriguaman, Sialupe, Siesquen, Suclupe, and Tuñoque families.

As in pre-Hispanic and Colonial times, the marginal environment places multiple constraints on economic activities while opening other opportunities entirely. Despite the
arid conditions, most Morropanos today are principally involved in agricultural and fishing activities (including collecting large quantities of Donax and other shellfish from the nearby beaches). Herding of goats is also practiced but is not widespread. Chicha is once again produced, and Mórrope is well known for its maize beer. Others are involved in the mining of salt and gypsum both north and south of Mórrope.

The degree of clay deposition in the area lead to a renowned community-level craft specialization of ceramic manufacture – in essence, Mórrope has exactly the kinds of environmental conditions where potting carried out on the household level might be expected to be thrive (Cleland and Shimada 1998: 115). Wares produced in Mórrope are consumed throughout the Lambayeque region, and may be distributed as far south as Lima. Some ten families are active potters in Mórrope, (Cleland and Shimada 1998), and Bankes (1985) cites a 1974 survey that identified over 100 families in the District engaged in potting activities. The Inoñan family claims involvement in ceramic production for at least five generations (Bankes 1985: 270). Overall, it is quite likely that Mórrope was producing ceramic wares in the seventeenth century if not earlier. Ceramic production in the area can be traced as far back to the Middle Sicán period.

What sets modern Mórrope craft production apart from other workshops in the Lambayeque region is the use of pre-Hispanic paddle-and-anvil or paleteada techniques (for a detailed ethnoarchaeological study of Mórrope potting, see Cleland and Shimada [1998]; also Bankes 1985 and Collier 1967). Locally grown cotton which does well in relatively arid conditions helps promote a moderate weaving industry in the rural Mórrope region. Just as depicted in first millennium Moche fineline paintings and in

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photographs taken by Brüning (1922[1989]), women in the Mórrope region employ backstrap looms in a mode of textile production that changed little in the last 1,500 years (Vreeland 1985). Vreeland’s (1985: 145) look at census data suggests that in 1878 and 1983, some 15.6 and 10.7 percent of women in the District of Mórrope were occupational weavers, respectively. Many of the products manufactured today include items for domestic use while tablecloths, runners, small backpacks, purses, and other items are made for tourists and sold in local museums and markets.

CONCLUSION

The colonial experience in Mórrope was part of a complex web of events, actions, and reactions that unfolded beginning with Pizarro’s invasion of the Andes. To construct an understanding of Colonial Mórrope, this chapter began with an overview of the sociopolitical, economic, and religious dynamics of the Viceroyalty of Peru. Then, corresponding developments in the Lambayeque Valley Complex were gleaned from a variety of non-systematic sources which revealed unprecedented postcontact transformations to local culture, behavior, and lifestyles. The ethnohistory of Mórrope itself, albeit developed from a single eighteenth century source, closely parallels larger colonial undercurrents while depicting unique local outcomes and experiences. Over the next three chapters, attention turns to archaeological and bioarchaeological data will be examined to gauge the impact of European contact in the Lambayeque Valley Complex.
CHAPTER 8

MATERIALS AND METHODS: BIOARCHAEOLOGY OF SPANISH COLONIALISM IN MÓRROPE

The preceding six chapters have established the relevant theoretical, ecological, archaeological, bioarchaeological, and ethnohistoric background which set the key parameters for this study. In this chapter, six research hypotheses, linked by an integrated burial analysis, are first presented. A description of the archaeological and skeletal materials used in this dissertation follows. Then, detailed consideration is given to the description of the methods used in the mortuary analysis, reconstruction of biological stress, activity patterns, diet, population genetic structures, and kinship patterns.

MATERIALS

*Mortuary Analysis: The Chapel of San Pedro de Mórrope*

Mórrope is 30 kilometers northwest of the modern city of Lambayeque on the east side of the new Pan-American Highway. The Chapel of San Pedro currently stands mostly restored as part of the San Pedro de Mórrope Architectural Complex which is comprised of a church, chapel, and convent (Figure 8.1). The San Pedro de Mórrope Complex is dominated by the towering Church of San Pedro inaugurated in May 1751.
The Chapel of San Pedro, established as early as 1536, is framed to the north by the parque principal and Calle Bolognese, Avenida Los Incas to the south, the Church of San Pedro immediately to the east, and Calle Arteaga to the west.

The Convent of San Pedro (founding and abandonment dates unknown) is found to on the east side of the Church. Like the Chapel, the Convent was constructed of adobe bricks (suggestive of relative contemporanity) but today lies in nearly total ruin. Various rooms, staircases, walls, and a possible access ramp were identified via pedestrian survey. The north-facing rooms of the Convent however continue to be used as the Parochial, serving as much needed administrative space for the Parish and its priest. While beyond the scope of the current project, future archaeological study of the Convent will prove invaluable in clarifying the form, function, and scope of activities carried out in colonial Mórrope.

The simple rectangular Chapel is located at 6° 32' 29.52'' South by 80° 00' 53.81'' West and sits at 21.6 meters above sea level. It is composed of a nave and sacristy 45 meters long and 16.5 meters wide (Figures 8.2, 8.3, and 8.4). It is aligned 11.0 degrees off true north, oriented slightly to the north-northwest. The principal building material is adobe brick and mud mortar, which had been covered by several layers of white plaster, each layer presumably representing a remodeling or re-facing event. The maximum height of its low-pitched roof configuration is 5.0 meters. Three small windows were placed high in each lateral wall while the sacristy featured a single, similar window at the center of its south wall. A large concrete and brick archway extends from the east side of the Chapel and physically connects it to the Church of San Pedro.
Figure 8.1. The San Pedro de Mórrope Complex, including the Chapel of San Pedro de Mórrope, the Church of San Pedro de Mórrope, and ruins of the Convent of San Pedro de Mórrope. Redrawn by Haagen Klaus from original renderings by Jorge Cosmopolis.
Figure 8.2: The Chapel of San Pedro de Mórrope, late 2002. Photo by and courtesy of Cesar Maguiña.

Figure 8.3: Front and back views of the Chapel of San Pedro de Mórrope. Redrawn by Haagen Klaus from original renderings by Jorge Cosmopolis.
Figure 8.4: East- and west-facing views of the Chapel of San Pedro de Mórrope. Redrawn by Haagen Klaus from original renderings by Jorge Cosmopolis.
The north-facing front of the Chapel exemplifies colonial European architectural traditions. It is by definition of the *ramada* style and shares many recognizable features with other *ramadas* as far afield as the Colonial Yucatán peninsula (Andrews 1991). Moreover, the pillars, gable, arched doorway, and rectilinear building shape at Mórrope are fully consistent with Christian shrine building styles. The gable is decorated with a large relief sculpture of the Papal Seal with its miter and crossed-key motif. At the apex of the gable is set a wooden cross.

In April 2003, initial architectural survey, restoration, and archaeological study were underway at the Chapel of San Pedro de Mórrope, directed by Cesar Maguiña of ICAM (Instituto Americano de Conservación y Restauración) of Chiclayo. The Chapel had also been named to the World Monuments Watch list of 100 most endangered archaeological sites on Earth. The first phase of archaeological research was directed by Julio Fernández. Exploratory excavation involved five small and two large test pits placed in various locations in the nave, and two small test pits exterior to the Chapel. These units generally exceeded no more that one meter below datum. These exploratory excavations identified various floors, construction phases and features, and 27 burials during the six week study (Fernández 2003). The burials were not recovered but instead left *in situ*.

In July 2003, Klaus was invited by Maguiña to participate in the study of the burials and skeletal remains in Mórrope. A three month season in 2004 was co-directed with historical archaeologist Manuel Tam (Universidad Nacional de Trujillo) and involved documentation of the exposed burials, coffins, and their contents. This work
was conducted under the auspices of the Instituto Nacional de Cultura (INC) permit N° 071/INC-DREPH-DA). It became clear at this time the Chapel of San Pedro de Mórrope contained an intact colonial mortuary population in an excellent state of preservation.

Skeletal Samples and Sampling Considerations

Hypotheses 2 thru 6 are tested using skeletal and dental remains of 1,048 individuals from 15 late pre-Hispanic (ca. A.D. 900-1532) and Colonial Period (A.D. 1536-1750) derived from the Chapel of San Pedro de Mórrope (Table 9.1). Much of the late pre-Hispanic sample is skewed towards the Middle Sicán period (ca. AD 900-1050/1100). However, this period appears to represent the cultural zenith of the Lambayeque Valley Complex, and if ethnohistoric and archaeological evidence are indeed accurate, subsequent Late Sicán, Chimú, and Inka administration of the valley probably did not significantly alter the collective factors that shape the life experiences that influence human biological outcomes. The Middle Sicán period can be regarded as the biological late pre-Hispanic baseline. Four small Chimú and Chimú-Inka era samples have been incorporated into the analysis, justified by the above reasoning and that their size and small geographic coverage prevent any other meaningful temporal comparison other than from the broad late pre-Hispanic to Colonial periods. Also, 50 provincial Middle Sicán individuals from the Chicama Valley El Brujo population are included here as Farnum (2002) found their health outcomes could not be differentiated from those in
<table>
<thead>
<tr>
<th>Site</th>
<th>Date</th>
<th>N</th>
<th>Social Context</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sicán</td>
<td>A.D. 900-1050/1100</td>
<td>16</td>
<td>Ethnic Sicán elites</td>
<td>Farnum 2002</td>
</tr>
<tr>
<td>Sicán</td>
<td>A.D. 900-1050/1100</td>
<td>35</td>
<td>Inferred high-status ethnic Mochica</td>
<td>Farnum 2002</td>
</tr>
<tr>
<td>HPBG</td>
<td>A.D. 900-1050/1100</td>
<td>9</td>
<td>Inferred low-status Mochica craft producers</td>
<td>Farnum 2002</td>
</tr>
<tr>
<td>Illimo</td>
<td>A.D. 900-1050/1100</td>
<td>1</td>
<td>Lower echelon elite Mochica lord</td>
<td>Klaus 2004c</td>
</tr>
<tr>
<td>Illimo</td>
<td>A.D. 900-1050/1100</td>
<td>30</td>
<td>Low-middle status Mochica commoners</td>
<td>Klaus 2004c</td>
</tr>
<tr>
<td>Huaca Sialupe</td>
<td>A.D. 900-1050/1000</td>
<td>15</td>
<td>Inferred low-status Mochica craft producers</td>
<td>Klaus 2003</td>
</tr>
<tr>
<td>Huaca Cao Viejo, El Brujo Complex</td>
<td>A.D. 900-1050/1100</td>
<td>50</td>
<td>Comparative Lower Chicama Valley low-middle status Mochica population</td>
<td>Farnum 2002</td>
</tr>
<tr>
<td>Cerro Cerrillos</td>
<td>ca. A.D. 900-1375(?)¹</td>
<td>32</td>
<td>Mochica sacrifice victims</td>
<td>Klaus 2004a,b</td>
</tr>
<tr>
<td>Cascajales</td>
<td>ca. A.D. 1100-1375(?)¹</td>
<td>8</td>
<td>Low-middle status Mochica commoners</td>
<td>Centurion 2005</td>
</tr>
<tr>
<td>La Caleta de San José</td>
<td>ca. A.D. 1375-1475</td>
<td>24</td>
<td>Inferred Mochica fishers</td>
<td>Rodriguez 1995</td>
</tr>
<tr>
<td>Úcupe</td>
<td>ca. A.D. 1375-1475</td>
<td>18</td>
<td>Higher status Mochica</td>
<td>Klaus and Wester 2005</td>
</tr>
<tr>
<td>Túcume- Huaca Larga</td>
<td>A.D. 1745-1532</td>
<td>22</td>
<td>Inferred elites and possible ascribed elites</td>
<td>Toyne 2002</td>
</tr>
<tr>
<td>Túcume - South Cemetery</td>
<td>A.D. 1475-1532</td>
<td>12</td>
<td>Middle-low status; probable Mochica</td>
<td>Toyne 2002</td>
</tr>
<tr>
<td>La Capilla de San Pedro de Mórrope</td>
<td>Early-Middle Colonial (ca. A.D. 1536-1640)</td>
<td>385</td>
<td>Low-status Colonial Mochica</td>
<td>This work</td>
</tr>
<tr>
<td>La Capilla de San Pedro de Mórrope</td>
<td>Middle-Late Colonial (ca. A.D. 1640-1750)</td>
<td>485</td>
<td>Low-status Colonial Mochica</td>
<td>This work</td>
</tr>
</tbody>
</table>

¹ While many of the sites here are securely dated using multiple calibrated radiocarbon and AMS assays, others have been assigned chronological position based on decorated grave goods. The seriation of these stylistic elements into major cultural/chronological phases is validated by past by radiometric dates (Shimada 2000).

Table 8.1. Skeletal samples used in this dissertation.
the Lambayeque region. Overall, the wide geographic coverage, representative sampling strategies, mortality distribution, and balanced sex ratios all suggest the late pre-Hispanic sample is representative of a living population of human beings.

The postcontact sample is currently derived from just one large sample in Mórrope. It is a relatively small, marginal community that may not reflect the biological outcomes of the colonial Lambayeque Valley Complex as a whole. The marginal nature of Mórrope, which contributed to historically known water and other resource shortages, may have contributed to greater than average biological stress. Conversely, the closer a community is to the geographical centers of European activity, the worse health tends to be. The rural location of Mórrope may have insulated it from stressors more prevalent in and around large colonial towns like Lambayeque and Chiclayo or sugar cane haciendas. However, analyses in this chapter reveal the Mórrope mortuary sample also appears to be representative of a biological population, as mortality profiles and sex ratios again closely conform to expectations of a living population. Consequently, the Mórrope skeletal sample can be considered in terms of a population as well.

While not empirically measured, interobserver error between Farnum, Toyne, and Klaus is minimized due to the use of identical data collection protocols and coding systems (Buikstra and Ubelaker 1994). Informal comparison of scores for pathological conditions between Farnum and Klaus in 2003 revealed a high degree of replicability between each other’s observations.

Measures of biological distance were based on inherited tooth sizes and morphological features. Population genetic patterns were estimated using dental
measurements of adult teeth collected from a representative collection of late pre-Hispanic samples (Huaca Loro East and West Tombs, Illimo, Huaca Sialupe, Cerro Cerrillos, Cascajales, and La Caleta de San José) \(n=59\). The Colonial sample \(n=50\) were derived from the Chapel of San Pedro de Mórrope. The study of phenetic-spatial patterning in the Chapel of San Pedro was based on the dentitions of 50 adults and 90 subadults from the Chapel of San Pedro de Mórrope.

**METHODS**

*Excavation and Mortuary Sampling Strategy*

Tam and Klaus co-directed the large-scale excavation of the nave, sacristy, and atrium at the Chapel of San Pedro de Mórrope during a 14-week excavation season from June to September 2005, authorized by Resolución Directorial Nacional N° 842/INC. A total of 12 excavation units were placed in various locations covering 212.1m\(^2\) (Figure 8.5, Table 8.2).

The aims of the 2004 and 2005 field seasons centered on archaeological documentation of: (1) construction phases, (2) structure modifications and history, (3) documentation of a colonial mortuary population, and (4) recovery of large and coherent sample of postcontact human skeletons for bioarchaeological study. The work in 2005 was accomplished via large-scale vertical area excavation that proceeded in each unit until sterile sand was encountered. Unit sizes and locations was constrained by the fact architectural features such as walls, that it was necessary to dig around architectural features, maintain walkways and work spaces inside the church, and maintain the
Figure 8.5: Plan view of the Chapel of San Pedro de Mórrope including burials and excavation units. Drawing by Haagen Klaus.
<table>
<thead>
<tr>
<th>Unit</th>
<th>Location</th>
<th>Dimensions</th>
<th>Area</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Portico (doorway)</td>
<td>1x2m</td>
<td>2m²</td>
<td>1.2 m³</td>
</tr>
<tr>
<td>2</td>
<td>NW nave</td>
<td>1x3</td>
<td>3m²</td>
<td>4.4 m³</td>
</tr>
<tr>
<td>3</td>
<td>Central nave</td>
<td>5x5m</td>
<td>25m²</td>
<td>61.5 m³</td>
</tr>
<tr>
<td>4</td>
<td>West central nave</td>
<td>3.5 x6.7m</td>
<td>23.5m²</td>
<td>62.0 m³</td>
</tr>
<tr>
<td>5</td>
<td>Front center nave</td>
<td>5 x5m</td>
<td>25m²</td>
<td>64.5 m³</td>
</tr>
<tr>
<td>6</td>
<td>SE nave corner</td>
<td>2x4m</td>
<td>12m²</td>
<td>41.5 m³</td>
</tr>
<tr>
<td>7</td>
<td>SW nave corner</td>
<td>2x5m</td>
<td>12m²</td>
<td>18.0 m³</td>
</tr>
<tr>
<td>8</td>
<td>Center sacristy</td>
<td>4x7m</td>
<td>28m²</td>
<td>64.1 m³</td>
</tr>
<tr>
<td>9</td>
<td>East exterior wall</td>
<td>1.4x2m</td>
<td>2.8m²</td>
<td>3.64m³</td>
</tr>
<tr>
<td>10</td>
<td>West exterior wall</td>
<td>1.5x3m</td>
<td>4.5m²</td>
<td>5.9 m³</td>
</tr>
<tr>
<td>11</td>
<td>NE nave corner</td>
<td>2x12m</td>
<td>24m²</td>
<td>57.9 m³</td>
</tr>
<tr>
<td>12</td>
<td>Atrium</td>
<td>3x8m</td>
<td>24m²</td>
<td>24.5 m³</td>
</tr>
<tr>
<td></td>
<td>Rear center nave</td>
<td>2.8x6m</td>
<td>16.8m²</td>
<td>44.0 m³</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>212.1m²</td>
<td>453.1 m³</td>
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</tr>
</tbody>
</table>

Table 8.2: Description of excavation units.

integrity of the walls and roof supports. In general, units were placed along the center axis of the Chapel of San Pedro de Mórrope as well as along the sides of the nave that alternated from east to west sides in a zig-zag pattern to minimize sampling bias from one side of the Chapel. In this way, units could also be placed to examine important foundations, *horcón* columnar sockets, and the altar. Excavation was accomplished by hand trowling in 20 cm levels. Despite the burials being more that 50 cm below the modern surface, the presence of isolated human remains at even the shallowest depths relegated the use of shovels to the removal of the plaster and adobe brick floors. Backdirt was screened using five mm mesh. Mapping of all archaeological and architectural finds was a continuous endeavor and was accomplished in scale maps drawn by hand.
Burials and features were recorded using standardized protocols including data collection forms (Appendix A). Data were collected on a burial’s three-dimensional provenience, coffin construction, decoration, cardinal orientation, grave goods, clothing remains, and taphonomy. Careful documentation of intrusive pits, entomological activity, and missing and disarticulated skeletal elements aimed to develop a nuanced reconstruction of funerary programs at Mórrope. These lines of information were complemented with detailed large-scale burial drawings (1:2 and 1:4 scale), mapping, and more than 2,500 digital photographs.

Once recovered, artifacts and skeletal materials were inventoried, weighed, catalogued, bagged in clear polyvinyl, and packed into termite-proofed, custom-made wooden boxes designed for the long-term curation of the excavated materials.

_Intrasite Relative Chronology_

Accurate dating of burials is a fundamental concern for any mortuary study, especially in the absence of chronologically definable grave goods. Here, the relative chronology of the site is essential to the arguments in Chapters 9 thru 12 involving distribution of mortuary and biological patterns through stratigraphic space and thus time. Radiometric dating of such recent burials and associated materials at the Chapel of San Pedro de Mórrope would likely prove to be inaccurate and problematic. The lower limit of any radiocarbon date from such a young site would be associated with a very large sigma value or error range such that desired precision is unattainable. Quilter (n.d.) recently experienced this problem with one AMS and seven $^{14}$C samples from the ruined
colonial church of Magdelena de Cao Viejo. For example, he obtained calibrated dates (2-sigma) ranging from 1390-1640 (cigarette tobacco; AMS date) and 1660-1960 (reed mat; $^{14}$C).

A relative dating solution was pursued at the Chapel of San Pedro de Mórrope. However, the site lacks significant stratigraphic differentiation but does feature a vertically stratified mortuary population. Therefore, burials were seriated by depth below datum and placed into respective Level categories. Seriation in archaeology was pioneered by Petrie (1899) in his study of pre-Dynastic Egyptian grave goods, and the validity of the process has been demonstrated repeatedly over the years (e.g., Dethlefsen and Deetz 1966). The underlying assumption behind this process is that artifacts, styles, fashions, and other patterned behaviors are introduced or innovated and if accepted by the population at large, features progressively increases in popularity over time (and visibility within an archaeological assemblage) before declining in popularity and disappearing from use altogether. This approach is completely uninformative about absolute calendar dates, or how long an assemblage took to form. What is obtained is a relative intra-site chronology supported by the law of superposition.

The distributions of 27 different mortuary pattern variables were examined by Level. These distributions through stratigraphic space and time were examined using (1) lenticular (or battleship) curves, (2) line graphs, and (3) multiple correspondence analysis which is considered to be a more “modern” approach to seriation (Shennan 1997:342).

Correspondence analysis is an exploratory technique related to principal components analysis which finds the degree of multidimensional association between the
row and column categories of a contingency table (Greenacre 1993). Scores for row and column categories are generated on a small number of dimensions to account for the greatest proportion of the associated $\chi^2$ metric between rows and columns in the same way that principal components analysis accounts for maximum variance. Points in multidimensional space are considered to have mass or weight (relative frequency) and inertia (the total Pearson $\chi^2$ divided by the sum) (Greenacre 1984). Correspondence analysis is designed to show how data deviate from expectation when the row and column variables are independent.

Multiple correspondence analysis (MCA) is an extension of correspondence analysis to more than two variables. It is ideally suited for multiple forms of mortuary data such as these (sums of categorical data). Actual computation in MCA is based not on the indicator (or design) matrix with cases as rows and categories of variables as columns, but on the inner product of that matrix – the Burt Table – which involves cross tabulation of variables against themselves and other categories (Greenacre 1993). Here, an MCA program was written in International Matrix Language in SAS 9.1 (SAS Institute 2003). Frequency totals of the presence of mortuary variables (columns) were compared to stratigraphic level (rows).

The Concept of Systemic Stress

The hypotheses regarding metabolic stress, skeletal and oral health, and activity patterns are rooted in the concept of systemic biological stress. Systemic stress is defined as any perturbation that disrupts the physiological balance of an individual (Huss-
Ashmore et al. 1982; Goodman et al. 1988). Systemic stress is not a static concept cataloguing the totality of pathological conditions or dietary-induced nutritional strain. Rather, the goal is to elucidate the interplay therein where pathogens and human behaviors interact with diet, environment, and social structures to disrupt biological homeostasis in specific and empirically observable ways. Each of the following variables is sensitive to systemic stress, and can be used to document disruption of biological homeostasis in ways that are independent and highly complementary.

**Paleodemography**

Anthropological study of the demographic characteristics of past populations is motivated both by theoretical interests in the demography of typical human populations though evolutionary time and to gain insight the balance between, stress and fertility, mortality, and migration which can be related to health, lifestyle, and history (Storey 1992:137). Paleodemography is built into the very foundations of osteology and bioarchaeology. Paradoxically, if attempts to estimate sex and age from skeletal remains are one of the oldest endeavors in physical anthropology, then extracting valid demographic information from skeletal populations is the most challenging.

**Sex Estimation**

Biological sex is a key analytical element in a skeletal series as it provides a direct opportunity to examine the distribution of disease, trauma, degenerative joint disease, demographic factors, and other morbidity factors between males and females.
Grauer and Stuart-Macadam (1998) and Larsen (1997) effectively illustrate how patterns of iron-deficiency anemia, osteopenia, immune function, activity, and trauma can be strongly shaped by the dynamic cultural constructions of sex and gender roles. In this work, ratios between males and females are examined to assess paleodemographic patterns as well as temporal comparisons of pathological conditions by sex.

Accurate estimation of biological sex among children remains the “holy grail” of subadult osteology. Many attempts using the subadult cranium, mandible, dentition, and pelvis have been published since the 1870s but feature unacceptably low accuracy or reproducibility (Lewis 2007; Saunders 2000). Reliable sexually dimorphic skeletal morphologies are secondary sex characteristics that only become apparent during puberty and throughout the remainder of life.

Biological sex of was estimated using morphological characteristics of the adult pelvis and cranium (Buikstra and Ubelaker 1994). Subpubic morphological features of the pelvis (presence or absence of a ventral rampart, subpubic concavity, and symphyseal ridge) were the principle features used to establish sex (Buikstra and Ubelaker 1994). In cases where subpubic morphology was poorly preserved or absent, the morphology of the greater sciatic notch was principally assessed (Buikstra and Ubelaker 1994). However, sex estimation from the greater sciatic notch in isolation from the pubic bone includes a greater chance of error (Walker 2005).

Standard morphological features of the adult male and female crania and mandibulae (Buikstra and Ubelaker 1994) were scored to complement sex estimations derived from pelvic morphology. Sexing an individual by the skull alone can be highly
error-prone due to the potential range of population-based variation in cranial size and shape (Meindl et al. 1985). In cases when pelvic morphology was missing or poorly preserved, sex estimations based solely on the skull were compared with the scores of complete individuals and were then placed within a seriated range of skeletal sexual dimorphism.

**Age Estimation**

While sex is an important variable, age-at-death patterns lie at the heart of modern paleodemography. Accurate age estimation is critical to the study of population health (some age groups may be more susceptible to stress than others) and paleodemographic assessment of biological stress. Following a period of initial growth and optimism in the 1970s, the demise of paleodemography seemed inevitable following Bouquet-Appel and Masset’s (1982) resounding condemnation of osteological age estimation and unrealistic assumptions of stationary population theory (which seem commonly violated and would prevent creation of life tables and mortality estimations).

Effective rebuttals by Van Gerven and Armelagos (1983) and Buikstra and Konigsberg (1985) constructively addressed these issues: the key is to continually refine paleodemography and its methods, not abandon them (Storey 1992: 146). Error in aging is not equal across the lifespan (subadult aging can be rather accurate) and corrections for adult ages should be applied (Meindl et al. 1985; Paine 1989). The most important advances currently involve a paradigm shift in thinking about how age-at-death distributions relate to living populations.
Sattenspeil and Harpending (1983) calculated mean age-at-death is closely related to birth rate. This seemingly counterintuitive statement means that in a moderately growing or declining population, the effect of change in mortality on age-at-death is nearly zero. The appropriate inference from mean age-at-death is that it is actually inverse to the birth rate. When mean skeletal age increases in a temporally coherent skeletal series, birth rate has decreased. McCaa (2002:95) uses the example of a conventional population pyramid where the rate of death is greatest at the base and the peak – in other words, the young and elderly die in the greatest proportions. However, the effect of fertility strikes at the base of the pyramid, and is concentrated at this point whereas mortality is dissipated throughout the pyramid. High fertility produces archaeological populations of ‘young’ age and vice versa. This is to some degree a probabilistic argument – with higher fertility, more children are born, more are likely to die in higher numbers, and more are likely to be represented in the archaeological record.

Buikstra et al. (1986) estimated fertility as the inverse of the proportion of skeletal individuals older than 30 years \((D_{30+})\) and individuals older than five years \((D_{5+})\). Application of the \(D_{30+}/D_{5+}\) ratio illustrated increased fertility is associated with increased carbohydrate availability in Woodland and Mississippian populations in the American Midwest (Buikstra et al. 1986), and decreased population fertility in the postcontact Georgia Bight linked with chronic postcontact biological stress (Larsen et al. 2002). This method may be mathematically simple and somewhat coarse, but it is robust especially in use with small samples (McCaa 2002: 106).
Paleodemography still involves unresolved debates and sobering pitfalls. Taphonomy and mortuary programs may contribute to under-enumeration of infants in the archaeological record (Saunders 2000). Samples themselves may be even more broadly skewed by excavation strategy or preservation. Most skeletal age estimation techniques contain a spectrum of hidden assumptions and untestable assertions that seriously call into question straightforward use of standard osteological aging techniques (Jakes 2000). Many paleodemographic techniques including hazards analyses are still contingent on the supposition that a population is stationary (no growth, no migration) – what McCaa (2000: 102) calls the “whopper assumption.” Skeletal samples available for study are sometimes too loosely assumed to be representative resulting in somewhat cavalier comparisons to model populations.

Johansson and Horowitz (1986) and Storey (1992) argue the paleodemographic program should be a four-stage endeavor. First, cultural practices that could skew burial depositional patterns and skeletal preservation must be systematically evaluated. Archaeological bias should also be assessed, in terms of sampling and recovery techniques – the latter of which has been often blamed for underenumeration of infants and young children. Second, meticulous age and sex estimations are generated. In the third and fourth stages, estimations of mortality and fertility can be produced in the theoretical reconstruction of a society’s demographic characteristics.

In this work, subadult age was estimated using dental development, dental eruption, and epiphyseal union (Scheuer and Black 2000; Ubelaker 2000). Dental development is considered the most precise approach for aging as the tooth development
is highly heritable and relatively undisturbed by environmental influences (Smith 1991). Here, dental development was used as an indicator of age for erupted and partially erupted deciduous and permanent teeth due to the inability and impracticality to radiograph each individual. However, developing teeth within crypts could be visually observed in many cases. The developmental phase of each observable tooth was scored according to a protocol (Buikstra and Ubelaker 1994) based on the foundational work of Moorres et al. (1963).

Dental eruption also provides a similarly accurate and precise manner to estimate age-at-death for subadults (Cardoso 2007). The level at which each tooth had emerged from the alveolus was recorded. These observations were compared to a reference sample from living populations (Buikstra and Ubelaker 1994).

Other methods of estimating subadult age-at-death include epiphysial fusion and long bone length. Fusion of the epiphyses transpires within particular age ranges in subadults (Buikstra and Ubelaker 1994). Epiphysial union was according to standard protocols (Buikstra and Ubelaker 1994).

Adult age was estimated using the morphology of the pubic symphysis and auricular surface in concert with cranial suture closure and dental wear (Brooks and Suchey 1990; Lovejoy et al. 1985a; Meindl and Lovejoy 1985; Smith 1984). Initial studies of the pubic symphysis documented age changes related to the degeneration of this symphysial cartilaginous joint beginning around 19 years and continue into the sixth decade of life (e.g., Todd 1921). Studies over the next 50 years involved the pubic symphyses of American war dead and individuals of known age-at-death recovered from
forensic contexts (Brooks and Suchey 1990; McKern and Stewart 1957). Brooks and Suchey (1990) standardized these methods where degeneration of the pubic symphysis is scored by matching the visual appearance of the pubic symphyseal face with standard photographs and descriptions.

Patterns of degeneration documented at the sacroiliac joint of the auricular surface of the pelvis (Lovejoy et al. 1985a) were also used either in lieu of or in concert with the pubic symphysis. While more often preserved better than the pubic symphysis, auricular surface changes are much harder to read and interpret. While plagued with a greater of interobserver error, changes can be followed to age 50 and beyond (Lovejoy et al. 1985a; Meindl and Russell 1998). Various degenerative patterns are observed on the auricular surface and compared to a standard reference sample (Buikstra and Ubelaker 1994).

Age estimation using cranial suture obliteration relies on the observation of cranial sutures at 17 separate points on the ectocranial vault (Buikstra and Ubelaker 1994; Meindl and Lovejoy 1985). As this method assumes cranial sutures slowly obliterate as individuals age, obliteration of cranial sutures were scored according to standard bioarchaeological protocols using photographs and descriptions (Buikstra and Ubelaker 1994). Individual scores for the anterolateral and posteriolateral vaults were summed to yield an age range for each cranium.

It is critically important to note that some degree of error is inevitably associated with age estimations. The reference populations which these various standards were developed from do not share a recent common ancestor with people of the Lambayeque region. Populations of various geographic origins demonstrate perceptible differences in
crown formation timing owing to different genetic and environmental contexts, which are further confounded by projecting these standards back in time for use with archaeological populations (see Reid and Dean 2006; Saunders, 2000; Sciulli 2007). In other words, these standards tend to be most consistent for the population or museum collections from which they were generated. Also, dental developmental schemes have been developed from non-survivors, not living individuals. These deficiencies signify standard age estimations hold considerable uncertainties and untestable assumptions (Hillson 1992).

To allay this potentially significant source of error, seriation was employed. Sorting without reference to age ranges or standard age-at-death estimates produces consistent results within the sample. Instead of age being established independently for each individual based on a previously devised system, they are established relative to each other. The process is also fast and detection of errors is simple. Maturity stages or age classes were then developed for these samples based on attainment of major developmental or degenerative landmarks. Among subadults, dental development, dental eruption, and long bone lengths were seriated. Among adults, seriated variables included stages of pubic symphysial and auricular surface morphology, cranial suture closure, and dental wear (Hillson 1992; Sciulli 2007, n.d.).

The best age estimations are based on simultaneous evaluation of multiple indicators, and the preeminent multivariate aging technique today remains the summary age procedure (Lovejoy et al. 1985b), a descendent of Ascádi and Nemerskéri’s (1970) complex method. The technique requires a minimum of two age indicators from a skeleton. These indicators are used to generate an intercorrelation matrix subjected to
principle components analysis. The correlation of an indicator with the first principle component is interpreted as its weight, and the final age of an individual is derived from a summation of each age assigned by each indicator ($a_{i1}$) times its weight ($w_{i1}$) divided by the number of age indicators ($n_i$), or:

$$\frac{a_{i1} (w_{i1}) + a_{i2} (w_{i2}) + a_{i3} (w_{i3}) + \ldots + a_{ip} (w_{ip})}{n_i}$$

The summary age procedure has generated highly accurate results when performed on a population of known age-at-death. Error in estimating ages greater than 45 years were identified early in its use and a constant was added to each individual’s summary age value. The largest corrections are applied to middle and old adults (Lovejoy et al. 1985b). Summary age estimations were generated in this work using multiple programs written in International Matrix Language using SAS 9.1 (SAS Institute 2003) (Appendix B). Six age classes were defined by this process, and are listed in Table 8.3.

<table>
<thead>
<tr>
<th>Age Class</th>
<th>Summary Age Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 - 4.9 years</td>
</tr>
<tr>
<td>2</td>
<td>5.0 - 14.9 years</td>
</tr>
<tr>
<td>3</td>
<td>15.0 – 24.9 years</td>
</tr>
<tr>
<td>4</td>
<td>25.0 – 34.9 years</td>
</tr>
<tr>
<td>5</td>
<td>35.0 – 44.9 years</td>
</tr>
<tr>
<td>6</td>
<td>45 years and older</td>
</tr>
</tbody>
</table>

Table 8.3: Age classes and associated summary age ranges used in this study.
Childhood Metabolic Stress

Perhaps no other category of person is more susceptible to stress or is more revealing about population health than children (Goodman and Martin 2002; Lewis 2007). Systemic stress during childhood can be imprinted into the skeleton. Dental enamel hypoplasias provide a nearly indelible indicator of stress during tooth crown formation (prenatally to 12 months for deciduous teeth; birth to 7 years for deciduous teeth). These defects most directly reflect the activity and functioning of ameloblasts (specialized cells which deposit the amelogenin matrix of enamel) and tooth ontogeny such that disruption is understood in detail (Goodman and Martin 2002; Hillson 1992; Goodman and Rose 1990, 1991).

Enamel hypoplasias are rows, pits, or grooves observable on tooth crowns (Figure 8.6). When enamel production is disrupted, shortened enamel prisms are deposited on the dentine by the ameloblasts. Disruption of enamel production is associated with inadequate nutrition, acute and chronic infection, weanling diarrhea, psychosocial disturbance, and physical trauma (Goodman and Rose 1991). The sensitivity of enamel formation is underscored by the over 100 known kinds of possible stressors that can lead to hypocalcification (Schultz et al. 2001). Accordingly, dental enamel defects are best interpreted as a non-specific indicator of stress. Hereditary anomalies can also cause hypoplasias, but are exceedingly rare in modern populations and even less prevalent among prehistoric skeletons. Localized trauma may also appear similar to those associated with systemic stressors (Hillson 1996) but defects induced by traumatic injury are very infrequent observed in human dental remains. Accordingly, the features
described here as enamel hypoplasias are those manifest systematically on antimeric teeth (Goodman and Rose 1990, 1991). As enamel does not remodel, defects are observable after death and serves as a nearly permanent record of stress experienced during childhood and can be extrapolated to reconstruct socioeconomic and environmental interplays among past populations. However, the study of hypoplasia frequencies can be negatively affected by the under-enumeration of defects in the absence of microscopic analysis (Hillson and Bond 1997). It is fundamentally necessary to highlight that the enamel defects macroscopically identified in this work represent a *minimum* estimate of teeth reflecting stress episodes.

Because of the relationships between stress, enamel hypoplasias, nutritional status, and socioeconomic status have been well-documented experimentally, clinically,
and archaeologically, enamel hypoplasias are of central interest to this work. Enamel defects were observed macroscopically and under 10x magnification using a hand-held loupe. Low magnification helped identify anomalous features that could be confused with hypoplasias (i.e., large perikymata). Again, a standard protocol was used (Buikstra and Ubelaker 1994) to document each defect, its type, and the most occlusal distance of the defect from the cemento-enamel junction.

A second measure of childhood stress involves porotic hyperostosis lesions (Figure 8.7). This condition is associated with various forms of iron-deficiency anemia manifest most often on the parietal bones and occipital region principally as a function of marrow hyperplasia. The morphological syndrome known as cribra orbitalia which involves the orbital roofs appears part of the same pathological complex; recent research suggests cribra orbitalia is the precursor to porotic hyperostosis lesions (Blom et al. 2005; Lewis 2007). Porotic hyperostosis results from hyperactivity of haemotopoietic tissue in the skull during childhood. Lesions are characterized by the thinning of external lamina. The diploë becomes visible and the enlargement of the cancellous bone by radial growth of the bony trabeculae reduces the lamina in a process akin to pressure atrophy (Schultz 2001). These spongy or coral-like lesions can only be formed during childhood (expansion of the marrow spaces in a child’s cranium is due to the entire bone completely occupied by red marrow). The window for lesion formation spans approximately four to six months after birth (infants are often buffered due to inborn iron stores) to four to six years (Blom et al. 2005). Lesions are remodeled at a very slow rate such that inactive lesions can still be observed several decades later in adults (Mensforth et al. 1978).
Low oxygen saturation of arterial hemoglobin leads to hypoxic conditions which stimulate increased red blood cell and large immature precursor cell production. Iron-deficiency anemia may be clinically defined as low serum ferritin, low transferrin, or elevation in erythrocyte protoporphyn levels (Stuart-Macadam 1998). Lesions are symptomatic of inadequate diet, poor iron absorption, increased iron utilization, blood loss, infection, or a combination of these factors which may vary significantly with sex and age. Consequences of anemia are well-documented to include elevated risk of childhood mortality, changes in organ structure and a lack of enzymes needed for DNA synthesis and mitochondrial electron transport (Goodman and Martin 2002; Larsen
Anemia also compromises immunocompetence, leads to decreased work capacity, and impairs cognition, learning, memory, and socialization.

Diagnosis of porotic hyperostosis must be cautious, as scalp inflammation, non-specific osteitis, hemorrhagic processes, and tumors can produce similar lesions. Cribra-like lesions may result from inflammation of frontal, ethmoidal, and maxillary sinuses, hemorrhage, and pseudopathology (Schultz 2001; Walper et al. 2004); Schultz and colleagues argue only histological examination can produce accurate diagnosis, as pathological conditions such as scurvy and rickets can produce similar-looking lesions. In the Andes, pressure from infant cradle boarding has been considered as a possible cause of porotic lesions (Verano 2003), but Blom and colleagues (2005) regional and diachronic study of lesion patterning along the Peruvian coast points strongly to anemia as the source.

Careful visual examination of lesion patterning can help distinguish lesions resulting from anemia versus other causes (Larsen and Sering 2000) including bilateral patterning and lesion location. Most archaeological cases of porotic hyperostosis appear to be linked to iron-deficiency, though rare conditions such as hereditary anemia, congenital cyanotic heart disease, renal osteodystrophy, dystrophic myotonia, and polycythemia can also lead to anemia (Ortner 2003; Stuart-Macadam 1989).

Contra Stuart-Macadam’s (1992) position, porotic hyperostosis cannot be interpreted as a positive sign of adaptation. First and foremost it involves a negative and increased health burden borne by those afflicted with it (Goodman 1993). Regional and diachronic studies summarized by Larsen (1997) suggest a synergistic etiology rooted in
systemic biological stress, low bioavailability of iron, sedentism, and infection. Utility of porotic hyperostosis as a systemic metabolic stress marker is well supported due to its links to iron status, undernutrition, disease, growth disruption, socioeconomic status, and life history. Porotic hyperostosis and cribra orbitalia lesions were documented using standard protocols and descriptive categories (Buikstra and Ubelaker 1994) based on Stuart-Macadam’s (1985) foundational research. Lesion location, activity, and severity were documented in this study.

A third measure of subadult stress is found in growth patterns and terminal adult stature. Anthropometric measures have become central to the study of human adaptation due to inherent biological sensitivities to the environment. Growth parameters, such as stature, weight, arm circumference have been shown to be such sensitive indicators of nutritional and health status such that growth has become inseparable from assessment of nutrition (Goodman and Martin 2002). Economic historians illustrate the importance of stature changes in relation to economic conditions, social class, nutritional adequacy, and health status (Larsen 1997: 8-9).

Though generally continuous, two intense periods of growth occur: birth to one year, and then adolescence. Genes, hormones, and psychological stress impact growth, but nothing is more significant than environmental stressors – especially nutrition (Larsen 1997). Nutrition and disease have a synergistic relationship: poorly nourished individuals are more susceptible to infection and infection can inhibit the ability of the body to absorb essential nutrients; the fewer nutrients one ingests, the less a person can grow. Therefore, assessment of terminal adult stature can serve as sensitive indicator of chronic
stress and nutritional status. The main advantage of looking at growth in subadults (growth velocities, dental eruption) is that they are free from the potential of catch-up growth in later adolescents and adults who would effectively erase all traces of earlier growth retardation (Bogin and MacVean 1978; Stinson 2000).

Living stature from skeletal remains is most accurately reconstructed using the Fully (1956) anatomical method which accounts for the multiple anatomical structures that contribute to height (cranium, vertebrae, long bones, and foot). Owing to taphonomy and human ritual, many pre-Hispanic and postcontact Lambayeque Valley skeletons are incomplete. Use of the Fully method to estimate stature and develop population-specific equations is not currently feasible. Long bone lengths must be relied upon instead.

Long-bone derived stature estimation formulae were developed by Genovés (1967) based on a modern Mexican reference sample. These formulae have been used exclusively in past north coast Peru stature estimation (e.g., Gaither 2004; Toyne 2002; Verano 1997a,b,c) as it is the closest ecogeographic, population-specific analog available for the coastal Andes. The Genovés method is however less than ideal, since it has not been empirically shown that body proportions (such as limb length to trunk height ratios which are related to climatic selection [Holliday and Ruff 1996]), are comparable nor do Andean and Mexican populations share a common gene pool or a recent ancestor. However, Genovés (1967) is used here with caution. Its use most importantly permits direct comparison with a larger regional and diachronic set of stature estimations. Considering the range of error may be introduced with its use, less emphasis is placed on
absolute stature rather than the changing proportions of stature between samples and time periods.

When comparing stature in two populations based on a common mathematical formula, it is imperative that they too are shown to possess similar body proportions. Therefore, brachial (BI) and crural indices (CI) were first calculated for pre- and postcontact samples where $BI = \left( \frac{\text{Radius}_{\text{max.}}}{\text{Humerus}_{\text{max.}}} \right) \times 100$ and $CI = \left( \frac{\text{Tibia}_{\text{max.}}}{\text{Femur}_{\text{max.}}} \right) \times 100$. Terminal adult stature was calculated for each individual with a complete femur using the Genovés (1967) formulae separately for males and females:

- **Terminal Adult Male Stature** = $(2.26 \left[ \text{Femur}_{\text{max.}} \right]) + 66.379 \pm 3.417$
- **Terminal Adult Female Stature** = $(2.59 \left[ \text{Femur}_{\text{max.}} \right]) + 49.742 \pm 3.816$.

**Infectious Disease**

A key window on past populations can be opened through the study of infectious disease. Merbs (1992) defines infection as the invasion and multiplication of microorganisms in or on body tissue. The frequency of members of a population affected by disease forms a baseline of information from which health status, stress, nutritional adequacy, diet, transmissibility, waste disposal, and hygiene may be understood (Larsen 1997: 64). Stress from infectious disease is among the principle contributors to modern morbidity and mortality and likely had similar effects in the past. For decades, the unit of measurement of disease was often the adult, but increasing awareness regarding the importance of the health of children has emerged.
Acute infections, such as smallpox, plague, or influenza are fast acting. The host either survives infection or dies before bony involvement is initiated (Ortner 2003). Conversely, chronic infections are typically non-lethal conditions that reflect community level health patterns and everyday environment. Upwards of 90 percent of non-specific skeletal lesions are attributed to varieties of *Staphlococcus* and *Streptococcus* infection that produce large ulcers on the skin and are often exacerbated by venous stasis. These particular microorganisms have enjoyed a long-term, intimate, and usually non-lethal relationship with humans for potentially millions of years (Merbs 1992), but when stress increases and immunological and biocultural systems are fail to properly to buffer, infection sets in.

Skeletal infections represent a continuum of action or progression, with involvement of periosteum, cortical bone, and medullary cavity (Larsen 1997). Many types of systemic infections cause increased venous blood flow with reduced oxygen tension (Ortner 2003). Under such anoxic conditions, osteoblasts are stimulated. Periostitis (Figure 8.8) results from one such response to bacterial infection, though conditions such as scurvy and localized trauma can stimulate the periosteum-lining osteoblasts as well (Resnick and Niwayama 1995). Inflammatory periosteal responses initially involve a vascular reaction to infection which elevates the periosteum and creates a subperiosteal hemorrhage. Capillaries dilate and allow escape of large molecular proteins, fibrinogen, and leukocytes (Ortner 2003: 180). They migrate by chemotaxis to an infection site and often create pus. Areas of raised, necrotic bone characterize active
lesions, whereas healing lesions that are being remodeled feature smooth walls and margins.

Throughout space and time, the human tibia seems to be the most common location of non-specific periostitis, and may be linked to the fact the tibial diaphysis is the largest vascularly inactive area of the skeleton (Larsen 1997:85). Periostitis of traumatic origin (such as impact on the shin) often results in small, localized, and non-destructive periosteal lesions, whereas infectious diseases are more systematic, widespread, and bilateral. Diagnosis of periosteal inflammation in subadults is notoriously difficult since non-pathological woven bone associated with normal growth can mimic lesions (Lewis 2007: 135). Periostitis trends across time and space link higher prevalence of the
condition to settings experiencing increasing population density, less diverse diets, poor sanitation, and related factors (Larsen 1997).

Osteomyelitis, which is far more rare and severe, involves a proliferation of both endosteal and periosteal surfaces. Direct infection via fractured bone piecing the surface can introduce pyogenic bacteria, fungi, parasites, or viruses that lead to osteomyelitis (Ortner 2003). Usually a distinctive cloaca, sequestrum, and involcrum are formed. Periostitis is almost never fatal, but osteomyelitis can be deadly if dissemination via the circulatory system occurs.

Diagnosis of a specific disease processes in bone can be reached only in a small number of cases. Tuberculosis, treponemal disease (particularly syphilis) and leprosy have been the focus of dedicated attention by paleopathologists and bioarchaeologists (Powell and Cook 2005; Ortner 2003; Roberts and Buikstra 2003) because of their impacts on health over the centuries which continue today. In these cases, an infectious agent can lead to specific patterns of bone involvement. However, early optimism in paleopathology has given way to the recognition of methodological inadequacies, the obligatory need for differential diagnoses, and the fact that different disease processes produce a similar distribution of lesions (Lovell 2000; Ortner 1991, 2003).

Here, periostitis and osteomyelitis were scored according to standard coding protocols (Buikstra and Ubelaker 1994) as were other lesions indicative of specific disease processes including careful and systematic documentation of lesion location, size, activity, and other macroscopic characteristics.
Childcare: Artificial Cranial Deformation

Though artificial cranial deformation has been regarded by some as an intentionally-inscribed marker of ethnic identity in the southern highland Andes, similar interpretations for north coast societies is untenable (see discussion in Chapter 6). However, cranial deformation is the principle form of body modification on the north coast of Peru which relates to technology, behavior and a style of child care (Figure 8.9). Specifically, artificial cranial deformation is being used here as an indirect factor related to childhood biological stress using the following logic: if an infant or very young child is restrained to a cradle board for extended periods of time, the probability of being exposed to disease vectors is relatively lower than if the child is unrestrained. If potentially more mobile, a young subadult is more likely to interact with their environment and disease vectors. Artificial cranial deformation was scored using Buikstra and Ubelaker’s (1994)

Figure 8.9: Artificially deformed cranium, lateral right view, Cerro Cerrillos Burial 15. Photo: Haagen Klaus.
protocols noting the multiple characteristics of cranial shape, planes of pressure, and artifacts of binding and pads placed against the head.

**Activity and Lifestyle**

Physical activity is a defining characteristic of human adaptive regimes, and corresponding articular degenerations and muscular modifications can provide a range of inferences about activity. Data derived from living populations indicate workload and lifestyle can have enormous impacts on demography and health. Excessive activity and heavy work can reduce ovarian function, fertility, and immune function (Ellison 1994; Ellison and O’Rourke 2000; Larsen 1997).

Diarthrodial (highly mobile, such as the glenohumoral joint) and amphiarthrodial joints (relatively stable, such as the pubic symphyses) are the two major classes of articulations in the skeleton. The term osteoarthritis applies to degeneration the synovial, diarthroidal joints while osteoarthrosis is often the preferred term for degeneration of amphiarthroidal joints. The anatomy and function of intervertebral disk joints is also different and relates to a somewhat dissimilar process of degeneration. Arthropathies can also involve idiopathic or secondary causes related to trauma, congenital defects, and calcium deposition. To encompass all of these, the term degenerative joint disease (DJD) is adopted here.

Degenerative joint disease is a multifactorial and biologically complex phenomenon that is not fully understood. Genetic factors, body weight, diet, age, and physical activity play active roles in its manifestation (Jurmain 1977, 1999; Goodman and Martin 2002, Larsen 1997; Pearson and Buikstra 2006). Normally robust repair
mechanisms of a joint are either compromised or fail to keep up with the mechanical loading on the joint and severe fibrillation and deep defects appear in the cartilage (Jurmain 1999). Initial stimulation of new, pathological bone growth at a joint arises as capillaries penetrate into the subchondral plate and the deep, calcified zone of articular cartilage when the normal cartilaginous vascular barrier is breached by wear-and-tear (fibrillation). Skeletal manifestations of these conditions are scored by bioarchaeologists as osteophytes, marginal lipping, porosity, and bone-on-bone contact or eburnation (Figure 8.10).

Some joints, such as the knee, appear to be very well adapted to long-term loading experienced during running, for instance, but may be prone to DJD as a result of activities involving habitual bending. Dissimilar stimuli, such as heavy lifting, promote

Figure 8.10: Advanced joint destruction and eburnation, distal left humerus of U7 IH 21 (A); distal marginal lipping of the left femur, Burial U3 05-43. Photos: Haagen Klaus.

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degeneration in the hip and spine (Jurmain 1999:105). Developmental age and activity may also play a role. Earlier injury and joint modification can produce degenerative changes later in life (Jurmain 1999:105).

Population-based studies show a great deal of temporal and regional variation of DJD (Bridges 1992; Boyd 1996; Larsen 1997, 2006b). Examples from North America, the Terry Collection, Inuit, Great Basin and Pecos Pueblo Indians, pioneer Euroamericans, and other groups reveal tendencies linking DJD with lifestyle; the most comprehensive bioarchaeological study linking DJD to activity is perhaps Merbs’ (1983) study of the Sadlermuit Inuit. Sexual division of work and activity appears to play a role, as males show a greater prevalence of DJD regardless of all other variables across the globe (Larsen 1997). In stratified societies, social rank may also contribute to specific DJD patterns. Such differences have been used to evaluate temporal trends and adaptive shifts have been thematically focused on the shift from foraging to farming and European contact in the Americas (Bridges 1992; Larsen 1997).

Behavior inferences based on DJD patterns must however be tempered by cautious and thoughtful consideration. A critical perspective is espoused by Jurmain (1999) who cites a body of sometimes contradictory clinical and epidemiological literature that suggest in some activity regimes DJD may be a less direct indicator of activity. Knüsel (2000) states there is no clear-cut relationship between strenuous activity alone and DJD, while Bridges (1992) demonstrates that at least in one archaeological setting DJD and lifestyle changes were not closely related.
The most reliable and valid approach to the study of DJD involve population-level comparisons that scrutinize each available joint in the entire skeletal population (Larsen 2006b). Earlier practice of inferring specific habitual activities (such as atlatl use or horseback riding [Kennedy 1989]) can no longer be supported. Knüsel (2000) argues the goal of DJD studies should aim to reconstruct movements and motions. In this study, DJD lesions were again scored using the coding system of Buikstra and Ubelaker (1994) and documented lesion location, type (e.g., spicule formation, porosity, or eburnation), and severity of expression.

Skeletal trauma represents another window on activity and lifestyle (Figure 8.11). Besides contributing to an understanding of morbidity and mortality, trauma analysis can go beyond simple description of violent activities and wound identification to consider the physics of bone fracture and the wider behavioral, cultural, and lifestyle

Figure 8.11: A well-healed traumatic fracture of the left radius, Burial U4 05-28. Photo: Haagen Klaus.
implications of accidental or violent injury (Eisenberg and Hutchinson 1996; Martin and Freyer 1997; Walker 2001).

Vertebral bodies are not particularly dense and are vulnerable to crushing under conditions of pathological overload. Depressions on the superior or inferior surfaces of the vertebral bodies resulting from Schmorl’s Nodes are the result of intervertebral disk herniation (Merbs 1989). Broken ribs, Colles’ fractures, and dislocations may also be interpreted as accidental in origin (Lovell 1997), resulting from rapid deceleration injuries such as a fall. Stress fractures resulting from pathological overload may be incomplete and difficult to discern but can shed valuable light on behaviors including labor (Merbs 1989: 169), such as linkages between spondylolysis of lumbar vertebrae to habitually pathological loading of the lower back.

Other types of traumatic injury may evince violent interaction: healed nasal fractures, sharp force weapon wounds, embedded projectile points or bullets within bone, or blunt force cranial trauma (Eisenberg and Hutchinson 1996). These observations can be the basis of examining the violent lifestyles led by some individuals, as well as the social role and construction of violent acts from wife beating to organized warfare in across cultures (Martin and Frayer 1997; Walker 1997, 2006).

Lovell (1997) underscored the urgent need for careful and thorough descriptive protocols to identify fracture type, potential mechanisms of injury, and interpretation of the ultimate cause of fracture placed within an understanding of (1) the characteristics of the fracture itself; (2) patterns of fracture within an individual and the population; and (3) social, cultural, historical, and environmental contexts. Contextual understandings of
physical environment (topography, architecture, ice) and recognition of sex or gender roles that may put some people at higher risk than others for particular injuries are also required (Lovell 1997). Here, traumatic bone injury was recorded using the protocols of Buikstra and Ubelaker (1994) and documented lesion location, type, degree of healing, and other fracture characteristics.

_Diet_

As Goodman (1994: 165) so importantly defines, diet is literally what goes in one’s mouth and into the digestive tract to be broken down and transported to points beyond. Nutritional status is defined as the state resulting from the balance between the supplies of nutrients that are contained within the diet. Diet can be characterized by dental caries, tooth loss, and dental wear. It is important to note that while oral health data are not precise dietary indicators, multiple and compelling inferences on dietary composition can be developed.

Dental caries (Figure 8.12) is a disease process characterized by focal demineralization of dental enamel (most often in the complex occlusal grooves in molars) by endogenous acidogenic bacteria (Streptococcus mutans, Lactobacillus acidophilus) as they ferment dietary carbohydrates. At least three major factors are involved: exposure of tooth surfaces to the oral environment, the presence of aggregates of complex indigenous oral bacterial flora, and dietary composition (Larsen 1997). Hillson (1996) notes dental caries can be alternatively progressive – sometimes active, sometimes not. Modifying factors may include oral pH, speed of food consumption, salivary proteins, hormonal
levels, food texture, and hardness of food leading to rapid attrition that would remove the
groove systems. Antemortem tooth loss is another pathological feature of the oral cavity.
Antemortem tooth loss can result from a variety of factors, including advanced caries,
impaction, trauma, alveolar bone loss, periapical bone loss, and extensive dental wear
that exposes a pulp chamber. If the pulp of a tooth is compromised by dental caries or
attrition, an inflammatory response is trigged as bacteria pass down the root canal and out
of the tooth’s periapical foramen (Hillson 2000). Surrounding bone is resorbed to
accommodate a growing periapical granuloma or accumulation of pus. The result is a
periapical abscess, and is usually accompanied by a buccal fistula.
Dental wear itself is another informative phenomena caused by tooth-on-tooth and tooth-on-food contact during mastication. The degree to which teeth are worn within a population can be very consistent and can serve as gross indicators of dietary intake, changes in food preparation, and dietary hardness (Smith 1984).

In this work, oral pathological conditions were observed visually and under 10x magnification using a hand-held loupe. Carious lesion size, location, and severity, antemortem tooth loss, alveolar abscess size and location, dental wear, location and size of calculus deposits, and periodontitis were documented (Buikstra and Ubelaker 1994). Because microscopy can identify carious lesions that are invisible to the naked eye (Hillson 2000), the prevalence of carious lesions reported here represent a minimum estimate of dental caries.

While porotic hyperostosis lesions of the cranium are a principle indicator of nutritional stress, it can also be considered a gross indicator of diet under special circumstances, such as with coastal Peru. Higher levels of porotic hyperostosis are associated with iron poor, maize-centric diets. Paradoxically, porotic hyperostosis is also associated with populations that exploit iron-rich marine resources. Marine diets are rich in heme and ferrous iron and their high protein content further promotes iron bioabsorption (Mensforth et al. 1978; Steinbock 1978). However, many fish and marine mammals are also rich in parasites which can be transferred to the human gut (Blom et al. 2005; Ubelaker and Newson 2002; Walker 1986). Gastrointestinal conditions stemming from colonization by endoparasites such as hookworm, whipworm, ringworm, and other organisms cause chronic abdominal bleeding and diarrhea such that blood loss, rapid
gastric mobility, and theft of dietary iron by endoparasites promotes conditions of anemia in the host (Blom et al. 2005).

Oral health can hold several indirect implications for the general health of a population. Dental caries (described below) are a form of infectious disease, and as Powell (1985) and Lukacs (1989) have argued, poor oral hygiene promotes dental caries, gingival inflammation, abscessing, periodontitis, caries-induced pulpitis, and tooth loss. This promotes poor nutrition via loss of appetite, reduction of masticatory efficiency, and ultimately less resistance to infection. Endogenous oral bacteria may disseminate to other regions of the body via an abscess that opens a door to the circulatory system and can produce soft tissue infections including lethal endocarditis.

Statistical Methods

One of the most important problems in bioarchaeology is the study of changing patterns of disease over time such that comparison of prevalence is very basic to this endeavor. Many past bioarchaeological studies have dealt with crude prevalence rates. Crude prevalence \( (P) \) of a given disease condition is simply calculated as:

\[
P = \frac{p}{q}
\]

where \( p \) is the number of individuals afflicted with a pathological condition and \( q \) is the population or sample size.

Estimations of crude prevalence rate are fraught with potential problems which can produce misleading or erroneous results. Consider Neves and Wesolowski (2002) study of oral health before and after the introduction of pottery (thought to be directly
linked to sedentary agriculture) in coastal Brazil. A Fisher’s Exact Test indicated some preceramic samples possessed higher prevalence of caries. Overall comparison demonstrated no statistically significant difference with ceramic-era skeletal samples. Either coastal Brazil experienced a very unusual set of biological outcomes with the adoption of agriculture, or pottery production was not associated with agricultural lifeways. Either possibility holds important implications.

Yet, these results require re-examination. The ceramic-era samples possess a much younger mean skeletal age-at-death. Compared to the preceramic samples, ceramic period individuals were not exposed to potential health risks for a similar amount of time. Even in absolute terms, they did not have an equal chance to accumulate the population’s full potential of oral pathological conditions (Sciulli 2006: personal communication). Age structures artificially deflate the crude prevalence rate of the ceramic period individuals. In almost any situation, a comparison of univariate rates is very difficult to justify, and can produce misleading and possibly erroneous findings. Since the expression and patterning of skeletal pathological conditions are intimately tied to age, a method that considers differences in sample age stratification and that can produce comparable rates between two populations is required.

Odds ratios, as described by Waldron (1994: 62-63) are ideally suited for this task. A basic risk ratio, which proportionally considers age-specific prevalence \((p_1 \ldots p_n)\) and respective sample size \((q_1 \ldots q_n)\) can be calculated as:

\[
\frac{p_1}{q_1} \quad \ldots \quad \frac{p_n}{q_n}
\]
This risk ratio becomes the basis of the odds ratio (OR) – a measure or prevalence which is an estimate of the risk associated with a particular exposure to a disease, or:

\[
\frac{p_1}{1-p_1} \div \frac{q_1}{1-q_1} \ldots \frac{p_n}{1-p_n} \div \frac{q_n}{1-q_n}
\]

The sum of the age-specific prevalence rates divided by the total sample size to give the common (or overall) odds ratio (\(\hat{\text{OR}}\)) which relates the age-specific prevalances in two populations as a single figure (Waldron 1994: 63; Clayton and Hills 1993). Odds ratios are probably the best method to compare prevalence of a pathological condition between two populations and the \(\hat{\text{OR}}\) statistic expresses that difference in manner that is readily understood (Waldron 1994: 70). The \(\hat{\text{OR}}\) statistic does come with a few disadvantages. There can be a loss of information where a high prevalence in a younger age class may be canceled out by a low prevalence in an older age class and the \(\hat{\text{OR}}\) approaches unity (Waldron 1994: 71). Therefore, it is appropriate to examine both age-specific odds ratios and the common odds ratio simultaneously. Odds ratios are also based on dichotomous present or absent character states and valuable information on the severity of a pathological condition must be analyzed in a different manner.

An odds ratio program was written in IML using SAS 9.1 to calculate age-specific OR values and the \(\hat{\text{OR}}\) for each pathological condition (Appendix B). The program also calculated the \(\chi^2\) value for the \(\hat{\text{OR}}\) and associated 95 percent confidence intervals. Odds ratios were not calculated in age classes 1 and 2 for periostitis and DJD where no individuals were affected by the condition. Zero values in those cells would strongly artificially deflate \(\hat{\text{OR}}\) values. Regarding interpretation, values equal to or greater than
1.01 represent a higher prevalence in the first population being compared, whereas those equal to or less than 0.99 correspond to a greater prevalence in the second sample. Regarding the latter, actual odds of greater prevalence are calculated by taking the inverse of the OR. Exact stasis would be represented by $\hat{OR} = 1.00$ and $\chi^2_1 = 0.00$.

On the other hand, the actual number of teeth affected by carious lesions, teeth lost antemortem, and abscesses are more informative as count data rather than categorical present or absent data, so a $G$-test was used to evaluate most oral health data. The $G$-statistic is a measure of independence or goodness-of-fit to test if frequencies of a given pathological condition are significantly different in one group versus another.

The $G$-statistic is ideal for the multiple small subsamples (< 50 individuals) generated here by the age class partitions. When observed minus expected values are greater than the expected values, low expected values are often calculated which can artificially increase the $\chi^2$ value (Sokal and Rohlf 1995; see Temple 2007 for bioarchaeological applications). The $G$-statistic considers this factor by utilizing the expected frequency as the denominator in the likelihood ratio that calculates the $\chi^2$ value. In this respect, the $G$-statistic can be considered a more conservative version of the $\chi^2$ test. It is also known as a maximum-likelihood $\chi^2$. A program written in IML using SAS 9.1 was used to calculate the $G$-statistic for this purpose (Appendix B).

The Relethford-Blangero Model: Mathematical Basis

One of the principle goals in anthropological genetics is assessment of microevolutionary forces acting in the distant past and the modern world. The structure of
a regional population results from the interplay of genetic drift, gene flow, mating
network configurations, mutation, and natural selection as experienced by its component
subpopulations. Accordingly, study of the genetic structure of relatively
contemporaneous populations can provide a quantitative window on of the contributions
of social, technological, and environmental factors on a population’s evolutionary
trajectories (Tatarek and Scuilli 2000:364).

Harpending and Ward (1982) developed a model-based approach that compares
how observed population genetic heterozygosity deviates from an expected pattern of
heterozygosity given various parameters. Use of an R, or relationship, matrix
characterizes the direction and magnitude of difference of total heterozygosity and
distance from the regional genetic mean. The model is based on the null hypothesis that if
all populations within a region exchange mates at equal rates, then relationship between
average-within group phenotypic variance and the distance to the regional centroid
should be linear (Harpending and Ward 1982: 217). Should observed data deviate from
these expectations, a population is either experiencing greater than average gene flow and
is more heterozygous or it has become more isolated and homozygous.

However, the Harpending-Ward model was developed for use only with allele
frequency data. Relethford and Blangero (1990) extended this model for use with
polygenic quantitative traits using an equal and additive effects model of inheritance
based on a phenotypic covariance matrix in lieu of known trait heritabilities or an
additive genetic covariance matrix. Using this approach, an R matrix between
populations i and j (r_{ij}) can be defined as:
\[ c_{ij} \frac{(1 - F_{ST})}{2h^2 v_p^2} \]

where \( c_{ij} \) is the product of the grand phenotypic variation mean subtracted from each subpopulation mean \([(x_i - x_m)(x_j - x_m)]\). \( F_{ST} \) represents the total genetic variation among all regional populations and is derived from the average weighted diagonal of the \( R \) matrix such that for \( g \) populations:

\[ F_{ST} = \sum_{i=1}^{g} w_i r_{ii} \]

Estimated trait heritability is represented by \( 2h^2 \) while \( v_p^2 \) is the phenotypic variance. Differential effects of drift are compensated for by substituting \( [r_{ij} g(w_i)^{1/2}(w_j)^{1/2}] \) for each element in the \( R \) matrix for \( g \) populations and \( w \) the relative weight of each population.

Because sample or population size is likely to bias results, the quantity \( 1/2n \) is subtracted from each element where \( n \) is the population size. The resultant unbiased \( R \) matrix can be converted into estimates of genetic distance between populations \( i \) and \( j \) where \( d_{ij}^2 = [r_{ii} + r_{jj} - 2r_{ij}] \) (Harpending and Jenkins 1973). These distances represent minimum distance from the regional centroid (Williams-Blangero and Blangero 1989).

The multivariate equation for calculating within-group heterogeneity (Relethford and Blangero 1990) is a function of the pooled within-group phenotypic variance \( (v_w) \), the distance of subpopulation \( i \) to the regional genetic centroid \( (r_{ii}) \) and the average distance to that centroid across all regional subpopulations, or:

\[ E(v_i) = v_w(1 - r_{ii})/1 - F_{ST} \]

The difference between expected genetic variance, or \( E (\Lambda_i ) \), and the observed genetic variance, \((\Lambda_i - E [\Lambda_i ]\), are termed residuals. Positive residuals signify greater than
average gene flow with an external source while negative values represent less than average external gene flow.

$F_{ST}$, originally developed by several decades ago by Wright in his infinite islands model, was used to estimate how long two divergent populations had been evolving from a common ancestor. In this context, $F_{ST}$ is a measure of genetic heterogeneity or microdifferentiation (Blangero 1990). Values can range between 1 (no contact between populations and variation is maximized such that allele frequencies are fixed) and 0 (gene frequencies between populations are identical and there is no between-group variability). Since these are phenotypically-derived $F_{ST}$ estimations, they represent the minimum possible $F_{ST}$ and is therefore a conservative estimate.

The requirements and limitations of the Relethford-Blangero model are stringent. Traits must be selectively neutral, which is a reasonable assumption concerning teeth. Since genetic variances are required and are often unavailable for archaeological populations, translation of phenotypic variance data into this role assumes identical trait heritability which is probably not far from reality given small study areas (Relethford and Blangero 1990:11).

Perhaps most importantly, bioarchaeological use of the Relethford-Blangero model must satisfy four critical criteria (Stojanowski 2007: personal communication). First, they must be relatively contemporaneous and reasonably capable of exchanging genes. However, how to define “relatively contemporaneous” in archaeological settings is debatable. Does membership within a defined archaeological culture meet this criterion? Should “contemporaneous” be measured in terms of two, three, or seven generations, or
is “contemporaneous” best defined within the brackets of a chronometric date? Second, the populations should be considered part of a regional mating network. Third, skeletal samples must be of similar temporal duration, and fourth, must originate from cemeteries sharing similar use histories and population representation. Ultimately, the first two conditions set theoretical limits, while the last two normalize statistical estimates of population variance.

Metric data gathering was modeled after Jacobi’s (2000) methods which involve meticulous and clear description of measurement techniques, and are based on the foundational works by Frayer (1978), Goose (1963), Kieser (1990), and Moorrees (1957). Metric data were gathered from each observable tooth via two passes to minimize effects of intraobserver error. If values were within 0.20 mm, they were averaged, and if not, a third measurement was made. During the 2002-2004 field seasons, teeth were measured using a Mitutoyo digital sliding caliper with sharpened tips calibrated to 0.01 mm. In 2005 and 2006, a digital Hillson-FitzGerald dental anthropology caliper manufactured by PaleoTech with sharpened tips calibrated to 0.01 mm was utilized.

Maximum mesiodistal and buccolinguial tooth crown dimensions were recorded for maxillary and mandibular dental arcades (Table 8.4). Teeth from the left side of the dental arcade were used in this analysis since they are highly correlated to tooth dimensions from right side; if a left tooth was missing, measurements from its antemere were used in its place. The mesiodistal dimension represents the maximum length of a tooth crown, and is made parallel to the occlusal plane. This measurement is taken at the midpoint of tooth’s contact facets, always keeping the calipers parallel to the mesio-distal
Table 8.4. Abbreviations used for the sixteen dental metric variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper first molar mesiodistal</td>
<td>UM1MD</td>
</tr>
<tr>
<td>Upper first molar buccolingual</td>
<td>UM1BL</td>
</tr>
<tr>
<td>Upper third premolar mesiodistal</td>
<td>UP3MD</td>
</tr>
<tr>
<td>Upper third premolar buccolingual</td>
<td>UP3BL</td>
</tr>
<tr>
<td>Upper canine mesiodistal</td>
<td>UCMD</td>
</tr>
<tr>
<td>Upper canine buccolingual</td>
<td>UCBL</td>
</tr>
<tr>
<td>Upper first incisor mesiodistal</td>
<td>UI1MD</td>
</tr>
<tr>
<td>Upper first incisor buccolingual</td>
<td>UI1BL</td>
</tr>
<tr>
<td>Lower first molar mesiodistal</td>
<td>LM1MD</td>
</tr>
<tr>
<td>Lower first molar buccolingual</td>
<td>LM1BL</td>
</tr>
<tr>
<td>Lower third premolar mesiodistal</td>
<td>LP3MD</td>
</tr>
<tr>
<td>Lower third premolar buccolingual</td>
<td>LP3BL</td>
</tr>
<tr>
<td>Lower canine mesiodistal</td>
<td>LCMD</td>
</tr>
<tr>
<td>Lower canine buccolingual</td>
<td>LCBL</td>
</tr>
<tr>
<td>Lower first incisor mesiodistal</td>
<td>LI1MD</td>
</tr>
<tr>
<td>Lower first incisor buccolingual</td>
<td>LI1BL</td>
</tr>
</tbody>
</table>

occlusion is used (Goose 1963; Jacobi 2000: 95). The buccolingual dimension is the line of the tooth. In rare instances involving tooth rotation or abnormal interproximal wear, facet-to-facet measurement can be erroneous. Measurement would then be made from the buccal side to provide the maximum length or an approximation of ‘normal’ maximum width of a tooth crown between its buccal and lingual surfaces. This measurement is perpendicular to mesiodistal plane. In particular, measurements were recorded on maxillary molars between the two anterior cusps (paracone-protocone) as they are the most genetically stable (Jacobi 2000). Mandibular molars were measured from the most mesial portion of the two distal cusps (hypoconid-entoconid) which tend towards greatest genetically stability and maximum diameter.
Pre-analysis data preparation involved assessment of interobserver error and age correlations with tooth sizes. First, the degree of interobserver error was assessed using programs written in SAS 9.1 (SAS Institute, Inc. 2003) using a one-way ANOVA to compare the variance of the averaged first and second polar tooth size measurements to expected values generated by the statistical model. A sample was generated of 824 measurements from adult maxillary polar teeth and 1,152 measurements of subadult maxillary polar teeth.

Second, an analysis of age correlations was carried out between each individual’s tooth measurements and their summary age value Using SAS 9.1 software. If tooth size is correlated to negatively age, then it stands to reason dental wear has affected the mean tooth size whereas positive correlations to age probably stem from calculus buildup, subadult mortality bias, or truncated selection (Stojanowski and Schillaci 2006). Tooth size becomes a function of age rather than genotype. Accordingly, measurements with correlation coefficients significantly different than zero would be omitted from the analysis. Third, missing values were estimated using an Expectation-Maximization (EM) algorithm using a program written in R. The EM algorithm finds the maximum likelihood estimate for missing data using a parametric model (Little and Rubin 1987). In the first step (expectation), the conditional expectation of the complete data log likelihood is calculated. The second step (maximization) finds the parameter estimates to maximize the complete-data log likelihood of step one. The two steps are iterated until
convergence. The EM algorithm also provides an unbiased estimate that does not affect levels of between-group variance (Nystrom 2006).

Population history was then examined using standard population genetic and variance comparison methods using the R matrix (Relethford and Blangero 1990) using a series of programs written in IML in SAS 9.1. The first step involved minimizing the effects of sexual dimorphism. Each measure was standardized separately for sex. Individuals were then assigned to their original subpopulation with the measures for each individual representing a deviation from the sex-specific population mean.

From these data, a $g \times m$ matrix of subpopulation means ($X$), $m \times m$ sample covariance matrices ($P_i$), and the pooled within-population covariance matrix ($P_w$) were generated where $m$ = the number of measures and $g$ = the number of samples.

The matrix of subpopulation means was used to construct a deviation matrix ($\Delta$) which represents the deviation of each subpopulation from the regional centroid, or:

$$\Delta = (I - 1W') X$$

where $I$ is an identity matrix, $1$ is a vector of ones, and $W$ is a vector of relative population sizes. Since late pre-Hispanic population size is unknown and Colonial census data probably is incomplete at best, the conservative route was chosen and subpopulation sizes were converted into percentages and weighted equally.

The deviation matrix was then used as the basis of a codivergence matrix:

$$C = \Delta P_w^{-1} \Delta'$$

where is the $P_w^{-1}$ is the inverse of the pooled within-population covariance matrix. This matrix serves in the role of the pooled within-population additive genetic covariance
matrix (G_i) since there is no information on actual genetic variances within these subpopulations. This substitution is contingent upon the assumption that phenotypic variation is due solely to genetic variation. Heritability was set at 0.55, which is considered appropriate for anthropometric variables and is supported by individual, twin, and family studies of dental dimensions (see Stojanowski 2005b for review). Also, Relethford and Blangero (1990:16-18) tested a wide range of heritabilities from 1.0 to 0.25 and very little difference in predicted mean phenotypic variance was found; the R matrix is relatively robust such that average h^2 estimation does not have to be particularly accurate. One can make a very reasonable argument that h^2 may have been quite low (perhaps around 0.25) during the postcontact period due to chronically increased stress levels and selection that probably accompanied that stress.

The codivergence matrix also provides a summary measure of the variation between subpopulations and the overall genetic heterogeneity, or the minimum F_ST:

\[ F_{ST} = \sum w_i c_{ii} / (2m + \sum w_i c_{ii}) \]

and given the minimum F_ST (r_o), the R matrix can be constructed as:

\[ R = C (1 - r_o) / 2m \]

To eliminate any effects of sampling bias, 1/2N_i is subtracted from the diagonal elements of the R matrix where N_i is the size of the i-th subpopulation. The result is a scaled, bias-corrected R matrix, or:

\[ R^* = R - \text{Diag} (1/2N_i) \]

The bias-corrected minimum F_ST is also recalculated as:

\[ F_{ST}^* = r^*_o = \sum =r_{ii} / g \]
Minimum genetic distances from the population centroid are then derived from

\[ d^2 = (R^* \otimes I) J + (J(R^* \otimes I)) - (2R^*) \]

where \( J \) is a matrix of ones, and \( \otimes \) is the Hadamard product.

Again, since genetic covariance matrices are unavailable, the estimates of relative gene flow were based upon the phenotypic covariance matrices and the phenotypic distances. The observed average variance of subpopulation \( \Lambda_i \) is a function of the trace of the subpopulation covariance matrix. Expected average variance, \( E(\Lambda_i) \) is generated from the average trace of the population pooled covariance matrix \( \Lambda_w \), the subpopulation’s distance to the centroid, and the average distance to the centroid for the population:

\[ E (\Lambda_i) = \Lambda_w (1 - r^*_{ii}) / (1 - r^*_{io}) \]

These series of steps were followed to calculate minimum genetic distances, \( F_{ST} \) values, and Relethford-Blangero residuals for the late pre-Hispanic and Colonial Lambayeque Valley Complex samples separately.

**Interindivudal Kinship Analysis**

Tooth size measurements and non-metric dental traits were used in concert in this study of kinship relations. Mesiodistal and buccolingual measurements from the left maxillary mandibular polar teeth were collected from adults and subadults. Non-metric traits were scored using Turner et al.’s (1991) standardized Arizona State University Dental Anthropology Scoring System using plaster reference plaques. These traits are listed below Table 8.5. Because no formal method has been developed for data collection
of non-metric traits for the subadult dentition, scoring systems of Turner et al. (1991) and Sciulli (1998) were adapted for use with subadult teeth (Table 8.6). Incisor germination (twinning) and LP1 cusp number were added. As the subadult second premolar is morphologically molariform, the character traits for the adult UM1 and LM1 were extended here for use with the UP2 and LP2. All elements of kinship analysis were calculated using SPSS 15.0 (SPSS 2006).

To incorporate continuous and ordinal data into a single dataset and eliminate any bias caused by sexual dimorphism, two actions were performed. First, raw data were

<table>
<thead>
<tr>
<th>Maxillary Teeth</th>
<th>Mandibular Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD and BL measurements (mm) UI1*, UC*, UM1*</td>
<td>MD and BL measurements (mm) LI1*, LC*, LP3*, LM1*</td>
</tr>
<tr>
<td>Labial Convexity, UI1*, UI2</td>
<td>Shoveling, LI1*, LI2, LC*</td>
</tr>
<tr>
<td>Shoveling, UI1*, UI2, UC*</td>
<td>Cusp number, LM1*-LM3</td>
</tr>
<tr>
<td>Double Shoveling, UI1, UI2, UC*</td>
<td>Anterior Fovea, LM1</td>
</tr>
<tr>
<td>Tuberculum Dentale, UI1*, UI2, UC*</td>
<td>Groove Pattern, LM1-LM3</td>
</tr>
<tr>
<td>Canine Mesial Ridge*</td>
<td>Distal Trigonid Crest, LM1-LM3</td>
</tr>
<tr>
<td>Canine Distal Accessory Ridge*</td>
<td>Reflecting Wrinkle, LM1</td>
</tr>
<tr>
<td>Metacone (Cusp 3), UM1*, UM2, UM3</td>
<td>Protostylid, LM1*, LM2, LM3</td>
</tr>
<tr>
<td>Hypocone (Cusp 4), UM1*, UM2, UM3</td>
<td>Hypoconulid (Cusp 5), LM1*, LM2, LM3</td>
</tr>
<tr>
<td>Metaconule (Cusp 5), UM1*, UM2, UM3</td>
<td>Entoconulid (Cusp 6), LM1*, LM2, LM3</td>
</tr>
<tr>
<td>Carabelli’s Trait, UM1*,UM2, UM3</td>
<td>Metaconulid (Cusp 7), LM1*, LM2, LM3</td>
</tr>
<tr>
<td>Parastyle, UM1*, UM2, UM3</td>
<td>Enamel extensions or pearling LP3, LP4, LM1, LM2, LM3</td>
</tr>
<tr>
<td>Enamel extensions or pearling UP3, UP4, UM1, UM2, UM3</td>
<td>Peg shaped incisor or molar</td>
</tr>
<tr>
<td>Peg shaped incisor or molar</td>
<td>Odontome, all premolars</td>
</tr>
</tbody>
</table>

* Used in analysis

Table 8.5: Metric and non-metric traits used in kinship analysis among adults from the Chapel of San Pedro de Mórrrope.
Table 8.6: Metric and non-metric traits used in kinship analysis among subadults from the Chapel of San Pedro de Mórrope.

<table>
<thead>
<tr>
<th>Maxillary Teeth</th>
<th>Mandibular Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD and BL measurements (mm) DUI1*, DUC*, UP1*, UP2*, Incisor gemination, DUI1-DUI2*</td>
<td>MD and BL measurements (mm) DLI1*, DLC*, LP1*, LP2*, Incisor gemination, DLI1-DLI2*</td>
</tr>
<tr>
<td>Shoveling, DUI1*, DUI2, DUC*</td>
<td>Shoveling, LDI1*, LDI2, LDC*</td>
</tr>
<tr>
<td>Double Shoveling, DUI1*, DUI2, DUC</td>
<td></td>
</tr>
<tr>
<td>Tuberculum Dentale, DUI1*, DUI2, DUC*</td>
<td></td>
</tr>
<tr>
<td>Deciduous Canine Mesial Ridge*</td>
<td></td>
</tr>
<tr>
<td>Deciduous Canine Distal Accessory Ridge*</td>
<td></td>
</tr>
<tr>
<td>Metacone (Cusp 3), P2*</td>
<td></td>
</tr>
<tr>
<td>Hypocone (Cusp 4), P2*</td>
<td></td>
</tr>
<tr>
<td>Metaconule (Cusp 5), P2*</td>
<td></td>
</tr>
<tr>
<td>Carabelli’s Trait, P2</td>
<td></td>
</tr>
<tr>
<td>Parastyle, P2*</td>
<td></td>
</tr>
</tbody>
</table>

* prefix D = deciduous tooth
* Used in analysis

The z-transformation creates a standard measure of the distance of the score from the mean. Next, shape and size bias produced by sexual dimorphism would cause the larger teeth of males clustering with other males and the smaller teeth of females clustering together to effectively obscure biological patterns. Corruccini and Shimada (2002) used a shape vector to equalize robusticity (each individual’s normalized scores divided through by the geometric mean) due to the non-normal distribution of their sample (more females than males). However, a one-sample Kolmogrov-Smirnov analysis indicated a normally distributed data set such that use of c-transformation is sufficient; independent analysis of shape vectors and c-scores also generate comparable results. C-scores are normalization by row and column, based on Howells (1989). The data matrix is rotated 90 degrees as...
cases and variables are transposed. A z-score for the original z-score is made, creating a c-score.

Euclidian distance coefficients (d) were calculated for between each individual’s c-scores. This is a nonparametric multivariate approach to pattern recognition appropriate for mixed multi-state and ordinal data and Bonferroni type I redundancy error is minimized (Corruccini and Shimada 2002:117). It is also a straightforward technique to determine distances in multi-dimensional hyperspace.

In Euclidian $n$-space, the distance between points $P (p_1, p_2, \ldots p_n)$ and $Q (q_1, q_2, \ldots q_n)$ is determined by the square root of the measures’ average squared distance, or:

$$\sqrt{\sum_{i=1}^{n}(p_i - q_i)^2}$$

The d values calculated from c-scores can be though of as the square root of the average square difference, a kind of average amount of standard deviation units by which two individuals differ. These linear measures of dental phenotypic distance should therefore reflect to a great degree genetic distance, but are not necessarily directly proportional to the genotype. However, these measures are directly proportional to the square root of the generalized phenotypic distance, and to the degree to which the latter reflects genetic distance and variance/covariance, such that linear distance should be directly proportional to the square roots thereof (Corruccini and Shimada 2002: 117).

Multivariate hierarchical cluster analyses were used to graphically represent the interindividual distances within the c-score matrix. Tree clustering methods use dissimilarities or distances between cases to form clusters. Two agglomerative techniques were used: average linkage and furthest neighbor. Other clustering methods, like
centroid, median, and Ward’s Method were not employed, as they are appropriate only for $D^2$ measures. Average linkage and furthest neighbor tend to produce very well-defined and naturally distinct clusters, lack chaining, and past work has shown they corresponded to archaeological contexts (Klaus et al. 2004a). The linkage function specifies the distance between two clusters computed as the average distance between objects from the first cluster and objects from the second cluster. The averaging is performed over all pairs $(x, y)$ of objects, where $x$ is an object from the first cluster, and $y$ is an object from the second cluster. Two groups will merge if the average distance between $x$ and $y$ is small enough. The furthest neighbor approach resolves the greatest distance between any two cases in different clusters to determine distances between clusters. Average linkage results appear to be the most parsimonious and easily interpreted. Concordantly, they are emphasized in the results and discussion.

**CONCLUSION**

In this chapter, six linked hypotheses have been proposed regarding ritual syncretism, increased morbidity, and genetic transformation in Colonial Mórrope, Peru. The materials used to test these hypotheses were reviewed including the nature of the site of the Chapel of San Pedro de Mórrope and the pre-Hispanic skeletal samples that compose the comparative bioarchaeological samples. Methods were reviewed in detail, ranging from mortuary archaeology to the multiple conceptual and statistical means by which inferences on systemic biological stress, activity patterns, and diet can be gleaned.
from human skeletal remains. Methods of population genetic variance and kinship studies concluded the chapter. Over the next two chapters, the results of these analyses are described beginning with archaeological and mortuary patterning.
CHAPTER 9

RESULTS I: ARCHAEOLOGY AND MORTUARY PATTERNS AT THE
CHAPEL OF SAN PEDRO DE MÓRROPE

The findings of this dissertation are presented over the next two chapters. Hypotheses I is tested in this chapter by data derived from the archaeological excavation at the Chapel of San Pedro de Mórrope. Observations on the internal and external architecture, construction phases, and human activities of the site are first discussed. A central focus of this effort involves an understanding of site stratigraphy and cultural chronology upon which arguments about burial and skeletal biological patterning are built on. Then, the mortuary patterns of the Chapel of San Pedro de Mórrope are discussed and a brief overview of the findings in each excavation unit is presented. Next, colonial mortuary material culture is examined, and is followed by the results of the seriation of mortuary variables are presented, which allow for the partitioning of the mortuary sample into Early/Middle and Middle/Late Colonial phases. Evidence of living-dead interactions is examined, and in its totality, is used to construct a taphonomic model of mortuary ritual from Mórrope.
While the exterior of the Chapel of San Pedro de Mórrope is clearly a European *ramada* in style, it is upon opening the door of the Chapel that the Western world dissolves away. *National Geographic* writer Michael E. Long (1990: 40) described the white plastered floor, walls, and sinuous roof supports of the Chapel as “Looking like the bones of a fossilized beast, a stark colonial church …in the town of Mórrope preserves aspects of pre-Hispanic architecture.” The roof employs the traditional *horcón* post-and-beam construction style which appears as far back as first millennium Moche art (Figure 9.1) and continued to be used in rural and traditional settings in the Lambayeque region through the modern era.

Archaeological study showed each roof support element had been covered in multiple layers of plaster. During the initial phases of restoration by ICAM, the plaster was removed to reveal hewn *algarrobo* trunks as the principle structural element of the robust Y-shaped *horcón* posts and cross-beams. Five pairs of large *horcone* posts varying from 30 to 40 cm in diameter were placed equidistant from the center axis of the church which supported two parallel sets of multiple lateral beams some 20 to 30 cm in diameter. Similarly large crossbeams connected the lateral beam sets which in turn supported central longitudinal beams supporting the apex of the low-angled pitched roof (Figure 9.2). Secondary load bearing was assumed by 184 smaller, interlocking crossbeams.
averaging 12 cm in diameter, arranged in sets of four that spanned the full width of the roof.

The support system holding up the roof of the sacristy (a section of the Chapel that was before restoration completely walled off from the nave) featured a different design and construction style inferred as more modern in style. The roof is one line of evidence suggestive that it represented a later addition to the Chapel. Excavation around the base of two horcónes (N° 4 and 10) in the nave by Fernández (2003) reveals each were sunk within a subfloor columnar box not unlike those documented atop the Middle Sicán mound of Huaca Rodillona at the Sicán Precinct (Shimada 1995).
Figure 9.2: Roof support and horcón configurations. Redrawn by Haagen Klaus from original renderings by Jorge Cosmopolis.
Perhaps the most striking element of the Chapel of San Pedro de Mórrope is the altar, which appears to be unique in all of Christendom (Figure 9.3). Unlike standard altar designs that involve a pedestal base and large flat table facing to the west, the north-facing altar takes the form of a 3.5 meter tall, three-dimensional stepped pyramid that abutted the south wall of the chancel and has no recognizable base or table.

The two-dimensional stepped pyramid is a secondary icon appearing as a decorative element used by Salinar artisans in the first millennium B.C. (judging from
looted vessels on display at the Museo Larco Hoyle in Lima). However, by the Moche period and into the Middle Sicán era and beyond, the stepped pyramid appears to have been formalized as a common secondary icon, probably representing an abstracted *huaca*, mountain, or both simultaneously (*sensu* Bawden 1996: 70-72). The stepped pyramid thus embodies supernatural supremacy associated with the powerful mountain deities and forces, human agency and authority, and the interplay therein.

The altar of the Chapel of San Pedro de Mórrope was likewise encased in multiple layers (perhaps a few centuries worth) of plaster coating. During the initial restoration phases conducted by ICAM, the plaster was stripped and the altar was revealed to have been made of columns of vertically stacked adobe bricks bound my mud mortar. However, most of the base of the altar was actually hollow, its roof rising approximately 35 cm off of the floor. The roof supported by small *algarrobo* beams. Access to this clean and empty chamber, which emitted an acrid moldy odor identical to the more recent intrusive human burials, was accomplished by two small square openings that communicated in its rear east and west sides. The purpose of this chamber remains unknown.

**SITE FORMATION AND CHURCH CONSTRUCTION PHASES**

During the initial phases of the restoration at the Chapel of San Pedro, it was assumed the standing, extant architecture had changed very little if at all since the Chapel’s sixteenth century founding. A corollary working hypothesis at that time held the
Capilla de San Pedro de Mórrope was founded atop a pre-Hispanic structure, with an imposed Hispanic town layout built around it. As with the Iglesia de la Virgen de Soccoro at Huanchaco (outside Trujillo) which was ostensibly constructed atop a *huaca* that was partially leveled in the process, the Spanish commonly made a strong symbolic and secular statement by placing Churches atop symbols of pre-Hispanic authority and cosmology. In addition to testing the hypothesis of religious syncretism, archaeological study aimed to clarify if the Chapel in Mórrope was founded under similar circumstances.

*Site Stratigraphy*

The Chapel of San Pedro de Mórrope involved a relatively straightforward stratigraphic record. The south profile of Unit 3 is shown in Figure 9.4 as a representative illustration. At the lowest levels of each unit, between 2.5 and 3.0 meters below datum (hereafter BD), sterile, windblown Aeolian sand was universally encountered. The Chapel of San Pedro de Mórrope was constructed not atop a *huaca* but a large stabilized sand dune, probably leveled to some degree before construction could have been initiated. This finding demonstrates no earlier occupation, and is consistent with ethnohistoric portrayals of Mórrope as an early and informal colonial *reduccion*. The working hypothesis mentioned earlier was rejected.

Above the sterile soil was found 2.0-2.5 meters of a contiguous, extensively disturbed stratum that contained all of the burials. So heavily disturbed was this layer, designated the “burial zone,” that only the most recent and intrusive burial pits could be identified (see profile illustrations and photographs in Appendix C). The burial zone layer
was relatively free of cultural inclusions beyond funerary contexts. Inclusion of minimal debris, including relatively small fragments of plaster and adobe and charcoal was however common.

The burial zone was capped by a relatively intact compact earthen floor (Floor A) throughout the entire nave. Given the more than 1,000 burials probably deposited at the Chapel over 200-plus years it was in use, it is unlikely Floor A represents the original floor of the Chapel as first thought by Fernández (2003). The mostly intact unbroken nature of Floor A indicates it was probably laid down after most of the mortuary activity subsided in the early to mid-eighteenth century. Above the earthen floor, a single course of well-worn adobe bricks rested upon a sandy fill (Floor B). The adobe platform was
placed along the center of building which extended from the Chapel’s entrance to the foot of the altar in the space between the horcónes.

The adobe layer was capped by a plaster floor in a somewhat poor state of preservation (Floor C). Based on the accounts of local townspeople, Floor C corresponds to the plaster floor laid down in 1989 during repairs of the 1983 El Niño flood damage. Above this layer, a thin deposit of fine sand was present underneath the last plaster floor (Floor D) that was placed in 1998 following further El Niño flooding damage.

**Building and Remodeling Phases**

The adobe brick structure identified in modern consciousness as the original or fully authentic colonial *ramada* or *guyaron* does not appear to be accurate. At least four distinct building phases, designated Phase A Building 1, Phase B Building 2, Phase C Building 2, and Phase D Building 3 were identified, with D being the most recent. Evidence of Phase A is indirect but points to a far more modest structure that was built and represents the building first erected at Mórrope.

Unit 3 WX and Unit 10 were placed especially to examine architectural features including walls and foundations. Beneath the most basal course of original adobe bricks identified as the foundation of the modern Chapel, massive, roughly hewn, compact masses of light gray clay were observed, some being in excess of 75 cm in height. These compact clay masses appeared far more weathered than the oldest adobe bricks, and in some cases, extended into the excavation unit beyond the footprint of the adobe courses (Figure 9.5). The imprints of at least three distinct 15 cm-wide post holes dug into the
compact clay masses were documented in the north and east profiles of Unit 10. Found in direct association with the compact clay masses and nowhere else in the Chapel were fragments of cane-impressed clay, or *quincha*. Wattle-and-daub *quincha* served as a primary pre-Hispanic building material for residences and other structures (such as found nearby at Middle Sicán-period Huaca Sialupe), and continues to be used today in many rural dwellings. Phase A Building 1 probably was a far more modest and tenuous structure that probably occupied the same footprint as the modern Chapel (*sans* sacristy, which was added later). However, its walls were fabricated from *quincha* and the roof was supported at least in part by small-diameter posts set into the foundation’s inner perimeter. A major transformation of the Chapel followed with Phase B Building 2. The *quincha* walls were torn down and high adobe brick walls were set in their place. The

![Figure 9.5: East profile of Unit 10, Chapel of San Pedro de Mórrope. Drawing by Haagen Klaus, based on original field drawings by Davis Aguilar and Anita Alva.](image)

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chronology of Phase B is unclear, but it is possible to speculate *quincha*-walled structure of Building 1 is that referred to by Modesto Rubiños’ (1782 [1932]) comments on events in 1536, as he clearly states an ecclesiastical presence was present in Mórrope in the form of a *guayrona*. However, it is in 1548 that the Chapel was officially named and was referred to as if it were a completely different church. It is not unreasonable to assume the construction of the adobe Chapel as documented in Phase B could correspond to a complete renovation concluded in 1548.

Excavations in the atrium (Unit 11) just north of the entrance to the Chapel of San Pedro documented a large, wedge-shaped compact earthen ramp superimposed by a probable eighteenth or nineteenth century red brick platform and modern concrete platform, respectively. Corresponding by stratigraphic position to either Building 1 or 2, the ramp was perhaps in excess of 2.0-2.5 meters wide, and considering its low gradient, may have extended as much as 10 meters from the front door of the Chapel (Appendix C Figure 7). The ramp itself had been disturbed and was best seen as a distinct outline in both the east and west profiles of Unit 11. In terms of design and approach to construction, it was indistinguishable from several pre-Hispanic examples that provided access to *huacas*, shrines, or places of authority, and closely resembled a similar feature documented at the Huaca Sialupe Mound I in 2001.

The placement and antiquity of the *horcón* posts may date to Phase B Building 2, but it is unclear if they were associated with Phase A Building 1 as well; such massive objects are not casually manipulated. However, some movement and repositioning of at least two *horcónes* transpired between Phase B and Phase C Building 2. Two empty
subfloor columnar sockets in alignment with the extant north-south line of *horcónes* were identified in Units 3 and 4. U3 Feature 03-1 consisted of a large, square adobe, compact clay, and mortar mass with an empty central post hole that once held a *horcón* (Appendix C Figure 8). While not as well preserved and located in the north profile of Unit 4, Feature U403-F1 was likewise another empty subfloor columnar box (Appendix C Figure 1). Motivations behind the repositioning of *horcónes* may have related to an expansion of the building or other kind of remodeling process that is not fully clear.

Phase C also involved alterations to the roof of Building 2 and the construction of a red brick archway above the inner doorway (Appendix C Figure 9). The use of red brick (indicating an eighteenth or nineteenth century date) in the interior archway corresponds to limited use of red bricks used as shims between *horcónes* and cross beams against the thatched roof that collapsed in the mid-1990s. While there is very little stratigraphic evidence attesting to the construction of the sacristy, the single contiguous roof corresponding to Phase C that covered the nave of Building 2 covered the sacristy.

Phase D Building 3 relates to the early twenty-first century restoration of the Chapel of San Pedro de Mórrope. The east, west, and south walls were torn down by ICAM in 2003 and rebuilt using modern adobe bricks. The north wall was refinished and restored. All wood elements were stripped of plaster, fumigated with Bora-Care, and where necessary, consolidated using Liquid Wood. As part of this process, all roof elements save horcónes and lateral cross beams were temporality removed for restoration.

A few other observations around the chapel signify remodeling events but are hard to assign to a building phase. In Unit 5 and 6, the adobe brick foundations of at three
above-ground crypts were located. Feature U505-F2 even had the base boards of an adult-sized coffin still in place on the crypt floor. A few elderly Morropanos shared memories of the Chapel including above-ground crypts once located along the walls and in between the horcónes. These crypts were reportedly demolished in the early twentieth century.

Material Culture Remains

Unlike the colonial chapel of Magdalena de Cao in the Chicama valley currently being studied by Quilter (n.d.) and colleagues, the Chapel of San Pedro de Mórrope did not feature extensive deposits of material cultural remains. In fact, the chapel in Mórrope is starkly clean in comparison. Most material culture remains probably emanated from disturbed burials (see Appendix D). The most common class debris in the matrix was remains of copper tacks that once adorned coffins. Small sherds of ceramics vessels were also found. Some fragments were unambiguously colonial –decorated with glazes and other European conventions. A few sherds originated from domestic thick walled tinajas or porrones. Only a few sherds bore pre-Hispanic decorative motifs. Considering the persistence of local ceramic production styles on the north coast into the seventeenth century (Rowe 1948), it is improbable these sheds are pre-Hispanic.

Clothing buttons, drilled shell or stone beads, and textile fragments were also not uncommon. Fragments of flat glass, iron nails, candles, melted candle wax, wooden decorative elements that would could have adorned pews or the altar, and even two clay marbles were recovered. Several coins were also recovered. Some were very irregularly
shaped and traces of decoration link them to Early Colonial currency (Dargent 2000). On other coins, the coinage date was legible and temporally late: 1776 and 1880, for instance.

Surprisingly, some food remains were recovered in the upper stratigraphic layers and included small quantities of fruit seeds and pits, shells of *Donax sp.*, and even various bones of unidentified domesticates (possibly goats or pigs). These remains may have been introduced into the Chapel as refuse following its eighteenth century abandonment and decay.

One feature (U505-F3) appears to have been an offering: a large ceramic sherd consisting of the upper body, neck, and rim of what was originally a large tinaja that was placed by the northeast corner of the altar. It contained over 50 pieces of charcoal, all probably carbonized wood. Since the sherd bore no trace of *in situ* burning or ash deposits, the charcoal was probably already burned before deposition. The very shallow stratigraphic position of this apparent offering point to its placement after the Chapel was abandoned in the eighteenth century.

Several chunks of metalworking debris – slag – were found in various, isolated locations in the matrix of the Chapel. Considering the use of copper items in colonial funerary rituals (decorative elements of coffins) and the production debris from metal smelting, local production of copper seemingly continued. The large size of the slag however dwarf pre-Hispanic slag, and indicate European smelting technologies may have replaced indigenous production styles (Shimada 2005: personal communication). Exactly how and why slag came to be deposited in the Chapel is an enigma.
Burial excavations at the Chapel of San Pedro de Mórrope commenced in late June 2005 with a team of ten undergraduate and graduate students from the Universidad Nacional Trujillo and The Ohio State University aided by five local workers including former members of the Sicán Archaeological Project. By the second week of September 2005, 322 funerary contexts corresponding to the remains of at least 867 individuals were documented and recovered. Burials were designated by unit number, year of excavation, and order in which they were identified. For instance, Burial U10 05-27 represents the twenty-seventh interment uncovered in Unit 10 in 2005. To avoid confusion, burials assigned simple consecutive numbers in Units 2, 3, 4, and 6 by Fernández (2003) were recoded using this system but burial number was unchanged (U3 03-11 is followed by U4 03-12, and so on).

A relatively representational burial displaying many of the common features of the Chapel of San Pedro de Mórrope mortuary pattern grammar can be observed in Burial U3 03-4, an older adult male who appears to date to the Middle-Late Colonial Period (Figure 9.6). Preservation of Burial U3 03-4 was excellent. Fingernails, head, facial, and body hair was present (including eyebrows, pubic, and leg hair). This old adult male was placed in extended position within a simple wooden coffin in the shape of an elongated trapezoid. The coffin was interred on a roughly north-south axis with the head to the north such that the deceased was facing the altar. While some minor variations in hand,
Figure 9.6: Burial U3 03-4. Drawing by Haagen Klaus.
arm, and feet positioning were observed throughout the site, the arms and hands of U3 03-4 were positioned at the side of the body. The legs were fully extended.

Varying degrees of disarticulation were observed in the skeleton of U3 03-4. The head had rolled some 75 degrees towards the right shoulder. Hand and foot bones were fully disarticulated, while the left ulna, a few carpal bones, and the first metacarpal had rolled out of anatomical position into the pelvic cavity. The vertebral column was slightly jumbled and the rib cage was completely collapsed and flattened. These observations indicate that while many of the Mórope burials were disarticulated, the movement of skeletal elements is fully consistent with graviturbation (Lyman 1994), and the body decomposed within the open space of the coffin interior (Roskandik et al. 2003).

Textiles were present in varying degrees of preservation. A large mass of poorly preserved (virtually powdered) material – likely the remains of a pillow – was found beneath and to the left of the head. The base of the coffin interior was covered by a cloth sheet indistinguishable from textiles of the local pre-Hispanic era. Fragments of a long orange ribbon (probably manufactured from silk or similar material) were found beneath the pelvis and along the left femur. Though no remains of flowers were found inside the coffin of U3 03-4, identical ribbon material was used to tie small bouquets placed with the body in multiple burial contexts. No grave goods were present. However, he was buried wearing European-style dress, evidenced by the three white glass buttons found on the upper body and the nearly disintegrated soles of leather shoes.

Still, U3 03-4 is only one burial, the physical remains of only one funeral. Multiple modes and styles of burials were encountered in Mórope, ranging from primary
burials, altered primary burials, prolonged primary burials, and secondary burials aligned to a variety of cardinal axes and disposed of either in cotton shrouds or wooden coffins. The Chapel of San Pedro de Mórrope featured a physically and temporally stratified mortuary sample, with interments placed throughout a burial stratum varying between 117-170 cm deep consisting of highly disturbed darkened sand. Sterile sand was encountered at relatively uniform depths throughout the chapel (approximately 240-270 cm BD). Only one grave exceeded 270 cm BD. The following presents a basic descriptive summary of the mortuary patterns by excavation unit. A summary of basic mortuary data for all burials in each unit is provided in Appendix E. Burial maps of individual excavation levels of each unit may be found in Appendix F. Selected burial drawings and photographs can be found in Appendix G.

Unit 2

This narrow 1x3 meter unit placed by Fernández (2003) in the northwest rear nave just southwest of the doorway was intended to examine architectural features including the base of Horcón 10 (Figure 9.7). Three shallow shroud burials were identified in 2003 with a fourth coffin burial excavated in 2005. Burials U2 03-26A and B were apparent secondary burials of infants placed adjacent to U2 05-26C, one of the few haphazardly placed burials, with arms and legs splayed outward as if it were thrown into the grave pit.
This child’s skeleton had also been disturbed, but by the 2003 excavations. U2 05-26C was directly superimposed upon the intact coffin of another young subadult, U2 05-1. Ultimately, Unit 2 had fulfilled its purpose in defining architectural features in 2003. Due to the small size of the unit and inability to expand it without compromising the balk-walkway between Unit 2 and 12, work on Unit 2 was suspended following removal of Burial U2 05-1 and was excavated down to only 145 cm BD.
Unit 3

Unit 3 (U3) was a 5x5 meter unit placed at the very center of the nave and was excavated to sterile to 260 cm BD. Sixty-one burials were documented in Unit 3 (Figure 9.8). The first 11 burials exposed were by Fernández (2003) (U3 03-1 thru U3 03-11) who excavated the unit to only 160 cm BD, while 49 were exposed in 2005 (U3 05-1 thru U3 05-47). Unit 3 contained the single inhumations of 16 adults, 45 subadults, and 11 secondary burials. Eighteen contexts were classified as undisturbed primary burials while 30 were altered by human activity; some altered burials were clearly the result of unintentional disruption such as the placement of a new interment. Yet, people interacted with even disturbed human remains in a far more systematic and ritualized manner, as will be discussed subsequently. Twenty-six people found in Unit 3 were buried in coffins and 23 in shrouds. The overwhelming majority (38 burials) were oriented north-south facing the altar, five bodies were placed south-north, one west-east, and two east-west.

Several notable burials were documented in this unit. U3 03-1 was the largest secondary burial studied at the Chapel of San Pedro de Mórrope. This ossuary deposit was placed in a conical pit 93 cm deep, and contained 1,279 bones corresponding to disarticulated skeletal remains of at least 79 individuals (51 subadults and 28 adults). Burial U3 05-9 was a subadult in a state of excellent preservation. The body was wrapped in a white textile featuring intricate blue zig-zag and circular designs. A textile cap fabricated from a paper-thin material was placed on this young child’s head. Thin copper sheets arranged in a V-shape were sewn onto the cap using thread. Faded orange ribbon found on the mid-body still contained the desiccated remains of flowers. Just to the south,
Figure 9.8: Unit 3. Illustration by Haagen Klaus, based on original field maps and drawings by Rafael Palomino and Haagen Klaus.

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another coffin contained the remains of an older subadult, U3 05-12 who was wrapped in an undecorated coarse brown textile. Judging from the well-preserved, long braided hair, this was probably a girl. As many other burials throughout the Chapel of San Pedro de Mórrope, a dyed-red textile covered her face and mouth.

At the lowest level of Unit 3, one of the earliest burials placed at the site was identified. Burial U3 05-43 was an old edentulous adult male placed into the sterile Aeolian sand on the standard north-south axis without any grave goods or associated materials (Appendix G Figure 3). A brown stain around the body resulted from the decomposition of a burial shroud, and there is no indication of the body being otherwise clothed. Depth and salinity resulted in a fragile and fragmentary skeleton. However, his bones revealed correlates of a difficult life, including a healed fracture of the left humerus and severe DJD in many joint systems. At least three distinct lenses of in situ ashy deposits were associated with the burial pit of U3 05-43 and surrounding bodies. Evidently, small fires were set adjacent to these early graves at some point during the burial ritual.

**Unit 3 West Extension**

Removal of the first 20 cm of floor and overburden was carried out in 2003 in an area designated Unit 3 West Extension (U3WX) which is contiguous with the west side of Unit 3, though a large balk was maintained between these two areas of vertical excavation. Unit 3 West Extension (Figure 9.9) was itself enlarged via one small south
Figure 9.9: Unit 3 West Extension. Illustration by Haagen Klaus, based on original field maps and drawings by Flor Carranza, Patricia Leyva, and Haagen Klaus.
extension and two small north extensions to reach its ultimate size of 3.5 x 6.7 meters. Sterile sand was encountered below 246 cm BD. The unit contained 57 burials corresponding to 33 subadults, 14 adults, and 10 secondary burials. Seventeen individuals were interred within coffins, while 27 others were buried in textile shrouds. Of these, 15 were primary contexts and 32 were altered in a variety of fashions. Twenty-eight bodies were placed on a north-south axis to face the altar, and eight individuals faced away from the altar on a south-north orientation.

Like Unit 3, Unit 3 West Extension contained intact primary burials, prolonged primary burials, disturbed burials, intentionally altered burials, secondary burials, burials with red textiles placed upon the face, use of flowers, textile caps placed on the heads of a few children – all conforming to the basic mortuary pattern grammars of the site. Again, several small and one large secondary burial was documented, but the large ossuary deposit in this unit was located in the lowest level and was compositionally dominated by long bones. In the southeast and south central quadrants of the unit, secondary burials involving the depositions of mostly crania were found. At the bottom of the burial stratum (Levels 12 and 13), a group of regularly-spaced bodies placed in an east-west row were identified. This group represents the most spatially organized set of inhumations at the site. This patterning suggests either contemporaneous deaths or planned spatial arrangement. Unfortunately, these skeletons extended into the north profile of the unit and could not be recovered to examine kinship relationships.
Unit 4

Fernández (2003) also initiated the excavation of Unit 4, another 5x5m unit placed directly in front of the altar in the front central nave (Figure 9.10). It was excavated to about 162 cm BD (Level 9) which exposed the first layer of burials (Burials U4 03-12 thru U4 03-24 and U4 03-27). The 2005 excavations uncovered an additional 34 contexts (Burials U4 05-1 thru U4 05-32) Sterile sand was encountered around 253 cm BD. In all, Unit 4 contained 52 interments including 19 primary burials, 22 altered contexts, and eight secondary burials, most of which were relatively small in size and uncomplicated. Eighteen adult skeletons were buried among the remains of 24 subadults and one fetus. The majority (22) individuals were interred within coffins, while 15 were found in shrouds. Twenty-seven bodies were aligned on the north-south axis to face the looming stepped-pyramid altar, while 11 others faced in the opposite direction looking north.

Several unique funerary contexts were identified in Unit 4, including the first burial located in 2003, an intrusive Republican-era coffin. The name of the individual was written on the coffin lid in almost completely faded ink as well as the year of death: “Santiago Germenio Cajusoli. D.C. 1877.” The initials S.G. were also spelled out on the coffin lid using decorative copper tacks. Inside, the skeleton of a 15-20 year-old, long-haired male was found in a stunning state of preservation. His head rested on a textile pillow and the remains of a leather vest rested atop the bones of the flattened thoracic cage. A cotton scarf was wrapped around the neck and over the left shoulder. Remains of trousers and leather shoes were also present. The coffin along with several others was
Figure 9.10: Unit 4. Illustration by Haagen Klaus, based on original field maps and drawings by Rafael Palomino and Haagen Klaus.
removed *en bloc*, data collected studied *in situ*, and was formally reburied in December 2005.

Elsewhere, a group of apparent coffin boards at a variety of haphazard angles were uncovered in Level 8 in the southwest corner Unit 4 and were interpreted by Fernández (2003) as the dumped remains of looted burials serving as evidence of modern grave robbing. Further study in 2004 revealed these contexts to be intact coffins, each containing a single child. These burials instead serve as evidence of another type of burial alteration: coffin manipulation and movement.

An Early Colonial burial interred directly into sterile Aeolian sand is Burial U4 05-32. This adult female’s body was placed the deepest of any interment at the Chapel at 340 cm BD. The corpse was deposited in a positively haphazard manner: both arms were extended above the head, and the legs flexed and rotated above the body to give the appearance of a corpse that was very unceremoniously thrown into the burial pit. This individual’s bones were also riddled with advanced and extensive proliferative osseous lesions (many of which were active at the time of death), and may correspond to treponemal infection (see Chapter 9; also Appendix G Figure 7).

*Unit 5*

Unit 5 was a small, 2x4m unit placed in the southeast corner of the nave intended to span the Chapel’s east inner wall to the foundation of the altar (Figure 9.11). A north (2x3m) and south extension (2.5x3m) was placed to investigate various features and to
Figure 9.11: Unit 5. Illustration by Haagen Klaus, based on original field maps and drawings by Anita Alva, Estrella Espinoza, and Emily Middleton.
recover burials extending into the profiles of the original unit. Given the size of Unit 5 and the fact this unit could only be excavated to the beginning of Level 11 (200cm BD) by the time the field season ended, a small sample of only 14 burials were recovered from this location. These interments included eight subadults and three adults. The unit contained five contexts were undisturbed primary burials, six which were altered in various manners including the prolonged primary burial of an infant who had been naturally mummified, and three secondary burials. Eight bodies had been disposed of in coffins while only two were buried in shrouds. While they did not literally face the altar from this point in the church, seven of the skeletons were placed on the dominant north-south axis, two were found south-north, and one east-west.

Despite the relatively small numbers of burials in Unit 5, several unique contexts were noted. Burial U5 05-1 was a large secondary burial composed of 305 disarticulated human bones. Burial U5 05-7 was clearly an intrusive Republican-era grave that contained an unusual black painted coffin featuring scalloped and beveled edges. Like Santiago Germenio Cajusoli, (U4 03-12) this young man under 30 had long hair and was buried in a well preserved woolen suit and leather boots. Elsewhere, the coffin of U5 05-4A had been opened and the lid removed. A secondary burial (U5 05-4B) was placed directly atop the body which remained completely undisturbed. Upon opening the coffin of Burial U5 05-3, the skeleton was found encased in a layer of washed-in mud. Like a few other burials (especially in Unit 7), such evidence points to exposure or interment associated with a rain event.
Unit 6

Fernández (2003) carried out excavation of Unit 6, another fairly small and irregular unit on the opposite side the Chapel as Unit 5 (Figure 9.12). One burial was documented in this unit (U6 03-25) and stands apart from almost all other burials at the site. U6 03-25 appears contemporaneous with U5 05-7 mentioned previously with its black painted coffin, beveled edges, and high stratigraphic position (126 cm BD). This child’s burial, placed on a north-south axis, was deposited inside an adobe brick chamber that may have been modified and hollowed out from the base of an above-ground crypt. The body had not fully decomposed and was encased in a hard crusted organic matrix.

![Unit 6 Illustration](image)

Figure 9.12: Unit 6. Illustration by Haagen Klaus, based on original field maps and drawings by Rafael Palomino.
Remains of entomological activity strongly suggest prolonged primary burial. Despite any time depth between this child’s death and the inhumations in the rest of the cemetery, flowers were similarly placed with the body and were tied together by thin green ribbon.

During the 2005 field season, Unit 6 remained unexcavated, save for cleaning the unit to better document the walls of the adobe chamber and unit profiles.

*Unit 7 (Sacristy)*

Unit 7 was initiated as a large horizontal exposure (5.5x10m) of the surface of the Sacristy (Figure 9.13). Fernández (2003) removed about 40cm of overburden and found that the surface deposits of the Sacristy consisted of large amounts of modern and historic trash and debris. In Level 3, quantities of human remains were located. Since these bones were assumed to be from looted contexts, they were simply collected without any documentation. These finds may have been secondary burials which are suggested by Fernández’s (2003) own drawings (Plano N°21).

In 2005, vertical area excavation of the Sacristy began with the placement of a 4x7m unit (still designated Unit 7) extending the entire north-south length of the Sacristy. Unit 7 was excavated to sterile sand that was encounter around 240 cm BD. A total of 40 funerary contexts – 18 subadults, 17 adults, and four secondary burials were documented in this unit. By far, Unit 7 contained the largest proportion of adults to subadults at the Chapel. Nineteen burials had been altered, many by the placement of subsequent interments. Seventeen coffin burials and 19 shroud burials were identified. Though 22
Figure 9.13: Unit 7. Illustration by Haagen Klaus, based on original field maps and drawings by Rafael Palomino and Haagen Klaus.
bodies were placed on the north-south axis, a relatively high degree of diversity in orientation was noted among the remaining five east-west and three west-east burials.

A number of unusual and remarkable funerary contexts were found in Unit 7. Burial U7 05-1 was another complex secondary burial that unlike any other contained the partially articulated remains of at least three adult individuals commingled among hundreds of other disarticulated skeletal elements. U7 05-2 experienced a remarkable range of human alterations, including removal of major portions of the individual buried in the coffin and the addition of long bones and crania of several other individuals. Burial U7 05-27 was placed in an unusual, reverse-extended position (face down) with her hands behind her back as if bound. Burial U7 05-30, another adult female, had her left hand drawn up to her face. Her skeleton also bore multiple healed traumatic injuries possibly suggestive of experiences of interpersonal violence.

Unit 10

Unit 10 was a 2x10m excavation along the northeast corner of the nave that reached sterile sand around 240 cm B.D. Forty one burials were recovered in this unit, including the single inhumations of 29 subadults, eight adults, nine primary contexts had been altered in some fashion by human activities (Figure 9.14). Additionally, five relatively small secondary burials were encountered. Thirty bodies were deposited in coffins, while only seven were found wrapped in cotton shrouds. North-south orientation predominated, seen among 27 burials that faced in the direction of the altar, with only child’s body however was inverted face-down inside the coffin. Textile preservation was
Figure 9.14: Unit 10. Illustration by Haagen Klaus, based on original field maps and drawings by Rafael Palomino and Haagen Klaus.
particularly good among a number of burials in the southern quadrant of the unit, and included various clothing items, flower offerings, and woven textile caps. One child, Burial U10 05-29, demonstrated cranial lesions that may be consistent with juvenile tuberculosis infection (see Chapter 9).

**Unit 11**

Unit 11 was placed in the atrium north of the Chapel’s entrance with the goal to define architectural phases. Upon defining the eighteenth or nineteenth century brickwork that was superimposed by the modern concrete platform, a distinct depression was noted in the brickwork, probably produced by the settling fill of a pit beneath it. Excavation proceeded then in the west half of the unit until a square chamber was identified containing Burial U11 05-1. The walls of the chamber were treated with white paint or plaster, though only traces remained. The chamber was located nearly three meters below the modern surface and almost 4.2 meters below datum. It also cut directly through the long, wedge-shape earthen ramp of the early Church buildings A or B (Appendix B Figure 7).

Within this pit, Burial U11 05-1 was identified as a massive ossuary involving the secondary burial of at least 500 or more bones (Figure 9.15). This burial was unfortunately discovered at the very end of the field season preventing its recovery. Copious observations and data were collected, and Burial U11 05-1 was reburied. The significance of U11 05-11 is addressed later.
Figure 9.15: Unit 11. Illustration by Haagen Klaus, based on original field maps and drawings by Flor Rojas.
Unit 12

Unit 12 was the final unit placed at the Chapel of San Pedro de Mórrope in the rear central nave. It measured 2.8x 6m and was excavated down to sterile sand at 250 cm BD. Forty nine burials were uncovered, including the single interments of 27 subadults and 15 adults (Figure 9.16). Twenty-five contexts in Unit 12 had been altered in both accidental and ritualized manners. Seven relatively small and simple secondary burials were also found, including two that were placed directly atop two bodies buried adjacent to each other. Nineteen people were buried in coffins, while more than half (22 burials) were placed within textile shrouds. North-south orientation predominates again in 26 cases, while 15 were found on the south-north axis: it would seem that the greater the distance between a burial and the altar, the more likely south-north orientation is practiced. Other cardinal orientations were not found in Unit 12.

No major deviations from colonial mortuary patterns were observed in Unit 12. It contained a range of diverse and mostly well-preserved burials. One of the more unusual contexts involved U12 05-34 and -35. Almost the entire coffin of U12 05-34 (adult male) had been removed; leaving only the skull and headboards intact and in situ. Then, the skull of an adult female (U12 05-35) was placed where the left shoulder of the adult male would have been (Appendix G Figure 36).
Figure 9.16: Unit 12. Illustration by Haagen Klaus, based on original field maps and drawings by Rafael Palomino and Haagen Klaus.
Among the burials documented at the Chapel of San Pedro de Mórrope, elements of Colonial material culture were integrated into and transformed for use in funerals (see Appendix H).

*Coffin Construction, Design, and Decoration*

Of the 263 inhumations of single bodies, 124 (or 47.1 percent) were interred in wooden coffins while the remainder were present in cotton shrouds. The coffins found at Mórrope followed a single conservative design and construction template. Coffins were universally shaped as elongated trapezoids, widest at the head and tapering down at the foot. Fish-tail or single break-style coffins—examples of the latter found at the nineteenth century mortuary site of Isla de San Lorenzo off the Lima coast (Hudtwalker and Pinilla 2004a)—were not present at Mórrope.

As seen in Figure 9.17, the construction of a coffin involved a left and right sideboard cut to an identical length and height. A headboard and footboard were fitted on the inside edge of each sideboard. Though less frequent, headboards and footboards were sometimes placed on the outside of the sideboards’ edge. Multiple (often matching) wooden planks were cut and arranged to form the coffin bottom and lid. Single boards used for coffin lids and bottoms were only seen with the smallest boxes that held very young infants or perinatal individuals. The ICAM team assumed the coffins were manufactured from locally available *algarrobo* wood, but this is quite unlikely. All
coffins appear to have been nailed together using iron nails around five cm in length. Unfortunately, the nails were extremely corroded preventing any observations on cross-sectional or head shape. In a few instances, copper nails were also employed.

Most coffins were fashioned with care and precision, though a number seem almost cobbled together. For instance, the lid of Burial U3WX 05-38 was fashioned from multiple, irregularly shaped planks including five that were painted black. Several infant coffin lids, such as U3 03-9 and U10 05-36 similarly seem fashioned from scrap wood or material used originally for some other purpose.
Only 32 coffins at the Chapel of San Pedro de Mórrope were found as plain wooden boxes, while the remaining 92 (or 74.2 percent) were adorned employing a limited range of decorative features (Figure 9.18; Appendix H Figures 1-3). Small copper tacks were either pressed or lightly hammered into the wooden boards in linear and geometric motifs. Tack decoration was classified into Simple Tack, Ornate Tack, or Christian Cross Tack configurations. Simple tack configurations were observed on 57 coffins usually involving several widely spaced copper tacks arranged in parallel lines on sideboards and less frequently headboards and footboards.

Ornate coffin decoration was noted in 27 cases, with closely spaced horizontal or vertical rows of copper tacks, or geometric figures (principally circles). Included in this category are several examples of extremely ornate decoration, such as the coffin of Burial U3 05-30B featuring tacks arranged in a form reminiscent of the Greek letter Σ. Sideboards of Burials U4 05-1, U7 05-2, U10 05-21, and U10 05-39 were decorated in variations of a floral-leaf motif. In three cases, initials were spelled out on adult coffins using copper tacks: “B.J.” (Burial U3 03-10), “S.G.” (U4 03-12, identified as Santiago Germanio Cajusoli), and “J.M.” (Burial U10 05-21).

The shape of the Christian cross was also unambiguously formed from copper tacks on 14 coffins. Cross motifs occurred in multiples on lids, side-, foot-, and headboards. These crosses ranged from simple, small shapes arranged from as few as five tacks to as elaborate shapes made from more than 20 tacks each.
Figure 9.18: Coffin decoration, Burial U4 03-12. Even though this burial was Republican-era, all of the basic decorative features, except for the initials of the deceased spelled out on this lid in copper tacks, did not change since the Early/Middle Colonial period in Mórrope. Drawing by Haagen Klaus.
Underneath many copper tacks were observed small textile fragments, preserved by the oxidation of the copper material. Evidently, coffins were wrapped in an exterior cloth (probably cotton) before decorative tacks were applied. In 37 contexts, coffins were clearly unwrapped and painted instead. Twenty eight coffins were covered in a red paint, three were white, and green and blue paint were seen in one case each. At least four coffins were papered-over in a red wallpaper-like material. Several other coffins were suggestive of being decoratively papered, but poor preservation of possible paper materials prevented evaluation. Two other coffins were decorated using thin zig-zagging textile ribbon secured in place by copper tacks.

Beyond these modes of decoration, no other form of coffin elaboration was practiced. Coffin furniture (e.g., metal depositums or handles) were absent except in the case of Burial U4 05-1 and U10 05-39. Both featured heavily deteriorated iron clasps placed at the center of the headboard and footboard intended to secure the lid.

Textiles and Clothing Remains

In the majority of coffin burials and even several shroud burials, textile remains associated with the body could be identified. Textile preservation was on the whole very poor, and many textile remains had become miniscule fragments or had deteriorated quite literally to the point of being powdered. In other words, it was obvious when textiles were present, but in almost all cases textile type, shape, or decoration was almost impossible to discern.
In at least three burials, the remains of a textile coffin lining was clearly discernable (Appendix H Figure 4). The presence of a thin single layer textile liner was hinted at in several other burials and was probably employed more even more widely, but had decayed. These liners were relatively coarsely woven and cannot be distinguished from local indigenous styles. Liners were placed on the floor of the coffin, and in Burial U3 03-4, against the interior sideboards as well. The majority of coffin burials featured bodies placed directly on the plain wooden surface of the coffin interior. In at least 30 burials, remains of poorly preserved textile masses were found beneath the skull of the deceased, and probably correspond to textiles that functioned as pillows. These objects contained no filler material (e.g., feathers) and were probably rolled or layered textiles. No evidence of any other coffin interior elaboration, such as mattresses or sheets, was found.

Several modes of treatment involving the body of the dead and textile coverings were noted. Clothing the dead was a common practice but was not universal. Clothing remains were observed or inferred in at least 76 burials and cross-cut all age groups and both sexes. The most direct evidence of clothing correlated to the presence of glass or worked bone buttons found in association with the bodies corresponding to shirt and pants locations (Appendix H Figure 5). Leather shoe remains were also noted in at least 15 contexts (Appendix H Figure 6). In sum, many adults seem to have been interred in European-style clothing that would have been worn during the course of everyday colonial life. Burial U5 05-7 (intrusive Republican era burial) was found in a well-preserved matching suit coat and trousers, perhaps the proverbial “Sunday best.”
Children, on the other hand, were more commonly wrapped in shrouds and then placed in coffins with little clear evidence of clothing remains. A number of adults may have been wrapped only in cotton shrouds as well. Burial U12 05-2, a young adult female, was wrapped in a poorly preserved textile just as Burial U3 05-43, an old adult male who may have been one of the earliest interments at the Chapel. These bodies may well have been nude when they were wrapped.

Ribbons and ribbon remains were found in 41 burials (almost all inside coffins) (Appendix H Figure 7). These ribbons appear to have been made from a fairly low-quality silk or satin material. The vast majority of these ribbons were orange in color, through a green variety was also present. Ribbon material appeared generally well preserved but was brittle enough such that it could not be straightened out to be measured. Ribbons on average appeared about 2.0 to 2.5 cm wide and probably between 25 and 30 cm in length. In the first several burials where ribbon was encountered, its function or purpose was quite ambiguous; the ribbon had shifted position and was not associated with any other element of the burial. Later, it became apparent that ribbon was used to tie together a small bouquet of flowers placed inside the coffin with the corpse.

Jewelry

Use of jewelry to adorn the body of the dead was noted in four cases. Beaded necklaces were found around the necks of three subadults: Burials U3 05-29, U7 05-3, and U12 05-21. The necklaces were made from dozens to hundreds of individually drilled stone or glass beads (Appendix H Figure 7). Bead colors included red, yellow, blue, and
Beads recovered from the matrix (evidently proceeding from disturbed burials) included a large cache of black cylindrical beads from Unit 10 and elsewhere isolated beads and bead fragments whose coloration is suggestive of *Spondylus* sp.

Burial U7 05-22, an old adult female, was buried with what appeared to be a small medal of a saint around her neck. A small metal Christian cross that had been painted white was associated with one of the semi-articulated bodies of U7 05-1A.

*Headgear*

Three forms of headgear were documented at the Chapel of San Pedro de Mórrope. First, a thin, uncolored woven jaw tie was found around the cranium and mandible of one adult female (Burial U10 05-6) (Appendix G Figure 28). Second, a copper headband backed by a textile strip was placed around the head of subadult Burial U4 03-18. This headband was stained green by the nearly complete oxidation of a very thin copper sheet placed along the outside of the headband. Remains of thread suggest the copper sheet had been sewn onto the headband. A much larger, embroidered textile headband was found wrapping around most of the face and head of another subadult, Burial U10 05-32 (Appendix H Figure 9). This goldenrod-colored textile featured a repeating, linear embroidered leaf or floral motif.

The third category of headgear involves caps placed on the heads of subadults, observed in 16 contexts (Appendix G Figure 13; Appendix H Figures 10, 11, 12). These caps were fashioned from a very thin material which may indeed have been a type of paper. A thin copper strip, perforated at regular intervals, was sewn along the cap’s
bottom. Identical copper sheet strip were likewise attached around the cap forming a repetitive V-shaped pattern (perhaps intended to mimic the shape of a crown). Despite the sometimes complete oxidation and disintegration of the cap components, copper stains on several crania indicated those children had likewise been adorned in death.

*Face Cloths*

In 37 funerary contexts, cloth had been applied to cover the face of the dead (Figure 9.19; Appendix H Figures 13, 14). In each case, the cloth was a red or maroon-dyed textile. Not a single red cloth was preserved well enough to study their original sizes and shapes, but in several cases, the cloth was large enough to cover the face and upper chest. This practice was common among children and adults. Often, large pieces or complete face cloths were present, but in others (particularly deeper, older burials), only.

Figure 9.19: Red face cloths. Burial U3WX 05-2 (A) and Burial U12 05-12 (B). Photos: Haagen Klaus.
traces of pigment along with impressions of the warp and weft of the cloth remained on the facial skeleton. The red color of the dye is suggestive of the use of an organic material rather than a mineral-based pigment. In all but one case, the face cloth was undecorated and otherwise featureless. The red cloth covering the face of U3WX 05-28 was unusually dull red and featured a leaf or floral design. In this respect, decoration does not fit the broader pattern, and this cloth may have originally served another purpose before it was used in this child’s funeral. Though original context is forever lost, imprints or other traces of red face cloths were observed on at least 21 additional disarticulated crania documented in various secondary burials throughout the site.

Grave Goods

For all intents and purposes, grave goods (in the traditional pre-Hispanic sense) were not placed with the dead. In four cases (or 1.5 percent of single inhumations), relatively small objects or trinkets were found with a body. For example, a worked bone rattle was located by the left foot of subadult Burial U3 03-5 (Appendix H Figure 15). This rattle featured a removable handle whose base could be screwed into the top of the hollow barrel, which contained a single copper bead the served as the noisemaker.

Beneath the head of Burial U3 05-18, an oxidized iron plate or disk was located inside the coffin. Its original function or meaning in this context is unknown (Appendix H Figure 16). Inside the coffin of subadult Burial U7 05-3, a pair of adult earrings fashioned from copper were found wrapped in a textile resting on the chest region (Appendix H Figure 17). The earrings were inset with a worked and beveled amber-
colored material. One earring also featured attached spherical amber-colored beads. The placement of these adult items atop this young subadult’s body is suggestive of an offering of some kind. A heavy cast iron axe-head was found resting on the coffin of U12 05-15, an adolescent female. While its use or significance as a grave good may be questionable, it would not have likely been haphazardly discarded or thrown into the grave pit; the axe head was more than heavy enough to break through the coffin lid if dropped or casually placed from even a short distance away, and points to the fact that it was intentionally placed atop this burial.

The only persistently recurrent grave good was flowers (Appendix H Figures 18 and 19). Remains of desiccated flowers (often stems, and sometimes the flower itself) were found in at least 42 burials. These offerings to the dead probably reflect conscious sentimentality and mourning. On one hand, they probably are not grave goods in the pre-Hispanic sense, seemingly lacking functional value for the deceased in the world of the dead (e.g., mortuary offerings of camelid meat as sustenance) nor do flowers appear to embody any particular social statements. On the other hand, local precedent clearly exists. Still, any emotive and symbolic associations with flower offerings may be far more intimately linked with European Catholic mortuary tradition.

**BURIAL SEPARATION AND CULTURAL SEQUENCE**

Multiple consistent patterns emerge from these three methods and help elucidate the cultural chronology at the Chapel of San Pedro de Mórrope. Mortuary variables
seriated through stratigraphic space and multiple correspondence analysis partition the burial sample into Early-Middle and Middle-Late Colonial phases.

*Distribution of Mortuary Variables*

At Mórrope, distributions are visually portrayed in two ways: lenticular diagrams and line graphs. These graphic representations are present in Appendix I. First, burial type was examined (Appendix I Figure 1). Primary burials are found throughout the stratigraphic sequence, sharply peak in frequency in Level 9, and then steadily decrease in an almost perfect “battleship” curve. Prolonged primary burials were practiced with relative consistency and reach their greatest quantity in Level 8. Disturbed and altered burials are by far more ubiquitous, usually outnumbering intact primary burials in almost every level. Most secondary burials were located in lower levels, and by the end of the cultural sequence, secondary burial seems to have become a relatively limited practice.

Second, placement of the body in a simple textile shroud was the dominant disposal style in the early phases of the sequence, only eclipsed by far more numerous coffin burials in Level 10 (Appendix I Figure 2). While bodies were still interred in shrouds above Level 10, they were never to outnumber coffin burials again.

Third, people at Mórrope predominately chose to place their dead on a north-south cardinal orientation. North-south orientation is also the oldest and original style practiced at the Chapel of San Pedro de Mórrope (Appendix I Figure 3). Only in later levels do south-north orientations begin to be practiced. East-west and west-east positions
are clearly the rarest, appearing in small numbers only in the middle and latter portions of
the sequence.

Fourth, styles of coffin decoration were examined (Appendix I Figure 4). Simple
linear or geometric tack decoration styles accompanies the emergence of coffin use in
Level 12 and remains the most frequent type of ornamentation. Ornate tack designs and
Christian cross motifs adorning coffins are phenomena essentially restricted to the latter
portions of the sequence. Likewise, red, white, blue, or green painted and papered coffins
are also mostly restricted to the upper levels, with red coffins being the most widespread
and longest practiced coloration.

Fifth, variables involving the adornment of the dead were considered (Appendix I
Figure 5). In the earliest levels, bodies appear to have been universally interred nude.
Clothing seem to have been introduced and gradually gained popularity, though many
children even in the terminal portions of the sequence may have been placed within their
coffins only covered in a textile material or simple shroud wrap. Associated remains,
such as glass, wood, and bone buttons were similarly distributed as they originate and
terminate together, though glass buttons were more common. Copper accoutrements are
generally co-occur with textile caps (often serving as a decorative material on the cap
itself). Necklaces are the rarest form of adornment and are restricted to the superior
portions of the stratigraphic sequence.

Sixth, burial goods were limited in general but again are generally restricted to the
middle and upper portions of the sequence (Appendix I Figure 6). Flowers and associated
ribbon materials appear quite abruptly and quickly become numerous. Grave goods are
very infrequent at Mórrope and are an idiosyncratic feature of burial patterning most common among middle stratigraphic positions.

These observations lead to a variety of points. All of the 27 mortuary data variables peak either below or above Levels 9 and 10, many falling on or near this set of positions in the stratigraphic sequence. Other features occur well above or below this point. A break point can thus be made at the interface of Level 9 with Level 10 to define two major cultural/chronological phases: an Early to Middle Colonial Period (Level 13+ to Level 10), and a Middle to Late Colonial Period (Level 9 to Level 4). This break point is also coincidentally located near the middle of the stratigraphic sequence itself.

In general, a low degree of burial pattern diversity and mortuary elaboration appears to be present in the Early to Middle Colonial Phase. In the deepest and earliest stratigraphic positions burial seems to be a materially ascetic ritual experience. Only in Middle to Late Colonial Phases does burial pattern diversity bloom and a wide variety of features emerge into practice, including coffin burials, east-west and west-east orientations, most forms of coffin decoration and corpse elaboration, and especially floral grave offerings.

**Multiple Correspondence Analysis**

The MCA results (Figure 9.20) demonstrate a distinct separation between Levels 4-9 and 10-13+ and their contents as inferred by earlier visual assessment of the mortuary data univariate distributions. This observation may be taken as further justification to partition the Mórrope sample in Early/Middle and Middle/Late Colonial phases with the
Figure 9.20: Multiple correspondence analysis of mortuary treatment variables and stratigraphic position.
breakpoint at the beginning of Level 10. Second, several relatively unambiguous structures in the data indicate lack of ornamentation or elaboration among the deepest (earliest) burials, while virtually all of the decorative features and mortuary material complexity corresponds to the inferred Middle-Late Colonial phase. Third, particular associations between features are notable, such the very close relationships between east-west and south-north orientations, ornate coffin tack decoration and red face cloths, flowers offerings and red painted coffins, and white painted coffins, papered coffins, and west-east orientation.

CONTACT BETWEEN THE LIVING AND THE DEAD

In 144 burials, all taphonomic evidence indicates interment shortly following death. However, in many other cases, it is also clear some individuals experienced protracted and complex interactions with the world of the living.

Prolonged Primary Burial

Unambiguous evidence of prolonged primary burial was observed in 22 burials (or 6.8 percent), spanning Early-Late Colonial phases (Appendix G Figure 2). In these cases empty muscoid fly puparia and ecdysial caps were associated with coffin burials in every excavation unit. No adult flies were found trapped in the sealed coffins and indicates all of the maggots had completed their metamorphosis into adult flies before interment. All prolonged primary burials were children, ranging from 9 months to 9 years.
of age; ten of these individuals (or 45 percent) were between one and two years old.

Dozens to hundreds of maggot casings were identified under and to the sides of coffin headboards. On the interiors, insect remains were commonly present in the upper body region, in and under hair mats, and embedded in desiccated brain tissue. One of the last burials at the Chapel had been extensively infested by maggots (subadult Burial U6 03-25; probable 19th century based on coffin style and stratigraphic association).

Ambiguous insect activity was also noted in 25 other individuals, including the carapace remains of beetles that may relate to the multiple species that are predacious on fly eggs and larvae.

Initial visual assessment reveals three varieties of puparia by size and morphological characteristics, the majority probably corresponding to the genus *Calliphoridae*. Experimental decomposition data suggests generally 20 to 35 days would have passed in the insect’s life cycle to hatch the adult fly (Haskell et al. 1997).

Unfortunately this is a highly generalized estimate owing to the lack of forensic entomological studies in hyperarid environments.

On the north coast, scavenging animals arrive on a carcass within minutes of death, and lacking signs of scavenging activity, it is clear prolonged primary burials at Mórrope were protected. One hint as to where the dead temporarily resided was found along the southeast corner of the chapel east of the altar. The base of a platform or crypt abutting the adobe brick wall was associated with distinct layers of several hundred fly puparia indicating decomposing remains were present at that location, possibly episodically, and then removed.
Evidence of prolonged primary burial also was noted in three secondary burials (see below). In Burials U3 03-1, U5 05-1, U3WX 05-30 multiple adult crania included preserved brain tissue with embedded fly puparia. Here, a more complex postmortem history is evident, with individuals’ prolonged primary burial and sometime later, exhumation and reburial.

The other previously-used criterion used to detect prolonged primary burial – subtle disarticulation or shifting of hand and foot elements – was nearly impossible to apply. Unlike the stable matrix that sand provides for a skeleton, hand and foot bones are free to shift, roll, and collapse inside an empty coffin following decomposition (Roksandic 2002), especially as grave fill was unevenly packed and many coffins settled at various angles. However, the skeleton of an infant (Burial U12 05-45) approximately one year in age was mostly disarticulated in its coffin. The right calcaneous was resting by the left side of the cranium, and the right scapula was altogether missing. Another infant, Burial U5 05-5, was mostly mummified. Though insect activity was undetectable in this case, it is doubtful that natural mummification would have been physically possible following burial in the semi-moist subsurface sands encountered at Mórrope.

Post-Internment Removal

The almost completely homogenized and heavily disturbed matrix under the Chapel floor was produced by extensive burial activity over approximately 200-215 years. As noted earlier, great frustration resulted from the inability to discern outlines of secondary intrusive pits (or even primary burial pit outlines) and prevented the
documentation of the vertical and horizontal stratigraphic signatures of postdepositional disturbance. However, intrusive activity and manipulation of human remains can be strongly inferred from other evidence.

Post-depositional removal of bones was observed in 92 contexts (or 28.6 percent). Removal of bones crosscuts age and sex groups. First, 34 burials were disrupted by the placement of a later interment and bones of the earlier burial removed. An example of such mortuary disruption and removal is seen with Burial U10 05-6 (probable middle-aged female) (Appendix G Figure 28). Only the upper body and surrounding coffin was present. Approximately 210 cm directly beneath this individual’s missing mid- and lower body was a Late Colonial-style coffin containing an adult woman. Another example is illustrated by Burial U5 05-13, where only the lower third of the coffin (and the bones inside) remained after being visibly cut or chopped to accommodate placement of Burial U5 05-7, an intrusive Republican-era coffin.

In one of the clearest cases of mortuary disruption, Burial U7 05-22 had been disturbed by the placement of Burial U7 05-23 directly on top of it. Later, Burial U7 05-23 itself was disturbed by placement of an infant, Burial U7 05-24, on its right leg. It is highly significant that in every case mortuary disruption, the living appear to have made the decision to remove the disturbed parts which then disappear entirely from the burial context. For instance, most of the mid and lower body of Burial U7 05-22 had been removed, and the skull, left arm, and right leg of U7 05-23 were absent.

Second, cases of intentional post-interment removal were inferred in 14 burials despite the lack of observable intrusive pits. The coffins of two subadults (Burials U7 05-
9 and U10 05-10) were found with their lids missing (Appendix G Figure 10). The skulls of both children had been removed. In Burial U7 05-9, more extensive activity was carried out with the removal of the right hand, legs, and feet in addition to the head. Another subadult shroud inhumation (U3WX 05-6) was also headless. Burial U7 05-2 (adult female, 50 years-plus) was also found without its lid, and the head, cervical vertebrae, upper limbs, and right foot of the woman was missing (Appendix G Figures 9, 25). Two Early-Middle Colonial burials placed next to each other were both undisturbed except for missing heads (Burials U4 05-28, -29) (Appendix G Figure 22). When Burial U12 05-23 was altered, parts of the coffin (including one sideboard and the lid) and the tibiae, fibulae, and feet were removed. In all cases, visual examination found no evidence of sharp force trauma and rules out perimortem decapitation or dismemberment. Removal of body parts followed decomposition.

At least three examples of exhumation were clear. Inside the lid-less child coffin of Burial U3 03-11, only well-preserved fragments of the cranial vault, remains of the immature permanent dentition, and a hair mat were present where this child’s body should have been. Virtually the entire skeleton had been removed leaving behind only a modicum of remains. In Burials U3 05-20 and U3 05-36, the coffins contained even fewer traces of the original occupant and were lid-less and empty.

Third, 44 burials featured missing skeletal elements but lacked a clear source of disruption. For instance, Burial U3 AO 05-33 was interred in sterile sand where only the outline of the primary burial pit was visible (Appendix G Figure 17). The entire right arm of the individual was missing, but there was no evidence of ante- or perimortem trauma.
A disturbed group of closely spaced subadults (Burials U4 05-2, -3, - 5, -7, and -8) were found in Unit 4 missing crania, long bones, hand, and feet with no visible intrusions or potentially intrusive primary burials. Delayed primary burial and resultant loss of skeletal elements such as that seen at San José de Moro is one possible explanation (Nelson 1998). Yet, the absence of critical supporting evidence (insect activity and ‘wandering bones’) these ambiguous contexts are best explained by some degree of deliberate opening of grave pits and removal of bones though stratigraphic evidence had been erased by more than 20 decades of intense digging and mortuary excavations.

Coffin Manipulations

Nine coffins (or 2.8 percent) appear to have been moved en toto. An assemblage of evidently manipulated Middle-Late Colonial period burials (five subadults and one adult coffin containing the bones of at least 4 adults) were exposed in Unit 4 (Burials U4 03-19, -20, -21, -22 -23, and -27) where intact coffins were piled atop each other at various angles (Appendix G Figure 5). Coffin lids were present but were either ajar or otherwise unattached. Burial U4 03-20 was found 90 degrees on its side, and Burial U4 03-23 was resting on its side at a nearly 75-degree angle. There is no evidence of any kind to indicate flooding, bioturbation, or uneven settling of grave fill. The layers of overlaying eathern, adobe, and plaster floors were intact ruling out modern disruption. Burial U4 03-22 was articulated in anatomical position despite the acute angle at which it rested due to the coffin having filled with sand. Other skeletons in this group lacking such sandy support were significantly disrupted; Burials U3 03-19 and -22 were significantly
jumbled, probably from movement.

Only in two other examples from the Chapel was there evidence of similar manipulation: subadult Burials U10 05-12 and U10 05-30. Both coffins were resting nearly at 90-degree angles. Burial 05-12 was perfectly articulated in a highly unusual extended-reversed (face down) position within a sandy matrix that filled the coffin. Conversely, the bundled contents of Burial U10 05-30 lacked such a matrix and shifted, bones became jumbled, and all came to rest on the right interior sideboard of the coffin.

Removal and Replacement

In only two cases (0.6 percent) was removal and replacement of human remains documented. In Burial U4 03-22, the cranium was found sitting upright on its base facing away from the body. While most of the skeleton was jumbled probably from being moved, the position of the cranium was impossible via natural taphonomy. A person appears to have removed the head and after an indeterminate period, replaced it. Also, nearly half of this child’s dentition was missing. Loss of teeth during the interval outside of the coffin is highly likely. While much of Burial U7 05-23 (old adult female) was removed as noted above, this individual’s mandible was removed and replaced off to the left side of the maxilla.

Secondary Burial – Ossuaries

Three modes of secondary burial were identified at the Chapel of San Pedro de Mórrope. The first mode is ossuary burial, where disarticulated and incomplete remains
from one or more individuals were collected and re-interred (Appendix G Figures 1, 18, 23, 31). A total of 53 (or 16.5 percent) contexts at the Chapel of San Pedro de Mórrone were secondary burials. All but three could be excavated. Where pit outlines could be observed or inferred, it was evident these deposits were placed in irregularly-shaped pits ranging from 20 to 94 cm in depth and contained anywhere from four to 1,279 bones. Each secondary burial appears to have been formed during a single depositional event. Placement of bones within each secondary burial was mostly haphazard. In only a few instances were groupings of long bones aligned on a north-south axis. The largest secondary burials (U3 03-1, U5 05-1, and U7 05-1) occupied very high stratigraphic positions and signify that during the terminal phases of the Chapel’s use, secondary burials not only became rarer but changed their character significantly as overall size increased drastically.

Assessment of the minimum number of individuals (MNI) in each secondary context was based on the counts of the most numerous skeletal elements: left and right femora and humerii. MNIs ranged from one to 79 individuals, but in most cases, between three and ten. The secondary ossuary burials collectively represent at least 327 additional individuals (123 subadults and 214 adults). In addition to osseous remains, many of the secondary burials included fragments of coffins, textiles, and clothing buttons – presumably debris associated with exhumation. In two secondary contexts, disarticulated faunal remains were present as well.

In almost all secondary burials, bones were completely disarticulated and imply complete skeletonization prior to reburial. A dramatic exception was noted in Burial U7
05-1, where three partially articulated adult skeletons were commingled amongst the
disarticulated remains of at least 14 other people. One partial individual consisted of an
articulated thoracic vertebral column, rib cage, and humeri, radii, and ulnae
 corresponding to in an inverted, face down position. One cranium was found articulated
with its mandible, first thru fifth cervical vertebrae, and the complete hyoid in anatomical
position. An articulated, semi-flexed left and right set of legs and feet (wearing remains
of leather shoes) were identified immediately to the south at the same depth. Near the
bottom of this secondary burial, an articulated set of five left metatarsals were identified.

In the largest ossuaries such as Burial U3 03-1 (Appendix G Figure 1), a variety
of cuts, chops, punctures, scrapes, crush damage, were noted on many bones.
Presumably, such damage was incurred when the skeletons were exhumed. First, this
implies these individuals may have experienced a rushed exhumation where less care was
exercised. Second, many damaged bones included incomplete greenstick fractures and
other forms of perimortem damage (Galloway 1999:49). Some exhumations and reburials
evidently followed primary burial during the perimortem interval as bones were still
relatively ‘fresh’ and high in collagen content.

In almost every secondary ossuary deposit where crania were present, teeth
(especially single-rooted anterior teeth) were universally missing from the crania and
were not found elsewhere in the secondary burial. Though no use-wear such as polish or
scuffing was noted on any crania, it is extremely likely teeth were lost by extensive or
prolonged handling during the transition from primary to secondary burial.
Secondary Burial – Superimposed on Primary Burials

A second mode of secondary burial observed in six contexts involved the placement of disarticulated bones directly atop undisturbed primary burials. The Middle-Late Colonial coffin of Burial U5 05-4 had been opened and the lid and right sideboard removed (Appendix G Figure 24). Then, multiple long bones and three crania of at least five adults and one subadult were placed atop the upper body of primary burial, a middle-aged adult male whose skeleton remained undisturbed by the process. Burial U7 05-2 (probable Late Colonial), was found without its lid (Appendix G Figures 9, 25). In this case, several bones of the primary burial (an old adult female) had been removed including her skull, arm long bones, and feet. Following the removal of these bones, the crania of four other individuals were set within the coffin – one cranium atop the shoulders, another by the right shoulder, one inverted cranium between the femora, and another between the tibiae. A left and right femur originating from two distinct individuals were placed inverted in the position of the arms. A left and right radius and an extra hand were situated in the upper body region.

Similar practices were observed among four Early-Middle Colonial burials. Directly superimposing several shroud burials placed in sterile sand were found substantial secondary deposits. Multiple long bones and crania covered one primary interment, Burial U4 05-31, from head to foot. In Burials U12 05-42 and –43, multiple long bones and crania were piled atop the mid and lower bodies (Appendix G Figure 38). Considering the formation of these secondary burials, it is a distinct possibility that when digging a new burial pit, earlier inhumations were disturbed and then reburied atop the
newly interred body. However, the opposite may be more likely at least with Burial U4 05-31A and -31B, where the preservation of the primary burial was poor and fragmentary while the bones comprising the superimposing secondary burial were superior. As such, the secondary burial may have been causally unrelated to the primary burial which was subjected to diagenetic factors for a markedly longer time. These observations thus point to a ritual activity where the dead were revisited and bones were buried atop them.

*Secondary Burial - Isolated Remains*

A third mode of secondary burial involved the reburial of several thousand individual skeletal elements (Appendix G Figure 39). Throughout every stratigraphic level of each excavation unit, isolated skeletal and dental elements were encountered during excavation and screening. Isolated bones ranged in depth from several centimeters below the compact earthen floors down to sterile sand to over two meters below datum. Isolated remains bore no apparent relationships to each other or adjacent burial contexts.

In all, over 525 kg of isolated skeletal and dental remains were recovered. Isolated remains represented all skeletal elements, with many complete long bones and crania. Due to time limitations during the 2005 and 2006 laboratory seasons, only isolated long bones were inventoried and bioarchaeological data collected. A total of 2,569 long bones were documented, with an MNI of 202 subadults and 77 adult individuals. The completeness of many of the isolated bones points to careful reburial.
Quantitative and Distributional Analyses of Altered Burial Contexts

A qualitative, impressionistic assessment points to a high proportion of manipulated crania and long bones at Mórrópe. In quantifying the distribution of manipulated elements, univariate and multivariate statistical description reveals similar non-random patterns of altered human remains.

For each altered primary burial, individual skeletal elements were coded as present or absent. Counts for left and right bones combined as there were essentially no differences in the number of missing bones by side. Bones were then grouped into element classes. The resultant frequency distribution demonstrates long bones represent the most commonly missing element, followed in frequency by pelvic elements, hands and feet, clavicles, vertebrae, scapulae, and lastly, skulls. The regular focus on long bones in removal activity, even in cases of mortuary and ambiguous disruption indicates systematic behavior. In other words, ritual action seems to have underwritten these patterns.

Secondary burials are far more complex assemblages. Instead of examining univaraite distributions, a Bone Representation Index (BRI) was applied to investigate the structure of the secondary burials. A BRI is the ratio of the bones excavated and the number of bones that should have been present based on the Minimum Number of Individuals (MNI) such that \[ \text{BRI} = 100 \times \sum \left( \frac{N_{\text{observed}}}{N_{\text{expected}}} \right) \] (Bello and Andrews 2006). BRI scores were generated for subadults and adults separately and plotted.

As seen in Figure 9.21, BRI scores for subadults and adults (MNI = 320) each follow a nearly identical pattern allowing us to speak of a common pattern of skeletal
Mórrope Secondary Burials:
BRI Values for Subadult and Adult Skeletal Elements

Figure 9.21: BRI values for subadult (dashed lines) and adult (solid lines) in secondary burials.

elements that were reburied in the secondary assemblages at Mórrope. This distribution also reveals no meaningful variations in the reburial of subadult versus adult remains. Clearest emphasis is placed on the reburial of femora (BRI= 60.4) and crania (BRI= 60.3), and is followed by tibiae (BRI= 40.5), humeri (BRI= 30.8), os coxae (BRI= 32.2), mandibulae (BRI= 29.5), radii (BRI= 18.21) and ulnae (BRI= 16.39). All other skeletal element scores fall below 15, with patellae (BRI= 0.97) and ribs (BRI= 0.28) the least represented elements and for all intents and purposes are unrepresented in the secondary burials.
While long bones and crania are faithfully reburied in comparison to other elements, the overall low BRI scores points to (1) a high degree of selectivity in the bones that were re-interred, and (2) a great deal of original skeletal “mass” comprising these 327 individuals is missing. By count data alone, 94.6 percent of the original minimum number of bones – 89 percent of which are accounted for by non-long bones – are gone. While the isolated burials of long bones discussed above certainly could represent some of these missing bones, at least 1,000 long bones would still remain unaccounted for. Clearly, some of these long bones could be present in Burial U11 05-1.

BRI scores can be also plotted against Missing Bone Index (MBI) values which are defined here as the ratio between missing skeletal elements in an altered burial and the number of elements comprising the original body such that $\text{MBI} = 100 \times \frac{\sum (N_{\text{missing}})}{N_{\text{original}}}$. If reburial all of disturbed remains is consistent, MBI should match the BRI distribution. As shown in Figure 9.22, almost all MBI values are consistently higher than quantity of “missing mass.” BRI values for crania and femora actually indicate there are more femora and crania than altered burials. In sum, altered burials may be inferred as a source of material for secondary burials, but it appears many bones removed from primary burials did not come to rest in the secondary deposits.

A multiple correspondence analysis was also used to explore the structure of these secondary burial structures in multivariate space. Frequencies of bones present were calculated, grouped into element classes, and analyzed using a program written in IML using SAS 9.1 software. The results in Figure 9.23 portray non-random relationships:
Figure 9.22: Primary burial MBI scores (dashed line) and secondary burial BRI scores.

long bones group coherently, especially with the close contingent relationships between radii and ulnae, femora, humerii, fibulae, and tibiae. The lack of sterna and patellae in the reburials is consistent with their status as outliers. Crania are also represented as an outlier due to the structure of the data: unlike any other element, crania are present in all but three secondary burials in a consistent range of frequencies.
TAPHONOMIC MODEL OF BURIAL RITUAL IN COLONIAL MÓRROPE

The above data, analysis, and discussion provide the elements of a model of burial ritual and taphonomic processes at Mórrope that can now be reconstructed (Figure 9.25). When a member of the living community died, the body was first subjected to a pre-burial ritual program of which only a few pieces of evidence remain. Catholic mortuary custom would have involved a short pre-burial interval allowing for a wake followed by a
funeral mass. The presence of faunal remains in a few contexts as well as a handful of animal bones scattered throughout the Chapel could point to the persistence of feasting rituals. Pre-burial curation of the corpse for up to one month or longer is also clear from the entomological evidence of prolonged primary burials.

Following the deposition of the body, a wide range of possible outcomes awaited the skeleton. Gravity was responsible for shifting of skeletal elements in many contexts, and among the oldest burials and those placed directly in the sand, while the effects of moisture and salt were responsible for natural taphonomic transformations. Other burials, such as those that rapidly filled with sand, were completely undisturbed.

Anthropogenic alterations of the burials at Mórrope are very clear, some resulting from accidental processes or subsequent mortuary activity. These disruptions often led to the disarticulation of skeletal remains as well as removal of bones from accidentally altered funerary contexts. Intentional alterations of burials involved opening grave pits or coffins and complete exhumation. Of the former, skeletal elements could be removed, added, manipulated, and even attempts at rearticulating altered bones was noted in at least two examples. It is logical to assume that grave opening activities which removed bones contributed to later secondary burials and isolated bone reburials though no direct physical evidence establishes this link. Complete exhumation seem to have shared most of these outcomes as well, contributing to secondary burials, deposition of isolated bones, and the removal of skeletal remains. Accidental disruption of burials that resulted in the removal of bones also likely contributed to secondary burials and isolated bone burials,
Figure 8.29: A model of burial ritual and taphonomic processes at the Chapel of San Pedro de Mórrrope. Illustration by Haagen Klaus.
but again, direct physical evidence of this process is archaeologically invisible.

Considering the missing quantities of bone that were not encountered in the Chapel of San Pedro de Mórrope as inferred from BRI and MBI values, accidental disruptions that resulted in the removal of skeletal elements, grave opening, and complete exhumation would have each played a role in this phenomenon. Where these bones were taken and what was done with them remains unknown, though some speculation is offered in Chapter 11.

**CONCLUSION**

In this chapter, results of the archaeological excavations and mortuary analysis at the Chapel of San Pedro de Mórrope have been presented. Evidence of site construction, stratigraphy, mortuary patterns, cultural sequence, and living-dead interactions have been presented. Presentation of results continues into the next chapter, which tests skeletal biological hypotheses surrounding biological stress and population genetic and phenetic patterns.
CHAPTER 10

RESULTS II: SKELETAL BIOLOGY OF POSTCONTACT ADAPTIVE TRANSITIONS IN MÓRROPE –BIOLOGICAL STRESS AND BIODISTANCE

In this chapter, results derived from the bioarchaeological study of the human remains from the Chapel of San Pedro de Mórrope and the comparative late pre-Hispanic Lambayeque Valley Complex skeletal samples are presented. These data test Hypotheses II, III, IV, V and VI. Accordingly, the patterning of various lines of data pertaining to systemic biological stress, activity, oral health, population genetic structures, and interindividual biological distances are described here. A representative visual survey of pathological conditions discussed in the chapter may be found in Appendix J.

SYSTEMIC BIOLOGICAL STRESS

Paleodemographic Structures and Female Fertility

Sex could be reliably assigned to 160 late pre-Hispanic individuals and 94 postcontact adults. Of the late pre-Hispanic sample, 79 males or probable males and 81 females or probable females could be identified, while 34 individuals were ambiguous.
The postcontact sample from Mórrope included 51 males or probable males, 43 females or probable females, and 19 ambiguous individuals. Further partitioning identifies 25 males or probable males, 19 females or probable females, and five individuals of indeterminate sex in the Early/Middle Colonial sample. The Middle/Late Colonial sample features 26 males or probable males, 23 females or probable females, and 14 individuals of indeterminate sex.

The ratio of males to females is essentially identical and balanced within the late pre-Hispanic sample (Table 10.1). Postcontact samples feature a consistent, though not particularly large, bias towards a greater proportion of males in the colonial Mórrope cemetery. First, this implies the skeletal samples are indeed are at least generally representative of a living human population which features roughly equal proportions of males to females. Second, analysis of skeletal stress markers is unlikely to be biased by significantly lopsided or unequal sex distributions.

Secure age estimations were generated for 220 late pre-Hispanic and 391 postcontact individuals. Accordingly, persons who were victims of sacrifice or suspected victims of sacrifice were removed from this analysis (Huaca Loro West Tomb females, Cerro Cerrillos, and the Huaca Larga females from Túcume).

<table>
<thead>
<tr>
<th>Male: Female</th>
<th>Male: Female</th>
<th>Male: Female</th>
<th>Male: Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late-Pre-Hispanic</td>
<td>Postcontact</td>
<td>Early/Middle Colonial</td>
<td>Middle/Late Colonial</td>
</tr>
<tr>
<td>0.97 : 1.00</td>
<td>1.00 : 0.85</td>
<td>1.00 : 0.76</td>
<td>1.00 : 0.90</td>
</tr>
</tbody>
</table>

Table 10.1. Sex ratios for late pre-Hispanic and postcontact Mórrope samples.
First, distribution of late pre-Hispanic and Postcontact deaths were compared to expected age-at-death distributions of Coale and Demeney’s (1966) best-fitting West Model life table (Paine and Harpending (1998) (Figure 10.1). The distribution of deaths for the late pre-Hispanic does not compare well to model predictions for a living human population. Gross under-representation of children under 5 is indicated. Twice as many individuals are present than the model predicts in age classes 2, 4, and 5 and three times the number of expected deaths are found in age class 3. Age class 6 is the only age class to match the model prediction.

Because the late pre-Hispanic skeletons are drawn from archaeologically representative burial samples, sampling bias is not a likely cause. Therefore, the demography of late precontact Lambayeque involves a different, non-Western age-at-death pattern. West Model life table expectations are based on recent European populations, and may not be appropriate for pre-Hispanic coastal Peru. The stark underenumeration of children under age 5 possibly owes to a cultural bias: a differential mortuary program where late pre-Hispanic mortuary programs did not dispose of many children in cemeteries (Verano 1997c).

Conversely, postcontact Móorrope demography conforms far better to the West Model life table expectations in every respect. This suggests the postcontact sample is representative of a living population, but a demographic structural shift transpired from the late pre-Hispanic to Postcontact period. It is reasonable to speculate indigenous postcontact population structures were altered to become more European. Additionally, high representation of children ages 0-5 points to a European burial program.
Figure 10.1: Comparative age-at-death distributions to the West model life table.
Second, $D_{30+}/D_5+$ ratios were calculated (Table 10.2). A broad comparison between the late pre-Hispanic and Postcontact samples feature an increase from 0.4397 to 0.6028 and is indicative of decreased fertility in the Colonial Mórrope population. Finer examination of fertility ratios in terms of Early/Middle and Middle/Late Colonial samples reveals additional patterns of interest. The late pre-Hispanic-Early/Middle Colonial decrease in fertility is even clearer (0.4387 to 0.6575). Early/Middle-Middle/Late Colonial comparison reveals a decrease from 0.6575 to 0.5735 such that the Middle/Late Colonial population experienced a relatively increased birth rate. Despite this apparently mild rebound, estimated late pre-Hispanic fertility was historically the highest and never came close to being re-attained. Yet, the Middle/Late Colonial sample contains a notably larger proportion of children 0-4.9 years of age which are not considered in the $D_{30+}/D_5+$ ratios. However impressionistic, the magnitude of Middle/Late Colonial period fertility increase is probably higher than what is indicated here.

Another independent approach to examine fertility is to compare these data to age-at-death patterns of living populations with known fertility rates: the Yanomamô

<table>
<thead>
<tr>
<th>Period</th>
<th>$D_{30+}$</th>
<th>$D_{5+}$</th>
<th>$D_{30+}/D_5+$</th>
</tr>
</thead>
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<tr>
<td>Late pre-Hispanic</td>
<td>166</td>
<td>73</td>
<td>0.4397</td>
</tr>
<tr>
<td>Overall Postcontact</td>
<td>141</td>
<td>85</td>
<td>0.6028</td>
</tr>
<tr>
<td>Early/Middle Colonial</td>
<td>73</td>
<td>48</td>
<td>0.6575</td>
</tr>
<tr>
<td>Middle/Late Colonial</td>
<td>68</td>
<td>39</td>
<td>0.5735</td>
</tr>
</tbody>
</table>

Table 10.2. $D_{30+}/D_5+$ ratios of the late pre-Hispanic and Colonial samples.
(relatively high fertility) and !Kung San (moderately low fertility) in a pattern-matching exercise (Milner et al. 1989). Specifically, interest rests in a test of increased Middle/Late Colonial period fertility. Distributions are pictured in Figure 10.2. Age patterns do not directly match – nor should they – since Colonial Lambayeque differed from the reference populations ecogeographically, socially, and historically. What is of distinct importance is the relative proportional relationships between the two reference populations and the two Colonial samples. Except in age class 4, the Early/Middle Colonial sample relates nearly exactly in proportion to the lower fertility !Kung San. The Middle/Late Colonial sample behaves like the higher fertility Yanomamö. An interpretation of the Middle/Late Colonial sample as possessing a higher degree of relative fertility is consistent with these observations as well.

Figure 10.2: Relative fertility/mortality comparisons with !Kung San and Yanomamö reference populations.
Linear Enamel Hypoplasia, Porotic Hyperostosis, and Infection

Odds ratio comparisons of the prevalence two subadult markers of metabolic stress, along with periosteal infection, were first examined in an overall late pre-Hispanic-Colonial temporal comparison (Table 10.3). Linear enamel hypoplasias were found to be nearly twice as prevalent during the Late Pre-Hispanic era (\( \hat{OR} = 1.84, \chi^2 = 4.96 \)). The highest prevalence differences are found in pre-Hispanic age classes 1, 2, and 3, and are between five and seven times greater than Colonial Mórrope. Porotic hyperostosis prevalence is elevated in the postcontact sample 1.5 times (\( \hat{OR} = 0.65, \chi^2 = 3.84 \)) but is barely statistically significant. The most pronounced common odds ratio value is associated with periosteal infection (\( \hat{OR} = 0.21, \chi^2 = 14.33 \)) which is 4.76 times more likely among postcontact individuals in Mórrope.

<table>
<thead>
<tr>
<th>Pathological Condition</th>
<th>O1a</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>( \hat{OR} ) b</th>
<th>( \chi^2 )</th>
<th>Interpretation</th>
</tr>
</thead>
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<tr>
<td>Enamel Hypoplasia</td>
<td>5.17</td>
<td>7.08</td>
<td>5.28</td>
<td>0.78</td>
<td>2.71</td>
<td>0.16</td>
<td>1.84*</td>
<td>4.96</td>
<td>Significant postcontact decrease</td>
</tr>
<tr>
<td>Porotic Hyperostosis</td>
<td>0.56</td>
<td>0.55</td>
<td>1.18</td>
<td>0.81</td>
<td>0.27</td>
<td>0.85</td>
<td>0.65*</td>
<td>3.84</td>
<td>Barely significant postcontact increase</td>
</tr>
<tr>
<td>Periostitis</td>
<td>---</td>
<td>---</td>
<td>0.78</td>
<td>0.13</td>
<td>0.66</td>
<td>0.02</td>
<td>0.21**</td>
<td>14.33</td>
<td>Strongly significant postcontact increase</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level
** Significant at the 0.01 level

*aO1 thru O6 correspond to individual odds ratios for age classes 1 thru 6.
*b\( \hat{OR} \), or common odds ratio, for each pathological condition.

Table 10.3: Odds ratios results, overall late pre-Hispanic-Postcontact comparisons, subadult and adult markers of metabolic stress and infection.
Examination of these same variables by finer temporal divisions (Table 10.4) reveals additional patterns of interest. The overall decrease in enamel defects reported above appears to be the result of a non-significant biological trend toward decreased acute childhood stress from the Early/Middle to Middle/Late Colonial periods. Porotic hyperostosis prevalence is slightly lower in the Early/Middle Colonial phase compared to the late pre-Hispanic era, and the overall elevated prevalence reported in Table 10.3 appears to be a function of increased iron deficiency anemia in the Middle/Late Colonial phase. Prevalence of periosteal infection literally skyrockets in the Early/Middle Colonial period some 6.67 times ($\hat{OR} = 0.15, \chi^2 = 20.41$). Still far elevated over the late pre-Hispanic baseline, prevalence of Middle/Late Colonial periostitis is suggestive of a non-significant trend towards a decline in chronic skeletal infection.

Odds ratios comparing the prevalence of these pathological conditions by sex within and between time periods are also instructive. Because of the smaller number of adult males in females in the Mórrope sample, subdivided Early/Middle and Middle/Late Colonial comparisons are not statistically tenable. Thus, only precontact-postcontact comparisons are made. Within-period comparisons (Table 10.5) are non-significant and similar. While the prevalence of periostitis is relative low in the late pre-Hispanic period, much of it appears to be concentrated among males ($\hat{OR} = 4.88, \chi^2 = 4.31$). The non-significant biological trends appear to all involve greater tendencies for elevated male prevalence in both pre- and postcontact sample, though a non-significant trend of greater female prevalence of enamel defects is observed among late pre-Hispanic women. Between-group comparisons of pathological conditions by sex (Table 10.6) points to
<table>
<thead>
<tr>
<th>Pathological Condition</th>
<th>O1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ÔR, LPH-E/MC&lt;sup&gt;b&lt;/sup&gt;</th>
<th>O1&lt;sup&gt;c&lt;/sup&gt;</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ÔR, E/MC-M/LC&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enamel Hypoplasia</td>
<td>3.58</td>
<td>5.14</td>
<td>4.23</td>
<td>0.62</td>
<td>1.36</td>
<td>0.13</td>
<td>1.29</td>
<td>1.37</td>
<td>1.00</td>
<td>2.01</td>
<td>1.49</td>
<td>2.00</td>
<td>6.00</td>
<td>1.72</td>
<td>Non-significant decrease over time</td>
</tr>
<tr>
<td>Porotic Hyperostosis</td>
<td>0.62</td>
<td>3.00</td>
<td>1.15</td>
<td>1.13</td>
<td>0.85</td>
<td>1.27</td>
<td>1.17</td>
<td>0.83</td>
<td>1.00</td>
<td>0.46</td>
<td>0.39</td>
<td>0.64</td>
<td>0.83</td>
<td>0.55</td>
<td>Non-significant E/MC decrease followed by non-sig. L/MC increase</td>
</tr>
<tr>
<td>Periostitis</td>
<td>---</td>
<td>---</td>
<td>0.75</td>
<td>0.08</td>
<td>0.23</td>
<td>0.02</td>
<td>0.15**</td>
<td>---</td>
<td>---</td>
<td>0.50</td>
<td>2.00</td>
<td>1.60</td>
<td>0.89</td>
<td>1.23</td>
<td>Major E/MC increase, followed by non-sig. M/LC decrease</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level  
** Significant at the 0.01 level

<sup>a</sup>O1 thru O6 correspond to individual odds ratios for age classes 1 thru 6, Late Pre-Hispanic-Early/Middle Colonial samples.  
<sup>b</sup>ÔR, or common odds ratio, for each pathological condition for the LPH (Late Pre-Hispanic) and E/MC (Early/Middle Colonial) comparison.  
<sup>c</sup>O1 thru O6 correspond to individual odds ratios for age classes 1 thru 6, E/MC (Early/Middle Colonial) and M/LC (Middle-Late Colonial) samples.  
<sup>d</sup>ÔR, or common odds ratio, for each pathological condition for the E/MC (Early/Middle Colonial) and M/LC (Middle-Late Colonial) comparison.

Table 10.4. Odds ratio results for Late Pre-Hispanic-Early/Middle Colonial comparisons and Early/Middle Colonial-Middle/Late Colonial comparisons of subadult and adult markers of metabolic stress and infection.
<table>
<thead>
<tr>
<th>Pathological Condition</th>
<th>O3&lt;sup&gt;a&lt;/sup&gt;</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>( \hat{\text{OR}} ), Pre-Hispanic Prevalence</th>
<th>O3&lt;sup&gt;c&lt;/sup&gt;</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>( \hat{\text{OR}} ), Postcontact Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enamel</td>
<td>0.40</td>
<td>1.35</td>
<td>0.75</td>
<td>1.33</td>
<td>0.86</td>
<td>9.00</td>
<td>8.00</td>
<td>4.00</td>
<td>0.75</td>
<td>3.61</td>
</tr>
<tr>
<td>Hypoplasia</td>
<td>1.24</td>
<td>1.28</td>
<td>0.30</td>
<td>2.33</td>
<td>1.05</td>
<td>0.37</td>
<td>3.33</td>
<td>3.00</td>
<td>0.17</td>
<td>1.04</td>
</tr>
<tr>
<td>Porotic Hyperostosis</td>
<td>6.00</td>
<td>1.18</td>
<td>2.25</td>
<td>2.22</td>
<td><strong>4.88</strong></td>
<td>0.00</td>
<td>0.00</td>
<td>4.5</td>
<td>0.30</td>
<td>2.44</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level  
** Significant at the 0.01 level  
<sup>a</sup>O3 thru O6 correspond to individual odds ratios for age classes 3 thru 6, Late Pre-Hispanic and Postcontact samples.  
<sup>b</sup>\( \hat{\text{OR}} \), or common odds ratio, for each pathological condition for Late Pre-Hispanic sample.  
<sup>c</sup>O3 thru O6 correspond to individual odds ratios for age classes 3 thru 6, Late Pre-Hispanic and Postcontact samples.  
<sup>d</sup>\( \hat{\text{OR}} \), or common odds ratio, for each pathological condition for Postcontact sample.
several informative observations. Pre-Hispanic males exhibit a slightly higher prevalence of enamel hypoplasias while postcontact females slightly surpass the prevalence of defects among their late pre-Hispanic forebears. Colonial males display a non-significant trend towards decreased porotic hyperostosis. Therefore, the elevated postcontact occurrence of porotic hyperostosis reported in Table 10.3 is centered among Colonial females who display a trend towards increased prevalence along with individuals of indeterminate sex which are not considered in these comparisons. Again, the most pronounced changes in biological stress appear in the form of periosteal infection, with both Colonial males (\( \hat{OR} = 0.28, \chi^2 = 6.52 \)) and females (\( \hat{OR} = 0.17, \chi^2 = 9.58 \)) displaying increased prevalence of infection. Moreover, postcontact females appear to have experienced greater infection-related morbidity than contemporaneous males.

**Specific Disease Processes**

Specific chronic disease processes contribute as well to overall population morbidity, but the handful of individuals affected by specific disease processes in the late pre-Hispanic (n=6) and Postcontact Lambayeque Valley Complex (n=4) is so small that a test of significance is needless. Burials 5 and 22 from the Caleta de San José and Burial 22 from Illimo display vertebral lesions most consistent with tuberculosis. Tuberculosis is a bacterial infection resulting from inhalation of *Mycobacterium tuberculosis* or ingestion of the milk or meat of animals infected with *Mycobacterium bovis* (Ortner 1999). Unfortunately, both skeletons were incomplete and disturbed which prevents a complete picture of lesion distribution on the entire skeleton and confounds inclusive
differential diagnoses. Macroscopic morphological characteristics of the vertebral lesions are most consistent with tuberculosis (Temple et al. 2005). As with tuberculosis, these lesions are destructive with bone formation around and within the margins of the multiple lytic foci present on contiguous inferior thoracic and superior vertebral bodies (Resnick and Niwayama 1995). Other diagnostic options include brucellosis, echinococcosis, paracoccidioidomycosis, osteomyelitis, and pseudopathology. Each of these differential diagnoses can be regarded as unlikely based on failure of observed lesion size, location distribution, proliferative response to match any of these conditions (Temple et al. 2005; also see Ortner 2003; Resnick and Niwayama 1995).

One Middle Sicán individual appears to show evidence of early prostatic carcinoma (Barybar and Shimada 1993). Caleta de San José Burial 27 also appears to feature possible correlates to recently disseminated prostate cancer. Multiple, irregular radiating trabeculae are found projecting from the anterior and left and right anteriolateral aspects of most of the L3 and superior L4 vertebral bodies. Large areas of the inferior L3 body are characterized by irregular lytic lesions that show no evidence of inflammatory response. Similar bone destruction is present on the superior L4 body but lesions are far smaller and numerous. While prostate cancer is often osteoblastic producing an extremely sclerotic reaction as seen here, a limited degree of bone destruction can accompany the condition (Ortner 2003: 535). Spinal tuberculosis and DJD can be readily rejected as differential diagnoses.

During the postcontact era at Mórrope, Middle/Late Colonial period Burial U10 05-29 was found with large, bilateral lytic lesions of the posterior cranium involving the
anterioinferior occipital bone extending across the inferioposterior parietal. These two massive lesions completely perforated the inner and outer table. They were active at the time of death and exposed the meninges. Both left and right lesions exhibit large, irregular destructive foci surrounded by ragged margins that show no evidence of inflammation or healing.

Again, tuberculosis is the most likely diagnostic option for Burial U1005-29. The distribution of tuberculosis infection in subadults is markedly different from adults, with the cranium being the most frequent site of skeletal manifestation. Subadult tuberculosis of the cranial vault can result from hematogenous dissemination or a direct extension of the tuberculoma of the brain or dura and is characterized by chronic, progressive destruction of the cranial vault accompanied by ragged margins (Ortner 2003: 248). Two other diagnostic options, Langerhans cell hystocytosis and metastatic neuroblastoma, must also be considered. Unlike the observed lesions, Langerhans cell hystocytosis rarely cross suture lines and metastatic neuroblastoma is often accompanied by marked osteoblastic activity.

A single case of possible postcontact treponemal infection was identified in Burial U405-32, an adult female over the age of 45. She was probably one of the first people buried at Chapel of San Pedro de Mórrope, placed in sterile sand at a depth of 340cm BD. As described in Chapter 9, her body appeared unceremoniously thrown into the burial pit.

Burial U405-32 was fragile and fragmentary. Paraloid B72 had to be applied to most of the skeleton before it could be removed. The skeleton was riddled by multiple and extensive lesions indicative of a chronic and systemic infectious process. Cranial
vault and frontal bone fragments featured multiple caries sicca lesions. The left clavicle and inferior left and right humerus included widespread periosteal bone inflammation and such extensive medullary osteosclerosis such that the medullary cavity was completely obliterated. Periosteal reactions were observed on external surfaces of rib fragments and the sternum. Patches of periosteal inflammation were also found inferior to the base of the left acromion process.

The entire diaphysis of the right femur was deformed by massive periosteal response, extensive sclerotic placquing, pitting, and complete medullary obliteration. The left femur displayed a region of markedly elevated periosteal bone formation inferior to the greater trochanter. This active lesion was restricted to the lateral side of the femur and was characterized by poorly organized but large radiating bone spicules. Both tibiae and fibulae featured small patches of remodeling minor periosteal lesions. The lower one-third of both tibial diaphyses were pathologically thickened and bowed medially.

Of all these features, caries sicca lesions are the most diagnostic feature of venereal syphilis in dry bone (Ortner 2003:280). Distribution of lesions elsewhere throughout the skeleton of U405-32 is consistent with tertiary syphilis. Yet, the lack of similar bilateral expression of infection on the femora is very unusual as is the lack of active involvement of the tibia – which is the most commonly active site of tertiary syphilis by a factor of 10 (Ortner 2003:283). However, no differential diagnosis can better explain this set of lesion patterning such that U405-32 may represent an atypical manifestation of venereal syphilis in the archaeological record.
Terminal Adult Stature

Estimation of terminal adult stature was first preceded by evaluation of body proportions in the late pre-Hispanic and colonial Mórrope samples. Brachial and crural indices are essentially identical, and are highly similar to those generated for Moche period individuals at El Brujo and Inka-period Puruchuco on the central coast (Table 10.7) (Gaither 2004). As these body proportions are identical, estimated statures can be directly compared.

Terminal adult stature was then calculated separately for males and females (Table 10.8). Late pre-Hispanic male skeletal stature averaged 158.48 cm, while women averaged 151.28 cm. Postcontact Mórrope males averaged 157.56 cm in height while

<table>
<thead>
<tr>
<th>Sample</th>
<th>Brachial Index</th>
<th>Crural Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late pre-Hispanic Lambayeque</td>
<td>75.98</td>
<td>84.01</td>
</tr>
<tr>
<td>Colonial Lambayeque</td>
<td>76.07</td>
<td>84.46</td>
</tr>
<tr>
<td>El Brujo- Moche a</td>
<td>77.68</td>
<td>83.59</td>
</tr>
<tr>
<td>Puruchuco a</td>
<td>78.68</td>
<td>83.63</td>
</tr>
</tbody>
</table>

a Gaither 2004

Table 10.7: Brachial and crural index comparisons.
<table>
<thead>
<tr>
<th>Sample</th>
<th>Average Male Terminal Adult Stature (cm± 3.417)</th>
<th>Average Female Terminal Adult Stature (cm± 3.816)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late pre-Hispanic Lambayeque</td>
<td>158.48</td>
<td>151.06</td>
</tr>
<tr>
<td>Colonial Lambayeque</td>
<td>157.56</td>
<td>147.95</td>
</tr>
<tr>
<td>Sicán capital ^a</td>
<td>161.90</td>
<td>156.70</td>
</tr>
<tr>
<td>Sipán – elite early Moche ^b</td>
<td>161.5</td>
<td>156.6</td>
</tr>
<tr>
<td>Pacatnamú – Late Moche ^c</td>
<td>157.60</td>
<td>146.80</td>
</tr>
<tr>
<td>El Brujo- Moche ^d</td>
<td>159.85</td>
<td>149.03</td>
</tr>
<tr>
<td>El Brujo – provincial Sicán ^a</td>
<td>159.0</td>
<td>146.60</td>
</tr>
<tr>
<td>Huaca de la Luna- Plaza 3A Sacrifice Victims ^e</td>
<td>156.40</td>
<td>---</td>
</tr>
<tr>
<td>Puruchuco ^d</td>
<td>159.87</td>
<td>149.25</td>
</tr>
<tr>
<td>Modern Lambayeque – San José ^f</td>
<td>156.6</td>
<td>145.10</td>
</tr>
<tr>
<td>Modern Lambayeque – Monsefú ^f</td>
<td>158.60</td>
<td>145.80</td>
</tr>
</tbody>
</table>

^a Farnum 2002   ^d Gaither 2004
^b Verano 1997b  ^e Verano 1998
^c Verano 1997c  ^f Lasker 1962; living stature given versus skeletal stature used in all other cases.

Table 10.8: Male and female terminal adult stature, north and central Peruvian coast.

females averaged 147.95 cm tall. Average stature in the postcontact period appears to decrease 0.92 cm while women were, on average, 4.02 cm shorter. The decrease in male and female stature is very minimal and within the associated error ranges for males and females such that no pre- versus postcontact change is apparent. Regionally and

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diachronically, these results are remarkably similar to other documented samples including living twentieth century Lambayeque regional postcontact populations.

**Childcare: Artificial Cranial Deformation**

Fronto-occipital binding is virtually ubiquitous in the late pre-Hispanic period. The frequency of this common deformation reached as high as 88.5 percent of individuals in the Cerro Cerrillos burial sample. Of the 309 crania that were complete enough to be scored for artificial cranial deformation in the postcontact Mórrope sample, only four individuals possessed fronto-occipital deformation. Cranial binding in a fifth individual was inconclusive, though a possible pad impression was found centered at the lambda. The crania of the remaining 304 individuals were not altered in any way.

**ACTIVITY AND LIFESTYLE**

Evaluation of activity and lifestyle using odds ratios began with an overall late pre-Hispanic-Colonial period comparison of degenerative joint disease (DJD) and traumatic injury (Table 10.9). The Colonial sample indicates notably elevated risk of DJD in joint systems of the arm. The postcontact shoulder joint is 2.2 times more likely to be affected by DJD (Î¼R = 0.45, \( \chi^2 = 4.22 \)), prevalence of DJD of the elbow increases 2.7 times (Î¼R = 0.37, \( \chi^2 = 11.27 \)) and is elevated in the wrist is 5.56 times (Î¼R = 0.18, \( \chi^2 = 13.17 \)). The only other statistically significant change is found in the knee joint, where
<table>
<thead>
<tr>
<th>Pathological Condition</th>
<th>O1*</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>OR b</th>
<th>$\chi^2_{1}$</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJD Shoulder</td>
<td>---</td>
<td>---</td>
<td>0.67</td>
<td>0.72</td>
<td>0.08</td>
<td>0.72</td>
<td><strong>0.45</strong></td>
<td><strong>4.22</strong></td>
<td>Significant postcontact increase</td>
</tr>
<tr>
<td>DJD Elbow</td>
<td>---</td>
<td>---</td>
<td>0.05</td>
<td>0.47</td>
<td>1.15</td>
<td>0.42</td>
<td><strong>0.37</strong></td>
<td><strong>11.27</strong></td>
<td>Strongly significant postcontact increase</td>
</tr>
<tr>
<td>DJD Wrist</td>
<td>---</td>
<td>---</td>
<td>0.17</td>
<td>0.15</td>
<td>0.56</td>
<td>0.09</td>
<td><strong>0.18</strong></td>
<td><strong>13.17</strong></td>
<td>Strongly significant postcontact increase</td>
</tr>
<tr>
<td>DJD Hand</td>
<td>---</td>
<td>---</td>
<td>0.61</td>
<td>4.09</td>
<td>2.33</td>
<td>0.15</td>
<td>0.74</td>
<td>0.38</td>
<td>No significant change</td>
</tr>
<tr>
<td>DJD C-Spine</td>
<td>---</td>
<td>---</td>
<td>0.92</td>
<td>1.63</td>
<td>0.58</td>
<td>0.20</td>
<td>0.57</td>
<td>2.04</td>
<td>No significant change</td>
</tr>
<tr>
<td>DJD T-Spine</td>
<td>---</td>
<td>---</td>
<td>1.55</td>
<td>1.68</td>
<td>0.67</td>
<td>0.13</td>
<td>0.71</td>
<td>0.82</td>
<td>No significant change</td>
</tr>
<tr>
<td>DJD L-Spine</td>
<td>---</td>
<td>---</td>
<td>0.83</td>
<td>0.85</td>
<td>1.17</td>
<td>0.27</td>
<td>0.70</td>
<td>0.91</td>
<td>No significant change</td>
</tr>
<tr>
<td>Schmorl’s Depressions</td>
<td>---</td>
<td>---</td>
<td>0.13</td>
<td>0.54</td>
<td>0.88</td>
<td>0.30</td>
<td>0.42</td>
<td>2.33</td>
<td>No significant change</td>
</tr>
<tr>
<td>DJD Hip</td>
<td>---</td>
<td>---</td>
<td>0.54</td>
<td>8.50</td>
<td>1.33</td>
<td>1.09</td>
<td>1.78</td>
<td>1.63</td>
<td>No significant change</td>
</tr>
<tr>
<td>DJD Knee</td>
<td>---</td>
<td>---</td>
<td>0.05</td>
<td>0.29</td>
<td>0.57</td>
<td>0.44</td>
<td><strong>0.28</strong></td>
<td><strong>14.35</strong></td>
<td>Strongly significant postcontact increase</td>
</tr>
<tr>
<td>DJD Ankle</td>
<td>---</td>
<td>---</td>
<td>1.36</td>
<td>6.92</td>
<td>0.40</td>
<td>1.33</td>
<td>1.52</td>
<td>0.86</td>
<td>No significant change</td>
</tr>
<tr>
<td>DJD Foot</td>
<td>---</td>
<td>---</td>
<td>1.25</td>
<td>1.24</td>
<td>0.70</td>
<td>1.54</td>
<td>1.20</td>
<td>0.11</td>
<td>No significant change</td>
</tr>
<tr>
<td>Traumatic Injury</td>
<td>---</td>
<td>---</td>
<td>0.58</td>
<td>0.78</td>
<td>0.97</td>
<td>0.97</td>
<td>1.33</td>
<td>0.64</td>
<td>No significant change</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level  
** Significant at the 0.01 level

* O1 thru O6 correspond to individual odds ratios for age classes 1 thru 6.  
** OR, or common odds ratio, for each pathological condition.

Table 10.9: Odds ratios results, late pre-Hispanic-Postcontact comparisons of DJD and traumatic injury.
postcontact prevalence of DJD was elevated 3.57 times (ÔR = 0.28, χ² = 14.35). A non-significant trend for greater risk of traumatic injury during the colonial period is also evident. Examination of individual odds ratios by age class for DJD in particular reveals that the greatest magnitude of significant postcontact change is often concentrated among the younger ages classes 3 and 4. DJD in the elbow and knee, for example, is 20 times more likely among age class 3 postcontact young adults, for example. Elsewhere, most other odds ratios that indicate elevated postcontact prevalence of pathological conditions such as spinal DJD, Schmorl’s Depressions, and traumatic skeletal injury.

Late pre-Hispanic-Early/Middle Colonial period comparisons (Table 10.10) show all statistically significant differences are found in Early/Middle Colonial individuals in Mórrope. Early/Middle Colonial DJD prevalence in the shoulder rises some 3.2 times (ÔR = 0.31, χ² = 10.96), 4.8 times in the elbow (ÔR = 0.21, χ² = 27.08), 9.9 times in the wrist joint (ÔR = 0.10, χ² = 24.01), 2.7 times in the hand (ÔR = 0.35, χ² =4.37), and 2.3 times in the knee (ÔR = 0.43, χ² = 3.97). Statistically significant changes in vertebral DJD not detected earlier are however evident here. Increased Early/Middle Colonial DJD prevalence is noted among cervical vertebrae (ÔR = 0.39, χ² =5.29), thoracic vertebrae (ÔR = 0.41, χ² =4.75), and lumbar vertebrae (ÔR = 0.39, χ²=4.06). Following these changes, Middle/Late Colonial period individuals show a mix of prevalence changes, but all are non-significant inferred biological trends. This is to say particularly the statistically significant results noted in Table 10.9 are a function of a well-defined
discontinuous increase in Early/Middle Colonial DJD patterning after which DJD prevalence changes little.

Temporal variation of DJD and trauma by sex reveals additional patterns. (Tables 10.11 and 10.12) Within-period comparisons reveals that during the late pre-Hispanic era, males universally dominate the statistically significant elevated relationships DJD and traumatic injury as well as most of the non-significant trends as well. Greater male prevalence is also noted among the postcontact population, especially with elevated male prevalence in the shoulder, elbow, wrist, and cervical spine. During the postcontact period, males similarly dominate most significant and non-significant patterns, with the exception of Schmorl’s Depressions and DJD of the ankle and the foot. Women in both periods appear to exhibit a greater tendency to exhibit Schmorl’s Depressions, and by inference, intervertebral disk herniations. Between period male-female comparisons (Table 10.12) show that in every one of the 13 comparisons of DJD and traumatic injury, elevated prevalence is clear among the postcontact males, especially in statistically significant relationships in DJD of the elbow, wrist, lumbar spine, hip, and knee, as well as Schmorl’s Depressions. Compared to their late pre-Hispanic counterparts, women in Mórope similarly display universally elevated patterns of DJD, significant in the shoulder, elbow, wrist, and knee. The only category where DJD risk was greater in pre-Hispanic women was the hip joint and was statistically significant (ÔR = 2.71, χ² =5.33).
<table>
<thead>
<tr>
<th>Pathological Condition</th>
<th>O1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ÔR, LPH-E/MC&lt;sup&gt;b&lt;/sup&gt;</th>
<th>O1&lt;sup&gt;c&lt;/sup&gt;</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ÔR, E/MC-M/LC&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJD Shoulder</td>
<td>---</td>
<td>---</td>
<td>0.23</td>
<td>0.66</td>
<td>0.13</td>
<td>0.33</td>
<td>0.31**</td>
<td>---</td>
<td>---</td>
<td>0.69</td>
<td>2.33</td>
<td>1.00</td>
<td>0.75</td>
<td>1.23</td>
<td>E/MC increase, followed by non-sig. M/LC decrease</td>
</tr>
<tr>
<td>DJD Elbow</td>
<td>---</td>
<td>---</td>
<td>0.03</td>
<td>0.35</td>
<td>0.24</td>
<td>0.27</td>
<td>0.21**</td>
<td>---</td>
<td>---</td>
<td>1.20</td>
<td>1.81</td>
<td>3.55</td>
<td>0.42</td>
<td>1.39</td>
<td>E/MC increase, followed by non-sig. M/LC decrease</td>
</tr>
<tr>
<td>DJD Wrist</td>
<td>---</td>
<td>---</td>
<td>0.08</td>
<td>0.06</td>
<td>0.13</td>
<td>0.11</td>
<td>0.10**</td>
<td>---</td>
<td>---</td>
<td>0.85</td>
<td>4.80</td>
<td>1.0</td>
<td>0.35</td>
<td>1.14</td>
<td>E/MC increase, followed by non-sig. M/LC decrease</td>
</tr>
<tr>
<td>DJD Hand</td>
<td>---</td>
<td>---</td>
<td>0.25</td>
<td>1.13</td>
<td>0.78</td>
<td>0.09</td>
<td>0.35**</td>
<td>---</td>
<td>---</td>
<td>0.38</td>
<td>0.67</td>
<td>0.17</td>
<td>1.40</td>
<td>0.64</td>
<td>E/MC increase, followed by non-sig. M/LC increase</td>
</tr>
<tr>
<td>DJD C-Spine</td>
<td>---</td>
<td>---</td>
<td>0.52</td>
<td>1.33</td>
<td>0.34</td>
<td>0.14</td>
<td>0.39*</td>
<td>---</td>
<td>---</td>
<td>0.33</td>
<td>1.50</td>
<td>0.40</td>
<td>1.78</td>
<td>0.89</td>
<td>E/MC increase, followed by non-sig. M/LC increase</td>
</tr>
<tr>
<td>DJD TSpine</td>
<td>---</td>
<td>---</td>
<td>1.80</td>
<td>1.11</td>
<td>0.10</td>
<td>0.15</td>
<td>0.41*</td>
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<td>---</td>
<td>0.22</td>
<td>3.60</td>
<td>3.50</td>
<td>0.75</td>
<td>1.34</td>
<td>Non-significant decrease over time</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level  
** Significant at the 0.01 level  
<sup>a</sup>O1 thru O6 correspond to individual odds ratios for age classes 1 thru 6, Late Pre-Hispanic-Early/Middle Colonial samples.  
<sup>b</sup>ÔR, or common odds ratio, for each pathological condition for the LPH (Late Pre-Hispanic) and E/MC (Early/Middle Colonial) comparison.  
<sup>c</sup>O1 thru O6 correspond to individual odds ratios for age classes 1 thru 6, E/MC (Early/Middle Colonial) and M/LC (Middle-Late Colonial) samples.  
<sup>d</sup>ÔR, or common odds ratio, for each pathological condition for the E/MC (Early/Middle Colonial) and M/LC (Middle-Late Colonial) comparison.  

Table 10.10: Odds ratio results for Late Pre-Hispanic-Early/Middle Colonial and Early/Middle Colonial-Middle/Late Colonial comparisons, DJD and traumatic injury.
<table>
<thead>
<tr>
<th>Pathological Condition</th>
<th>O1</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ÔR, E/MC&lt;sup&gt;b&lt;/sup&gt;</th>
<th>O1&lt;sup&gt;c&lt;/sup&gt;</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ÔR, E/MC-M/LC&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJD L-Spine</td>
<td>---</td>
<td>---</td>
<td>0.62</td>
<td>1.04</td>
<td>0.23</td>
<td>0.24</td>
<td>0.46&lt;sup&gt;*&lt;/sup&gt;</td>
<td>---</td>
<td>0.75</td>
<td>0.50</td>
<td>6.00</td>
<td>0.75</td>
<td>1.09</td>
<td>E/MC increase, followed by non-sig. M/LC decrease</td>
<td></td>
</tr>
<tr>
<td>Schmorl’s Depressions</td>
<td>---</td>
<td>---</td>
<td>0.36</td>
<td>0.64</td>
<td>0.52</td>
<td>0.50</td>
<td>0.50&lt;sup&gt;*&lt;/sup&gt;</td>
<td>---</td>
<td>0.20</td>
<td>0.60</td>
<td>0.67</td>
<td>1.33</td>
<td>0.65</td>
<td>E/MC increase, followed by non-sig. M/LC increase</td>
<td></td>
</tr>
<tr>
<td>DJD Hip</td>
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<td>---</td>
<td>0.89</td>
<td>5.13</td>
<td>0.83</td>
<td>0.93</td>
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<td>0.33</td>
<td>0.50</td>
<td>0.28</td>
<td>1.71</td>
<td>0.65</td>
<td>Non-sig. E/MC decrease, followed by non-sig. M/LC increase</td>
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</tr>
<tr>
<td>DJD Knee</td>
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<td>---</td>
<td>1.63</td>
<td>0.69</td>
<td>0.25</td>
<td>0.14</td>
<td>0.43&lt;sup&gt;*&lt;/sup&gt;</td>
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<td>0.40</td>
<td>0.67</td>
<td>0.26</td>
<td>3.00</td>
<td>0.61</td>
<td>E/MC increase, followed by non-sig. M/LC increase</td>
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<td>0.66</td>
<td>0.71</td>
<td>Non-significant increase over time</td>
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<td>0.62</td>
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<td>0.72</td>
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<td>0.50</td>
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<td>0.08</td>
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<td>Non-significant increase over time</td>
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<td>O5</td>
<td>O6</td>
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<td>Pre-Hispanic Prevalance</td>
<td>O3c</td>
<td>O4</td>
<td>O5</td>
<td>O6</td>
<td>ÔRd, Postcontact</td>
<td>Postcontact Prevalence</td>
<td></td>
<td></td>
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<tr>
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<td>0.33</td>
<td>2.30</td>
<td>0.69</td>
<td>1.73</td>
<td>Male +</td>
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<td>6.67</td>
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<td>3.36*</td>
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<td>2.09</td>
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<td>Male +</td>
<td>1.35</td>
<td>11.00</td>
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<td>0.71</td>
<td></td>
<td>2.71*</td>
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<tr>
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<td>0.56</td>
<td>1.27</td>
<td>9.75</td>
<td>5.50</td>
<td>4.35*</td>
<td>Male +</td>
<td>1.33</td>
<td>6.00</td>
<td>9.00</td>
<td>4.00</td>
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<td>3.56*</td>
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<tr>
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<td>0.38</td>
<td>0.69</td>
<td>Female +</td>
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<td>0.57</td>
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<td>2.00</td>
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<td>1.39</td>
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<tr>
<td>DJD C-Spine</td>
<td>2.27</td>
<td>1.08</td>
<td>5.09</td>
<td>6.6</td>
<td>2.93*</td>
<td>Male +</td>
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<td>0.00</td>
<td>4.50</td>
<td>14.00</td>
<td></td>
<td>4.78*</td>
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<tr>
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<td>1.25</td>
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<td>4.88</td>
<td>4.29</td>
<td>1.95</td>
<td>Male +</td>
<td>1.00</td>
<td>1.33</td>
<td>1.33</td>
<td>3.50</td>
<td></td>
<td>1.53</td>
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<tr>
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<td>2.74</td>
<td>3.52</td>
<td>1.24</td>
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<td>2.55</td>
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<tr>
<td>Schmorl’s Depressions</td>
<td>2.47</td>
<td>0.89</td>
<td>0.72</td>
<td>0.34</td>
<td>0.76</td>
<td>Female +</td>
<td>0.83</td>
<td>0.43</td>
<td>1.00</td>
<td>1.50</td>
<td></td>
<td>0.89</td>
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<tr>
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<td>0.45</td>
<td>0.060</td>
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<td>0.41</td>
<td>0.33</td>
<td>6.66</td>
<td></td>
<td>1.14</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>DJD Knee</td>
<td>0.43</td>
<td>1.67</td>
<td>4.29</td>
<td>4.66</td>
<td>2.74*</td>
<td>Male +</td>
<td>2.22</td>
<td>1.29</td>
<td>0.63</td>
<td>3.00</td>
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<td>1.43</td>
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<tr>
<td>DJD Ankle</td>
<td>0.96</td>
<td>0.32</td>
<td>0.50</td>
<td>1.25</td>
<td>0.64</td>
<td>Female +</td>
<td>0.30</td>
<td>0.44</td>
<td>0.66</td>
<td>4.00</td>
<td></td>
<td>0.96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DJD Foot</td>
<td>1.75</td>
<td>0.07</td>
<td>1.30</td>
<td>1.60</td>
<td>1.05</td>
<td>Male +</td>
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<td>0.60</td>
<td>0.20</td>
<td>0.75</td>
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<td>0.48</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Traumatic Injury</td>
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<td>5.46</td>
<td>4.00</td>
<td>2.83*</td>
<td>Male +</td>
<td>0.00</td>
<td>0.00</td>
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<td></td>
<td>2.44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level

⁵O3 thru O6 correspond to individual odds ratios for age classes 3 thru 6 for which biological sex can be estimated, Late Pre-Hispanic sample.

bÔR, or common odds ratio, for each pathological condition for Late pre-Hispanic male vs. female comparison.

cO3 thru O6 correspond to individual odds ratios for age classes 3 thru 6 for which biological sex can be estimated, Postcontact sample.

dÔR, or common odds ratio, for each pathological condition for Postcontact male vs. female comparison.

Table 10.11: Within-Period Late Pre-Hispanic versus Postcontact comparison of DJD and traumatic injury by sex.
## Table 10.12: Between-Period Late Pre-Hispanic versus Postcontact comparison of DJD and traumatic injury by sex.

<table>
<thead>
<tr>
<th>Pathological Condition</th>
<th>O3*</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ORb</th>
<th>Prevalance, Males</th>
<th>O3c</th>
<th>O4</th>
<th>O5</th>
<th>O6</th>
<th>ORd</th>
<th>Prevalance, Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJD Shoulder</td>
<td>0.36</td>
<td>1.11</td>
<td>0.26</td>
<td>0.33</td>
<td>0.48</td>
<td>Postcontact +</td>
<td>0.16</td>
<td>0.29</td>
<td>0.04</td>
<td>0.32</td>
<td>0.14**</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>DJD Elbow</td>
<td>0.55</td>
<td>0.17</td>
<td>0.17</td>
<td>0.84</td>
<td>0.21</td>
<td>Postcontact +</td>
<td>0.33</td>
<td>0.84</td>
<td>0.34</td>
<td>0.07</td>
<td>0.20**</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>DJD Wrist</td>
<td>0.21</td>
<td>0.11</td>
<td>0.19</td>
<td>0.05</td>
<td>0.13**</td>
<td>Postcontact +</td>
<td>0.15</td>
<td>0.86</td>
<td>0.14</td>
<td>0.08</td>
<td>0.18**</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>DJD Hand</td>
<td>0.60</td>
<td>2.00</td>
<td>0.20</td>
<td>0.13</td>
<td>0.37</td>
<td>Postcontact +</td>
<td>0.27</td>
<td>2.00</td>
<td>0.83</td>
<td>0.30</td>
<td>0.52</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>DJD C-Spine</td>
<td>0.47</td>
<td>0.82</td>
<td>0.24</td>
<td>0.08</td>
<td>0.30*</td>
<td>Postcontact +</td>
<td>0.35</td>
<td>1.71</td>
<td>0.21</td>
<td>0.24</td>
<td>0.39</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>DJD T-Spine</td>
<td>0.46</td>
<td>1.36</td>
<td>0.30</td>
<td>0.16</td>
<td>0.50</td>
<td>Postcontact +</td>
<td>1.20</td>
<td>4.00</td>
<td>0.21</td>
<td>0.05</td>
<td>0.46</td>
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</tr>
<tr>
<td>DJD L-Spine</td>
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<td>0.20</td>
<td>0.38</td>
<td>0.31</td>
<td>0.27*</td>
<td>Postcontact +</td>
<td>1.00</td>
<td>10.50</td>
<td>0.27</td>
<td>0.08</td>
<td>0.58</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>Schmorl’s Diseases</td>
<td>0.07</td>
<td>1.11</td>
<td>0.46</td>
<td>0.15</td>
<td>0.21**</td>
<td>Postcontact +</td>
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<td>0.56</td>
<td>0.85</td>
<td>1.45</td>
<td>0.67</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>DJD Hip</td>
<td>0.70</td>
<td>9.77</td>
<td>0.96</td>
<td>0.07</td>
<td>0.31**</td>
<td>Postcontact +</td>
<td>1.56</td>
<td>2.25</td>
<td>2.33</td>
<td>5.42</td>
<td>2.71*</td>
<td>Pre-Hispanic +</td>
</tr>
<tr>
<td>DJD Knee</td>
<td>1.60</td>
<td>0.22</td>
<td>0.46</td>
<td>0.22</td>
<td>0.34*</td>
<td>Postcontact +</td>
<td>1.17</td>
<td>0.08</td>
<td>0.05</td>
<td>0.09</td>
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</tr>
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<td>0.67</td>
<td>0.29</td>
<td>0.20</td>
<td>0.39</td>
<td>Postcontact +</td>
<td>0.58</td>
<td>2.00</td>
<td>0.41</td>
<td>1.00</td>
<td>0.89</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>DJD Foot</td>
<td>0.75</td>
<td>0.83</td>
<td>0.50</td>
<td>1.20</td>
<td>0.84</td>
<td>Postcontact +</td>
<td>0.28</td>
<td>3.00</td>
<td>0.07</td>
<td>1.25</td>
<td>0.50</td>
<td>Postcontact +</td>
</tr>
<tr>
<td>Traumatic Injury</td>
<td>1.50</td>
<td>0.70</td>
<td>1.20</td>
<td>0.44</td>
<td>0.81</td>
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<td>0.92</td>
<td>0.78</td>
<td>1.28</td>
<td>0.25</td>
<td>0.71</td>
<td>Postcontact +</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level
** Significant at the 0.01 level

a O3 thru O6 correspond to individual odds ratios for age classes 3 thru 6, Late Pre-Hispanic and Postcontact males.
b OR, or common odds ratio, for each pathological condition for Late Pre-Hispanic and Postcontact male comparison.
c O3 thru O6 correspond to individual odds ratios for age classes 3 thru 6, Late Pre-Hispanic and Postcontact females.
d OR, or common odds ratio, for each pathological condition for Late Pre-Hispanic and Postcontact female comparison.
ORAL HEALTH AND DIET

Oral health status was gauged by the prevalence of dental caries, antemortem tooth loss, apical abscesses, and tooth wear. First, as seen in Table 10.13, a broad late pre-Hispanic-Postcontact comparison demonstrates relatively little substantive change in the distribution of dental caries, except with higher postcontact prevalence of anterior teeth lesions in age class 3 ($G = 5.62, p = 0.02$). Postcontact prevalence of posterior teeth caries was very strongly elevated in age class 4 ($G = 36.19, p <0.0001$) and age class 5 ($G = 4.25, p = 0.03$).

Postcontact individuals at Mórrope exhibit consistent statistically significant patterns of antemortem tooth loss both in anterior and posterior teeth from age classes 3 thru 6. Some of these observations are associated with very large $G$ values, such as for anterior tooth loss in age class 3 ($G = 23.96, p <0.0001$) and age class 6 ($G = 37.70, p <0.0001$) along with posterior antemortem tooth loss in age class 3 ($G = 21.16, p <0.0001$). Statistically the late pre-Hispanic period tends toward a greater prevalence of periapical abscesses in three age classes.

Second, a late pre-Hispanic-Early/Middle Colonial and Early/Middle Colonial-Middle/Late Colonial comparison (Table 10.14) demonstrates a degree of stasis regarding caries. Lesion prevalence only increases in one age category for anterior teeth and two age categories for posterior teeth from the pre-Hispanic to Early/Middle Colonial period, but the increase in Early/Middle Colonial posterior dental caries in age class 3 ($G = 43.12, p <0.0001$) and age class 4 ($G = 33.76, p <0.0001$) is particularly strong. Essentially
### DENTAL CARIES: ANTERIOR TEETH

<table>
<thead>
<tr>
<th>Age</th>
<th>G</th>
<th>p</th>
<th>Interpretation</th>
</tr>
</thead>
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<td>0.10</td>
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<td>No significant change</td>
</tr>
<tr>
<td>2</td>
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<td>0.43</td>
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</tr>
<tr>
<td>3</td>
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<td>0.02</td>
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</tr>
<tr>
<td>4</td>
<td>1.50</td>
<td>0.22</td>
<td>No significant change</td>
</tr>
<tr>
<td>5</td>
<td>1.55</td>
<td>0.21</td>
<td>No significant change</td>
</tr>
<tr>
<td>6</td>
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<td>No significant change</td>
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</tbody>
</table>

### DENTAL CARIES: POSTERIOR TEETH

<table>
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<th>G</th>
<th>p</th>
<th>Interpretation</th>
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<tbody>
<tr>
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<td>No significant change</td>
</tr>
<tr>
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### AMTL: ANTERIOR TEETH

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### OVERALL TOOTH ABSCESS

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Table 10.13: Oral health conditions, late pre-Hispanic-Postcontact comparison.
### Late pre-Hispanic – Early/Middle Colonial Period

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### Early-Middle Colonial–Middle-Late Colonial Period

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### DENTAL CARIES: POSTERIOR TEETH

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### AMTL: ANTERIOR TEETH

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### AMTL: Posterior Teeth

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\( a \) G-value, or the maximum likelihood \( \chi^2 \) statistic.

\( b \) p, or the probability of G.

\( c \) Antemortem tooth loss abbreviated here as AMTL.

Table 10.14: Oral health conditions, late pre-Hispanic-Early/Middle Colonial and Early/Middle-Middle/Late Colonial comparisons.
Table 10.14 continued

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unchanged carious lesion frequency appears to extend into the Middle/Late Colonial period. Patterning of antemortem tooth loss exhibits a strong significant pattern of elevated Early/Middle Colonial throughout most adult age classes. Statistically significant patterns of Middle/Late Colonial period antemortem tooth loss is suggestive of a reversal of the earlier trend with decreasing prevalence in two adult age classes for anterior and posterior teeth, respectively. Abscess patterning remains relatively static through time, though abscesses in age class 1, 5, and 6 reveal higher late pre-Hispanic prevalence.

Third, within-group, pre-versus postcontact comparisons by sex (Table 10.15) indicates late pre-Hispanic period men experienced worse oral health than women. All but one of the statistically significant relationships feature greater male prevalence, including all four age classes examined for antemortem posterior tooth loss. In postcontact Mórrope, greater female prevalence is associated with all but two statistically significant comparisons including anterior and posterior dental caries and antemortem tooth loss in several age classes.

Fourth, between-group comparisons by sex were examined (Table 10.16). Few significant differences in oral health are evident between late pre-Hispanic and Postcontact males as carious lesion prevalence is identical. All but one of the five significant antemortem tooth loss comparisons indicates decreased postcontact prevalence. Oral health outcomes among postcontact females suggest the opposite outcome, such that indigenous Colonial women suffered from worse oral health than contemporaneous males. The Mórrope women feature significantly greater prevalence in
### Table 10.15: Within-group comparison of oral health conditions by sex, Late pre-Hispanic and Postcontact samples.

#### Late pre-Hispanic Period, Males vs. Females

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#### Postcontact Period, Males vs. Females

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*a* G-value, or the maximum likelihood $\chi^2$ statistic.

*b* p, or the probability of G.

*c* Antemortem tooth loss abbreviated here as AMTL.
Table 10.15 continued

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### Late pre-Hispanic Period

### Postcontact Period

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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>G</td>
<td>p</td>
<td>Interpretation</td>
</tr>
<tr>
<td>-----</td>
<td>----</td>
<td>------</td>
<td>----------------------</td>
</tr>
<tr>
<td>3</td>
<td>1.86</td>
<td>0.17</td>
<td>No significant change</td>
</tr>
<tr>
<td>4</td>
<td>6.39</td>
<td>0.01</td>
<td>Late pre-Hispanic +</td>
</tr>
<tr>
<td>5</td>
<td>0.64</td>
<td>0.42</td>
<td>No significant change</td>
</tr>
<tr>
<td>6</td>
<td>3.63</td>
<td>0.05</td>
<td>Late pre-Hispanic +</td>
</tr>
</tbody>
</table>

*a G-value, or the maximum likelihood $\chi^2$ statistic.  
*b p, or the probability of G.  
*a Antemortem tooth loss abbreviated here as AMTL

Table 10.16: Between-group comparison of oral health conditions by sex, Late pre-Hispanic and Postcontact samples.
Table 10.16 continued

<table>
<thead>
<tr>
<th>Age</th>
<th>G</th>
<th>p</th>
<th>Interpretation</th>
<th>Age</th>
<th>G</th>
<th>p</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1.73</td>
<td>0.18</td>
<td>No significant change</td>
<td>3</td>
<td>0.049</td>
<td>0.82</td>
<td>No significant change</td>
</tr>
<tr>
<td>4</td>
<td>2.52</td>
<td>0.11</td>
<td>No significant change</td>
<td>4</td>
<td>0.23</td>
<td>0.63</td>
<td>No significant change</td>
</tr>
<tr>
<td>5</td>
<td>0.05</td>
<td>0.82</td>
<td>No significant change</td>
<td>5</td>
<td>0.84</td>
<td>0.35</td>
<td>No significant change</td>
</tr>
<tr>
<td>6</td>
<td>8.89</td>
<td>0.0027</td>
<td>Late pre-Hispanic +</td>
<td>6</td>
<td>1.01</td>
<td>0.32</td>
<td>No significant change</td>
</tr>
</tbody>
</table>
five of eight comparisons for dental caries as well as four of eight comparisons of antemortem tooth loss.

Fifth, a late pre-Hispanic-Postcontact comparison of dental wear (Figure 10.3) shows very little difference in the extent of dental wear over time. Postcontact anterior tooth wear in Mórrope is slightly greater among age classes 1, 2, and 3, but then falls just below the precontact average for age classes 4, 5, and 6. Late pre-Hispanic posterior dental wear is slightly – but consistently – elevated above each postcontact average.

**POPULATION GENETIC VARIANCE AND GENE FLOW**

Analysis of measurement error show that among both adult and subadult teeth, measurement error was low, averaging 0.07mm among the adults and 0.09mm across subadult teeth (Table 10.17a and 10.17b). The range of actual measurement error fell well below the expected measurement error for every tooth and all F-values are strongly significant. Therefore, these measurements appear highly replicable and precise such that any observed variance can be considered as real phenomena rather than a function of measurement.

Age correlations were very few, though LI1MD was significantly affected by age ($r = -0.11, P = 0.05$) and was removed from the late pre-Hispanic dataset which was reduced to 15 variables. Two colonial tooth measurements were correlated with age, UCMD ($r = 0.69, P = 0.001$) and UI1MD ($r = 0.38, P = 0.009$) and were removed from the analysis. Any individual missing more than 20 percent of the data points were removed from the analysis and EM algorithm replaced any missing data.
Figure 10.3: Comparisons of dental wear scores for anterior and posterior teeth, late pre-Hispanic-Postcontact Period.
<table>
<thead>
<tr>
<th>Measurement</th>
<th>Number of Measurements</th>
<th>Average Measurement Error (mm)</th>
<th>Expected Error (Statistical Model) (mm)</th>
<th>DF</th>
<th>F Value a</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM₁ Mesiodistal</td>
<td>120</td>
<td>0.08</td>
<td>0.80</td>
<td>59</td>
<td>79.72</td>
</tr>
<tr>
<td>LM₁ Buccolingual</td>
<td>112</td>
<td>0.07</td>
<td>0.61</td>
<td>55</td>
<td>69.67</td>
</tr>
<tr>
<td>LP₁ Mesiodistal</td>
<td>110</td>
<td>0.09</td>
<td>0.81</td>
<td>54</td>
<td>89.64</td>
</tr>
<tr>
<td>LP₁ Buccolingual</td>
<td>110</td>
<td>0.07</td>
<td>0.73</td>
<td>54</td>
<td>109.08</td>
</tr>
<tr>
<td>LUC Mesiodistal</td>
<td>98</td>
<td>0.06</td>
<td>0.65</td>
<td>48</td>
<td>111.80</td>
</tr>
<tr>
<td>LUC Buccolingual</td>
<td>98</td>
<td>0.08</td>
<td>0.81</td>
<td>48</td>
<td>92.60</td>
</tr>
<tr>
<td>LI₁ Mesiodistal</td>
<td>88</td>
<td>0.07</td>
<td>1.05</td>
<td>43</td>
<td>236.35</td>
</tr>
<tr>
<td>LI₁ Buccolingual</td>
<td>88</td>
<td>0.06</td>
<td>0.77</td>
<td>43</td>
<td>159.59</td>
</tr>
</tbody>
</table>

a Probability of F ≤0.0001

Table 10.17a. Measurement error for a sample of adult maxillary polar teeth: one-way ANOVA results.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Number of Measurements</th>
<th>Average Measurement Error (mm)</th>
<th>Expected Error (Statistical Model) (mm)</th>
<th>DF</th>
<th>F Value a</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP₁ Crown Height</td>
<td>182</td>
<td>0.10</td>
<td>0.52</td>
<td>89</td>
<td>26.39</td>
</tr>
<tr>
<td>LP₁ Mesiocistal</td>
<td>184</td>
<td>0.07</td>
<td>0.53</td>
<td>91</td>
<td>59.16</td>
</tr>
<tr>
<td>LP₁ Buccolingual</td>
<td>182</td>
<td>0.08</td>
<td>0.54</td>
<td>90</td>
<td>44.74</td>
</tr>
<tr>
<td>LDUC Crown Height</td>
<td>164</td>
<td>0.13</td>
<td>0.99</td>
<td>81</td>
<td>56.43</td>
</tr>
<tr>
<td>LDUC Mesiodistal</td>
<td>164</td>
<td>0.08</td>
<td>0.99</td>
<td>81</td>
<td>139.88</td>
</tr>
<tr>
<td>LDUC Buccolingual</td>
<td>162</td>
<td>0.08</td>
<td>0.89</td>
<td>80</td>
<td>130.08</td>
</tr>
<tr>
<td>LD₁ Crown Height</td>
<td>160</td>
<td>0.15</td>
<td>1.06</td>
<td>79</td>
<td>45.25</td>
</tr>
<tr>
<td>LD₁ Mesiodistal</td>
<td>182</td>
<td>0.07</td>
<td>0.74</td>
<td>90</td>
<td>125.51</td>
</tr>
<tr>
<td>LD₁ Buccolingual</td>
<td>172</td>
<td>0.08</td>
<td>0.59</td>
<td>85</td>
<td>59.23</td>
</tr>
</tbody>
</table>

a Probability of F ≤0.0001

Table 10.17b. Measurement error for a sample of subadult maxillary polar teeth: one-way ANOVA results.
Estimation of genetic differentiation and differential external gene flow was based on the scaled, bias-corrected R matrix (Tables 10.18 and 10.19). Results from the late pre-Hispanic period indicate an extremely large discrepancy between observed and expected variance for the inferred members of the ethnic Sicán subpopulation. The resultant residual value, -6.708, is by far the largest magnitude of residual difference in any published bioarchaeological study. Conversely, the ethnic Mochica appear to have exchanged mates with outside populations at a rate greater than average (residual = + 0.711). Based on these individuals, the late pre-Hispanic population appears

Table 10.18. Analysis of differential gene flow in the late pre-Hispanic subpopulations.

<table>
<thead>
<tr>
<th>Sub-population</th>
<th>N</th>
<th>r_{ii}</th>
<th>\Lambda_i</th>
<th>E (\Lambda_i)</th>
<th>[\Lambda_i - E (\Lambda_i)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnic Sicán</td>
<td>14</td>
<td>0.2054</td>
<td>7.829</td>
<td>12.488</td>
<td>-6.708</td>
</tr>
<tr>
<td>Ethnic Mochica</td>
<td>45</td>
<td>0.2054</td>
<td>15.015</td>
<td>16.354</td>
<td>+0.711</td>
</tr>
</tbody>
</table>

F_{ST} = r^*_o = 0.041
Standard Error = 0.003

Table 10.19. Analysis of differential gene flow in the Early/Middle and Middle/Late Colonial subpopulations from Mórrope.

<table>
<thead>
<tr>
<th>Sub-population</th>
<th>N</th>
<th>r_{ii}</th>
<th>\Lambda_i</th>
<th>E (\Lambda_i)</th>
<th>[\Lambda_i - E (\Lambda_i)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early/Middle</td>
<td>28</td>
<td>0.0822</td>
<td>14.863</td>
<td>13.813</td>
<td>+1.165</td>
</tr>
<tr>
<td>Colonial Mochica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle/Late</td>
<td>22</td>
<td>0.0822</td>
<td>11.714</td>
<td>13.699</td>
<td>-2.214</td>
</tr>
<tr>
<td>Colonial Mochica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F_{ST} = r^*_o = 0.009
Standard Error = 0.002

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structured and heterogeneous ($F_{ST} = 0.41$). The Early/Middle Colonial Mochica population from Mórrope also feature greater than average external gene flow (residual = +1.165) and is almost twice as great when compared to the late pre-Hispanic Mochica. By the Middle/Late Colonial Period, the Mochica of Mórrope appear to be characterized by a significant, if not precipitous, drop in the level of external gene flow to a negative level (residual = -2.214). The Colonial populations as a whole is characterized by a low degree of phenotypic heterogeneity ($F_{ST} = 0.009$).

Further, while postcontact teeth from Mórrope are in general larger (Table 10.20), this pattern is not statistically valid. However, as reported in Table 10.21, some

<table>
<thead>
<tr>
<th>Tooth Dimension</th>
<th>Late Pre-Hispanic Standardized Mean</th>
<th>Postcontact Standardized Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>UM1 MD</td>
<td>-0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>UM1 BL</td>
<td>-0.23</td>
<td>0.20</td>
</tr>
<tr>
<td>UP3 MD</td>
<td>0.13</td>
<td>-0.11</td>
</tr>
<tr>
<td>UP3 BL</td>
<td>-0.07</td>
<td>0.06</td>
</tr>
<tr>
<td>UC BL</td>
<td>0.05</td>
<td>-0.04</td>
</tr>
<tr>
<td>UI1 MD</td>
<td>-0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>UI1BL</td>
<td>0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td>LM1BL</td>
<td>-0.22</td>
<td>0.19</td>
</tr>
<tr>
<td>LM1 MD</td>
<td>-0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>LP3 MD</td>
<td>-0.13</td>
<td>0.11</td>
</tr>
<tr>
<td>LP3 BL</td>
<td>-0.24</td>
<td>0.20</td>
</tr>
<tr>
<td>LC MD</td>
<td>-0.19</td>
<td>0.16</td>
</tr>
<tr>
<td>LI1 MD</td>
<td>-0.28</td>
<td>0.24</td>
</tr>
<tr>
<td>LI1BL</td>
<td>-0.05</td>
<td>0.04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Hotelling’s $T^2 = 33.13$</th>
<th>$p = 0.9741$ (not significant)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DF1 = 14</td>
<td>DF2 = 78</td>
</tr>
</tbody>
</table>

Table 10.20: Standardized tooth dimensions between the late pre-Hispanic and postcontact samples.
Non-Metric Traits | Correct Event | Correct Non-Event | Incorrect Event | Incorrect Non-Event | Percent Correct
--- | --- | --- | --- | --- | ---
UI1: Labial Curve, Double Shoveling, Tubeculum Dentale | 50 | 46 | 3 | 15 | 84.2
UC: Shoveling, Tuberculum Dentale, Mesial Ridge, Distal Accessory Ridge | 51 | 46 | 3 | 14 | 85.1
UM1: Metacone, Hypocone, Cusp 5, and Carrabelli’s Cusp, Peg Molar | 55 | 46 | 3 | 10 | 88.6
Lower Anterior Dentition: Lower Incisor Shoveling and LC Distal Accessory Ridge | 44 | 35 | 14 | 21 | 69.3
LM1: Protostylid Cusp 5, Cusp 6, Cusp 7 | 56 | 46 | 3 | 9 | 89.5

* Correct allocation of members of Group 1 (pre-Hispanic) into Group1.
* Correct allocation of members of Group 2 (postcontact) into Group2.
* Incorrect allocation of members of Group 1 into Group 2.
* Incorrect allocation of members of Group 2 into Group 1.
* Measurement of difference: identical samples would be 50 percent correct and completely divergent samples would be at 100 percent.

Table 10.21: Logistic discriminant function analysis of late pre-Hispanic and postcontact Lambayeque samples non-metric dental traits.

Postcontact change in the expression of inherited non-metric traits are observed in the complex of features of the UI1, UC, UM1, lower anterior dentition, and LM1 (Table 10.21). Using a logistic discriminant function analysis, the clearest divergence is present between pre- and postcontact UM1 and LM1 features, while the most conservative traits are present in the lower anterior dentition.

**INTERINDIVIDUAL KINSHIP ANALYSIS**

Data winnowing began with incorporation of non-metric traits from only polar teeth. Traits that were recorded as missing in excess of 25 percent of all cases were
removed. Due to dental wear and taphonomy, several adult non-metric traits could not be included (UI1 double shoveling, UP3 and LP3 odontome, peg-shaped incisors and molars, enamel extensions, and LM1 anterior fovea, groove pattern, distal trigonid crest, and deflecting wrinkle). Lack of dental wear prevented all but one adult non-metric variable from being culled (LP2 groove pattern). In all, the dataset contained 14 percent missing values. Missing metric data were replaced using the E-M algorithm, and the discrete traits replaced using a linear regression through a point appropriate for non- or semi-continuous data.

The relationships among the 37 Early/Middle Colonial adults interred at the Chapel of San Pedro de Mórrope are suggestive that the most phenetically similar individuals were not necessarily buried in close proximity to each other (Figure 10.4). Three primary third-order clusters were identified, designated E/MC Groups A, B, and C. No clear pattern can be established from these relationships. Regarding spatial distribution, some patterning can be discerned. While members of Group B and C appear to be distributed throughout the Chapel, individuals assigned to Group A appear to be present only in the rear and middle of the cemetery. Also, some of the Group A individuals appear to crowd together in Unit 3WX and Unit12, while a few members of Group C can be seen adjacent to each other in Unit 4. Among the 15 Middle/Late Colonial individuals, two third order clusters were defined: M/LC Group A and B (Figure 10.5). Despite the small number of burials, the members of Group A and B are distributed rather evenly throughout the Chapel.
Figure 10.4: Inferred kinship relationships and spatial organization based on dental phentic patterning among Early/Middle Colonial adults. Illustration by Haagen Klaus.
Figure 10.5: Inferred kinship relationships and spatial organization based on dental phentic patterning among Early/Middle Colonial subadults. Illustration by Haagen Klaus.
Phentic relationships among the 28 Early/Middle Colonial subadults again formed into three third-order groupings, E/MC Groups A', B', and C' (Figure 10.6). Again, the most phentically similar individuals are not in direct proximity to each other and while some spatially tight clustering is evident among a few individuals, no exclusive burial location is observed for members of one group over another. The 62 Middle/Late Colonial children appear to demonstrate more of a relationship between phentic similarities and spatial patterning (Figure 10.7). Members of M/LC Group A' appear restricted to the middle and back, and exterior (Sacristy) of the Chapel. Conversely, children assigned to M/LC Group B' are but for one case completely confined to the front of the nave. M/LC Groups C' and D' are generally less well organized but are mostly localized in the middle and front of the nave. M/LC Group E’ is found dispersed throughout the middle and rear of the Chapel, while Group F’ is distributed rather uniformly throughout the interior of the Chapel.

**CONCLUSION**

This chapter presented the range of data derived from the study of human skeletal biology of the late pre-Hispanic and postcontact Lambayeque Valley Complex on the north coat of Peru. To test Hypotheses II thru VI as defined in Chapter 1, the results of analysis pertaining to various lines of data reflecting systemic biological stress (female fertility, linear enamel hypoplasias, porotic hyperostosis, growth, and childcare practices), activity (DJD and trauma), oral health (dental caries, antemortem tooth loss apical abscess, and dental wear), population genetic structures gene flow (R matrix analysis of inherited tooth size), and interindividual biological distances (Euclidian
Figure 10.6: Inferred kinship relationships and spatial organization based on dental phentic patterning among Middle/Late Colonial adults. Illustration by Haagen Klaus.
Figure 10.7: Inferred kinship relationships and spatial organization based on dental phentic patterning among Middle/Late Colonial subadults. Illustration by Haagen Klaus.
distance analysis of metric and non-metric dental traits have been described. In the next chapter, interpretations of the significance of mortuary patterning, systemic biological stress, activity patterns, diet, population genetic gene flow, and cemetery patterning are integrated with the goal to understand the dynamic nature of the biocultural impacts of and adaptations to Spanish colonialism in Colonial Mórrope.
CHAPTER 11

DISCUSSION: OUT OF THE DARKNESS – MOCHICA IDENTITY, BIOLOGY, AND ETHNOGENESIS IN COLONIAL MÓRROPE

Considering the totality of all the dynamic cultural developments spanning Andean history, contact between the indigenous Mochica and the Spanish in the Lambayeque Valley Complex was unprecedented in terms of scope, impact, and force. The previous chapters, built upon detailed environmental, archaeological, and ethnohistoric contexts, have provided empirical evidence of distinct shifts in indigenous cultural and biological landscapes in Colonial Mórrope. Here, the significance and interpretation of these data are assessed. First, biocultural issues surrounding Mochica agency, identity, and postcontact cultural hybridization are examined. Second, patterns of health in Mórrope are both interpreted in terms of local historical, ethnohistorical, and ecological, variables, and as a manifestation of structural violence in Colonial Peru. Third, biodistance evidence will be examined as evidence of biological transformation. All of these lines of inquiry are then synthesized and postcontact ethnogenesis in Mórrope is described as a two-stage biocultural adaptive process.

The vision pursued follows that of Stojanowski (2005c) and Lyons and Papdopoulous (2002) in eschewing perspectives that perceive lifeless and one-
dimensional perceptions of the “colonized” and “colonizer.” Shedding notions of indigenous passivity in the wake of conquest is especially critical to model indigenous adaptive responses to socioeconomic disruptions. The indigenous Mochica are understood as active agents in the creation, reproduction, and innovation of their own histories under extremely stressful and unprecedented conditions (Hill 1996a).

An additional theme involves the notion of cultural collapse assumed for postcontact indigenous American populations. It is more useful to conceive of “collapse” not as destruction but as a cyclical process of creative reorganization, sociopolitical decentralization, and reconfiguration accompanied by ethnogenesis and the emergence of new peoples and identities (Schwartz and Nichols 2006). Cultural change in a European colonial context however introduces a number of unique variables and interactions are introduced that demand careful attention. This is especially important as an archaeology or bioarchaeology of colonialism can be the only means by which to study those peoples who did not record their own narratives in writing (Lyons and Papdopoulous 2002:11).

The following attempts to define their significance and elicit possible meanings via analogy must be cautious. An apparent match between archaeological and historical data must be carefully examined in terms of a relevant in-depth understanding of cultural context and other lines of evidence, guarding against disjunctions between form and meaning, potential homologies, or convergences (Shimada et al. 2004: 397). Salomon (1995: 340) states, “The local understanding of these constructions will always be hard to know, but perhaps not unguessable,” and in that stance, consideration of the meanings and motivations shaping ritual biocultural patterns in Colonial Mórrope can be offered.
HYPOTHESIS I: POSTCONTACT MOCHICA FUNERARY PRACTICE AND RELIGIOUS SYNCRETISM

Architectural, archaeological, and burial pattern data independently illustrate multiple syncretic idioms operating at the Chapel of San Pedro de Mórrope. In many ways, the Chapel of San Pedro de Mórrope forms a liminal space between two worlds. Local customs were to some degree preserved as a dynamic compromise was attained between the evangelizing Catholic priests and local Mochica people of Mórrope. This apparent survival strategy outcome could have only been achieved by the active manipulation of postcontact cultural milieu by the Mochica themselves.

The internal structure of the Chapel embodies a fusion of indigenous customs, symbols, and know-how with a foreign European religion. While the use of *quincha*, adobe, *horcónes*, and a wedge-shaped ramp are clear examples of this, the transformation of the millennia-old stepped-pyramid icon into a three-dimensional altar is remarkable. Perhaps more immediately pertinent, there are pre-Hispanic architectural features, such as “thrones” or “altars” where a better connection may be drawn. The stepped altar found a the Huaca de la Luna (Platform I, Upper Level, Structure B) serves as a good example.

*The Colonial Spanish Funerary Pattern at Mórrope*

The development of European burial practices involves a long and complex history, itself a synthesis between Christian and pre-Christian rituals (Ariès 1981; also Jacobi 2000:25-35 for a summary). With the diffusion of Christianity throughout Europe
by middle of the first millennium, attitudes of impurity toward the dead began to shift as burial became linked to notions of eternal salvation and resurrection. Cemeteries became associated with churches, first for saints, and later, other “worthy” people. Corpses were placed in an extended position, denoting a “sleeping” state of the dead. By the end of the Medieval period, European Catholic cemeteries featured spatially segregated areas within its sanctified ground. Preferential locations near holy loci within the church were often reserved for the wealthy, the noble, members of the church hierarchy, and otherwise devout parishioners. Baptized “pagans,” suicides, and unbaptized children would be placed in other areas outside the walls of the church in the churchyard.

Mortuary ritual in fifteenth and sixteenth century Spain closely followed the Catholic pattern. In North and Northeast Spain, individuals were buried feet toward the altar so they would be facing the focal point of redemption (Jacobi 2000:32). Churches and the extended bodies were oriented on an east-west axis with the altar on the east side of the building. The belief driving this practice held that during the impending Second Coming of Christ, the bodies of the dead would be resurrected and reunited with their eternal soul. They would rise from the ground to face the returning Christ in the direction of the rising sun. Priests were interred in the opposite orientation facing the parishioners. Spanish Catholic cemeteries were highly spatially structured, including burying the female head of a household based on her seating pattering in church during life. Her burial location became the basis of a family plot to accommodate her husband and children (Jacobi 2000: 33). Extremely special attention was devoted to the space and place of the burial of important individuals.
Spanish Catholic burial practices transplanted to the New World shared five basic characteristics (Jacobi 2000: 26-27). First, the entire body must remain intact to be resurrected during the End Times. Second, the pre-burial ritual dictated the dead must be carefully washed, anointed, and vested, wrapped in a white textile (symbolizing purity) such as linen. Third, symbols of Christianity, such as the Cross, were to be placed with the dead. Any other grave good including burial with an animal offering were seen as pagan apostasy. Fourth, burial had to take place in consecrated ground, being close to God and protected from the influence of the devil. Fifth, burial of east-west oriented bodies was another necessary component to resurrection, and though cemetery overcrowding sometimes undermined these efforts, bodies were generally placed in orderly rows within their socially determined zone in the cemetery.

The cemetery under the floor of the Chapel of San Pedro de Mórrope conforms to expectations of what a converted indigenous population’s cemetery should appear as. Subfloor burial of the dead included extended bodies facing the altar. Grave goods are absent. Many bodies were placed within in wooden coffins. Some coffins were decorated using the highly symbolic and religiously charged form of the Christian Cross. In general terms, the burial patterning in Mórrope is remarkably consistent to that documented at Tipu (Jacobi 2000) and throughout Spanish Florida (sees various contributions in McEwan 1993). The only major deviations at Mórrope would seem the lack of hands being positioned crossed over the pelvis or chest and the variable orientations of bodies.
Traditional Mochica Burial Grammars

Envisioning the Mórrope cemetery as reflection of a converted or pacified indigenous Colonial community would be superficial. Multiple features can be discerned either under the surface or parallel to the Catholic components of the Mórrope burial pattern that are not of European origin. Instead, these practices are local, patterned, and can be traced back in time at least to the second millennium B.C. Many of these ritual grammars may have also been intimately tied to the practice of pre-Hispanic Mochica identity. These symbols and actions, in their emblemic, assertive, and isocheletic dimensions, define burials at Mórrope as participating in the Mochica tradition.

One of the most basic, core features of the Mochica burial is the extended body on a north-south axis, and less commonly, east-west. This burial position for most individuals (n=184) featured the head placed at the north end of the grave to face the altar rather than the other way around as seen in pre-Hispanic contexts; strictly speaking, truly traditional south-north placements are found in 56 burials. Conditions on the ground may have superseded the specific detail of south-north orientation but the north-south axis mundi was however quite clearly maintained. It was even embodied in the orientation of the Chapel of San Pedro de Mórrope itself which deviated from the highly-standardized east-west placement of Colonial-era Spanish chapels.

In pre-Hispanic contexts such as the Huaca Loro tombs and Cerro Cerrillos, east-west and west east orientations appear to have involved special meanings and symbolisms. Several possible explanations for the 14 east-west orientations (facing the Pacific Ocean) and eight west-east orientations (facing the Andes mountains) could be at
play and are not mutually exclusive: speculation about “bad” deaths, “proper” Christian body placement, special social status, or the superordination of traditional meanings can be offered. There are no common variables that seem to unite these burials except many children received red face cloths.

The use of red face cloths covering the faces of dead again shares an identifiable precontact precedent. Pre-Hispanic rituals involved painting red pigments on the face or body of the dead. Cinnabar was used for high-status individuals while red ochre was the pigment used among commoners. This practice is well documented and appears to predate the Cupisnique. Thus, this practice is suggestive of a Colonial-era attempt to reproduce this tradition. At Mórope, the dye is probably organic in nature and lacks the brilliance of cinnabar, a mercuric sulfide.

Accessing the more emic rationale for the use of the face cloths is difficult, and why these particular individuals were treated in this manner is completely unknown. The symbolism of red face cloths may still be linked to pre-Hispanic concepts perhaps as a representation of life-force as embodied in blood. Association of the color red with the oxygenated blood accompanying birth may hold meanings involving life-force harnessed to accomplish rebirth or “regeneration” in a more metaphorical or abstract sense.

An argument for a pre-Hispanic style feasting component prior to burial is very tentative. In Mórope, very limited faunal evidence, restricted to the distal bones of limbs or toes, does exists for possible camelid and other similar sized mammals having been butchered and placed with a body. Frustratingly, all faunal remains were found in disturbed or secondary contexts erasing their original associations. The presence of
additional remains, such as half-eaten maize, pits of fruits, and Donax shells probably were refuse and not offerings. Colonial period funerary feasting, which likely took place at another locus, is best treated as an important working hypothesis for future work.

A wide range of altered burial contexts were documented in the Chapel of San Pedro de Mórrope, and in Chapter 9, it was argued many of these intrusions were intentional. Before proceeding, it must be recognized that altered burials are known from Old World and New World cemeteries alike, often produced accidentally as a function of cemetery overcrowding, or in some special cases, violation (Jacobi 2000; Larsen 1990, 1993; Weiss-Krejci 2006). Also, exhumation and redeposition of human remains in ossuaries are known in the churches of San Francisco in Lima and Quito (Ubelaker and Ripley 1999). But if we place the Mórrope data within the longue durée of the Lambayeque Valley Complex’s diachronic and regional contexts and north coast in general, practices of prolonged burial, repetitive removal of crania and long bones from graves, and secondary burials at the Chapel of San Pedro de Mórrope share parallel-patterned, pre-Hispanic counterparts in the categories of living-dead interactions. It is highly unlikely this evidence is coincidental or accidental.

Also, Colonial and modern Andeans widely viewed of the dead in an extremely negative and dangerous light (Salomon 1995: 337). At least some physical trace of material propitiation to the disturbed dead might be expected if accidental intrusion was the case. A local version of a Lambayeque oral tale (Las Malas Almas en Mórrope) drives this point home, with the Iglesia vieja as the nocturnal source of malevolent and deadly spirits looking to feed off the blood of the living (Narváez 2001: 363). Living-
dead interaction, to which attention now shifts, appears to have been ritualized and structured around local pre-Hispanic rites involving: soul-transfer and fertility.

**Soul Transfer**

Intentional maggot infestation of at least 16 children and eight adults were documented at Mórrope. Recent finds independently identified fly pupae as evidence of delayed primary burial in Moche and Sicán tombs and sacrifices as noted earlier. Analyses of the δ-shaped objects drawn by Moche artists on depictions of the lower jaws of sacrifice victims suggest (1) they are representations of fly pupae, and (2) flies in Moche iconography symbolized the departed “life force” or *anima* of the deceased (Bourget 2001; Hocquenghem 1981). This parallels the Quechua conception recorded in the Colonial Huarochirí folklore from the Lima highlands; there, the living intentionally colonized the deceased with fly larvae during a five-day pre-interment interval (Salomon and Urioste 1991). In the Quechua ritual, this process was seen to liberate the life force or *anima* and the volatile, spiritual component from the hard, dry, permanent, and ‘ancestral’ body parts– desiccated skin and bones (Salomon 1995: 330). Beliefs of the liberated spiritual essence animating other flying creatures such as butterflies and hummingbirds continue to persist in Andean highlands (Allen 2002:43).

The “good dead” are individuals whose bodies have gone through proper separation of flesh from bone after death (Allen 2002:45). Their bones have protective and living power, *in sensu* sexual potency and “are the source of health and fertility of the livestock, the crops, and the family members themselves” (Allen 2002:41-42, 45).
Historic and ethnographic observations of customs are reported for the Ecuadorian and Peruvian highlands involving curation of skulls of deceased relatives inside the house to protect it (including stored items) (Allen 1988:59, 2002:41; Weismantel 2004: personal communication). “Bad dead,” or condenandos, are also recognized in Andean ethnohistoric documents and ethnographies. For the people of Sonqo in the Peruvian highlands near Cuzco, an individual who has committed a sin such as adultery cannot “enter a new mode of existence” after death (Allen 2002:44). They become a kukuchi and remain in a repulsive, foul smelting, rotting state condemned to wander and haunt their own community driven by insatiable cannibalistic hunger (Allen 2002:45).

While separation of body from soul may be one explanation for the presence of sarcosaprophagous insects, the timing of burial itself may have been another important consideration. For the earlier Moche, Millaire (2002:173) ponders that delayed burial may have resulted from the desire to conform to a specific calendar for funerary ritual performance. Distant deaths might be another possibility for the delayed burials, with corpses naturally colonized by maggots on the trip home for interment. None of the affected skeletons at Mórrope were disarticulated and the remains of a possible charnel structure inside the Chapel of San Pedro de Mórrope point to local and purposeful treatment of these bodies.

Does this Colonial-era practice imply parallel or shared meanings of soul-transport? If so, why were these specific 24 people selected for soul-separation at Mórrope and all the others not? How does young age play into this pattern? Does delayed primary burial represent a special effort based in pre-Hispanic ritual to ensure proper
separation of the soul from corporeal remains? Was it a ritual response to conditions surrounding the end of their lives?

While answers are be elusive, physical evidence of prolonged primary burial at Mórrope, Moche iconography, and Huarochirí folklore at the very least show a common motivation rooted in Andean traditions to permit a body to putrefy and decompose preceding burial, and ultimately might point to widespread practices of separating the soul from the body throughout the pre-Hispanic and Colonial and Central Andes.

Limited evidence of fires associated with Early Colonial burials at Mórrope corresponds to Lambayeque regional traditions of burial and ritual temple entombment and associated fires that spanned Early to Late Horizons (1400 B.C. to A.D. 1500) at Huacas Soledad and Lucia (Shimada 1986), Huaca Loro (Shimada 2001, 2006: personal communication) and Huaca Sialupe (Klaus 2003). At Mound II of Huaca Soledad in the mid-La Leche Valley, thrice a new temple was built immediately above an entombed one. Each entombment ended with a series of small bonfires set atop the fill. Fire appears to have symbolized simultaneously an end and a new beginning of the temple as a sacred setting and institution of veneration and social and religious integration.

Burning organic matter such as wood not only mysteriously transforms them into something fundamentally different – ash and charcoal – but also results in smoke, heat, and light that dissipate in the air (Shimada et al. n.d.). In this sense, ritual fire may have been seen as mirroring the physical transformation of the corpse that accompanied the departure of the *anima*. Setting of fires near or atop the burial may well have symbolized attainment of a new, spiritual state of being for the deceased or initiation of the soul or
life essence journeying into the world of dead as expressed, for example, in the legend of Ñaymlap as a journey across the sea and the flight of a bird (Cabello 1950[1586]). Fire, in essence, seems to have embodied transition of the corpse and soul that is at the core of Andean and cross-cultural literature on death and the dead (Betanzo 1987[1551]; Hertz 1960[1907]; Kaulike 2001; van Gennep 1960[1909]).

*Altered and Secondary Burials: Rituals of Fertility?*

On the north coast, living-dead interactions spanning the shaft-tomb/temple complex at the Sicán capital and postdepositional funerary alterations of traditional Mochica burials have been argued elsewhere as reflections of ancestor worship (Klaus 2003; Shimada et al. 2004). Pre-Hispanic ancestor cults clearly continued (albeit modified) in the historic Central and South Central Andes (Doyle 1988; Salomon 1995). Given the evidence of local traditions persisting at Mórrope, do the altered burials at Mórrope reflect a form of ancestor veneration?

All of the living-dead interactions described in Chapter 8 involve the manipulation of the skeletal remains of both children and adults. Often, young and old alike were commingled in secondary burials. Andean ethnohistory and cross-cultural comparisons show ancestor status is a highly specialized social role attained by adults with offspring (Helms 1998; Salomon 1995; Sillar 1992; Whitley 2002). Andean ancestor worship also would likely involve a physical trace of direct periodic visitation, veneration, subsequent offerings, fêting, or even indirect contact, such as *ushnu*-like offering of libations (Shimada 1986), all of which appear to be absent in Mórrope.
Andean ancestor worship also appears to have focused primarily on elite individuals and lineages, and the prevalence of pathological conditions is not distributed differently between individuals in primary versus secondary burials (Klaus and Tam 2006). These observations strongly indicate an ancestor cult was not being expressed in this Chapel.

On the other hand, multiple ethnohistoric sources suggest the power of the Andean dead (including but not limited to ancestors) involved their influence on fertility in the living world, a common theme regionally and across cultures (Bloch and Parry 1982). One of the longest-lasting and widespread aspects of Andean cosmology is a vegetal (rather than sexual) metaphor of the dead as the source of fertility in the living world (Allen 1982; Duivols 2003; Szemiński 1993). Allen (1982:27) documented modern expression of this concept where dried but life-giving parts of a plant (seeds, tubers, rhizomes) are to be ritually nourished just as the dead, such that both may sustain crops and fertility. Salomon (1995) illustrates the same idea was present in colonial Peru. Not just bones or mummies but the anima itself also bore a vegetal-fertility connotation in the sixteenth century Andes (Duviols 2003:171). After the fleshy, volatile parts of the body rotted away, bones eventually emerge just as seeds fall from a dying plant, and the living are left with dried, hard, durable, permanent human remains – the dead become a seed, their remains holding the promise of new life.

In the south central Andes, this quality was ascribed to mummies physically accessible in caves, chullpas, and Inka royal cemeteries from pre-Hispanic to Colonial periods (Salomon 1995). The pre-Hispanic and Colonial conception of the fertile dead on the north coast of Peru may be expressed in a different manner. On the north coast, the
bones of the dead themselves may have been seen to contain inherent powers of fertility, perhaps broadly analogous to agricultural magic practiced by the Laymi of modern Bolivia (Harris 1982). It is possible altered burials and exhumations reflect the intention of the living to harness this characteristic of the dead. Following the collection of raw materials, subsequent acts of secondary burial completed a process that embodied a metaphor of seed planting. The living could direct the power of the dead to ensure fertility and communal well-being.

If manipulation of skeletal material was linked to fertility rites at Mórrope, it is worth further thought the manipulation of children and adults may have embodied different conceptions of fertility. Ethnography and ethnohistory demonstrate very different cultural perceptions of children in the Andes in that children were not human. They were equated to the wild, uncontrollable, and fertility-bearing mountain spirits from which they originate (Harris 1982, Sillar 1994). The first rains bringing fertility following droughts in modern Bolivia are conceived as the tears of dead children (Sillar 1994:55). The act of children’s play is seen as a medium of communication with the supernatural and unmarried teens produce music that invokes crops to grow (Stobart 1995 cf. Sillar 1994). Manipulation of subadult remains may have tapped into a liminal quality that bridged supernatural and earthly domains and served as a potent conduit for the living to appeal for water, productive fields, and the like. Connotations surrounding the remains of adults, while not necessarily related to ancestors, may have embodied fertility-bearing properties of the immutable type of existence of very old beings (Salomon 1995: 328).

Beyond the interpretation of flowers (the only consistently used grave good)
placed with the dead as tokens of affection or mourning, one may consider the possibility that vegetal metaphors were possibly tethered to floral offerings. Considering the quantity of ‘missing’ bones in the Mórrope secondary burials discussed earlier, perhaps some remains could have been removed from the church and curated, enshrined, or buried within a household or workshop. Perhaps other bones were taken into agricultural fields or other locations and quite literally planted.

Alternatively, Hecker and Hecker (1992a: 45; also 1992b) see the use of extracted human bones and funerary goods during Moche-era Pacatnamú as reflecting the belief that the soul of the recently deceased needs a medium that serves as an indispensable guide for its safe journey from the world of the living to that of the dead and beyond. Hill (2003) also argues for the use of properly or specially prepared human bones for their inherent spiritual power. Though Hecker and Hecker do not specify, could the nature and source of danger during the inferred journey be hostile animas that have not successfully made their transition to a new status or journey to another world (Shimada et al. n.d.)?

In closing, it is worth considering that the highly repetitive removal and secondary burial of crania and long bones at Mórrope reflect a widespread symbolic grammar regarding body parts. A literature review (Shimada et al. n.d.) indicates that along the north coast, south coast, and new discoveries at Pacahacamac, the skull is by far the most often manipulated bone. Mustering iconographic, bioarchaeological, and contextual data, Hill (2006:91) argues that in the Moche culture “human skulls were collected and curated by female ritual specialists for use as offerings in … rituals of ancestor veneration.” Also, the head may have been a “cathected object” that was
“imbued with a powerful and efficacious spiritual essence” (Hill 2006:96) Weismantle (n.d.) further explores concepts surrounding manipulation of the head and may well be applicable to Mórrope. Simultaneously, extensive attention devoted to long bones is clear in pre-Hispanic setting and Mórrope alike. Long bones may have been selected as they are the largest, most durable parts of the human skeleton.

While we still do not understand why some body parts were preferentially removed or replaced, in the case of the Moche, there are artistic depictions legs, arms, and an elite man raising his forearm with the hand clenched in a half fist (Donnan 1978: 151-155) that clearly held a special significance. Regardless of the explanation, post-interment removal, manipulation, and addition of bones at Mórrope may point to an underlying pre-Hispanic concept of metonymy or *pars pro toto*: the conceptualization of parts imbued with the same symbolic value as the whole may have been alive and well in Colonial Lambayeque. Multiple pre-Hispanic cases document intentional placement of body parts, sherds, or incomplete vessels either synchronic or anachronistic to the rest of the gravelot (Hecker and Hecker 1992a: 48-50; also 1984, 1992b). However, one is left wondering why and how specific body parts and objects acquired special symbolic significance and how those meanings may have changed during the Colonial era.

*Syncretism, Sedition, and the Reconfiguration of the Historic Mochica World*

Cross-culturally and on the north coast of Peru, burial was a “total social phenomenon.” It was especially susceptible domain of ideological discourse to sociopolitical and ideological manipulation and negotiation. In Bawden’s (2001) example
of the Moche, mortuary behaviors are seen shared by all members of the society and as conditioned in a very real sense by the social and political needs of the living that used burial to either embellish or construct social relationships, reinforce group integrity, the and performance of identity. Funerary performances are such a powerful sphere of influence that they direct relationships including status among the living and between the living and the dead (Bawden 2001:25). In other words, burials can be approached as complex and sometimes circuitous mirrors of social realities, either real or desired. The nature of cultural syncretism in Colonial Mórrope and the use of burial as an ideological and practical setting domain of resistance against the Spanish are examined here.

The mortuary evidence at Mórrope appears to reflect a form of religious and cultural syncretism as might be predicted for the Colonial Andes. Mortuary syncretism on the north coast of Peru was probably common and was more easily established by the sheer number of coincidental features shared between Spanish and Mochica burial customs. Both traditions involved below-ground burial, extended bodies, pre- and post-burial rites, for example. The burials at Mórrope simultaneously embody European and local Mochica traditions in what might be thought of as a creative, synthetic fusion of Old World and New. It is valuable to revisit Griffiths’ (1996:15-16) argument that a careful distinction must be made when applying the concept of “syncretism” in the Andes.

Syncretism is probably only applicable in the broader sense of the term “synthesis” rather than in the narrower sense of “fusion.” The two different faiths did not merge and blend but became juxtaposed. Colonial Andean Christianities, such as at Mórrope, appear nepanlistic and adrift in a kind of liminal limbo, as an environment was
created were Spanish efforts aimed to cut off the community from its past and the present had not been fully assimilated.

Moreover, Graham (1998: 29-30) cautions against perceiving Europeans colonialism as a simple vector that transmitted a monolithically configured package of Christianity to Native Americans. The direction of culture flow is long assumed as from the Old World to the New, and that Native Americans either accepted or rejected Christianity. Another notion that underlines various syncretism studies, that is, European Christianity as an authentic or essential form of the religion, should be treated quite critically. Catholicism in fifteenth century Europe was a highly and continuously syncretic combination of local pre-Christian traditions and official doctrine. Missionaries, accurately or otherwise, are viewed as agents of economic imperialism who attempt to impose “conditions of being” on others (Comaroff and Comaroff 1986). Such impositions involve changing native cultural imagination regarding aesthetics of religious representation and experience, deployment and presentation of the body, and the habits of daily life shaped by a new interplay between alien and indigenous semiotics of power and meaning (Comaroff and Comaroff 1986:1-2).

Unlike some mission societies in Africa, New World colonial settings like Peru created more coherent and unified Christian societies, though the process took 350 years or longer. The more penetrating effect of this process was the imposition of new modes of the indigenous conceptual universe, imagination, and cultural practice (Comaroff and Comaroff 1986; Graham 1998).

Additionally, syncretism in Mórrope burial rituals might have involved a form of acceptance characterized by the conscious adaptation of alien forms and ideas in terms of
indigenous counterparts. The dynamic pre-Hispanic religious matrix was at least superficially subordinated by Catholic elements while a mutual, though not equal, dialectical synthesis emerged rather than a simplistic fusion. Integration of traditional features into the new religious practices probably gave an opportunity for the Mochica to preserve parts of their pre-Hispanic culture in a sophisticated use of clandestine obstruction and deceit.

The broader historic and social interplay surrounding colonizing states, collapse, and local cultural regeneration as pondered by Kolata (2006) and is useful to consider in terms of Mórrope. While the idea may be critiqued for a dichotomous colonizer-colonized vision, Kolata sees two potential modes of interaction: hegemony with sovereignty (direct rule) and hegemony without sovereignty (indirect rule).

In the first mode, which might be considered for Colonial Peru, foreign governors of a colonizing state wield power through military force (violent shows of which are used to discourage rebellion), extract taxes, resources, and tribute, subordinate local political elites, build visible public monuments including shrines and found entirely new colonial cities. Colonizers are on a so-called civilizing mission that also involves territorial annexation, linguistic and religious changes, and “mind control.” Over time, these actions contribute to a society-wide “Stockholm syndrome” where subject populations identify, collaborate, and emulate the colonizers as local social identities and cultures are replaced (Kolata 2006:211). Any remaining opposition is covert.

Cases of colonial state formation under conditions of hegemony without sovereignty, which might be the expected conditions for the late pre-Hispanic
Lambayeque region, are envisioned as less transformative and evanescent. This is not to say impacts of this political strategy are minor: resources and products flow away from local populations, taxes and labor demands are high, and so forth. Interactions between colonizer and colonized are limited as scripted economic encounters, and the colonizers do not alter daily social practice (Kolata 2006:314). Approaches to Andean imperial organization, such as rule under the Chimú or Inka, seem to fit into this conception.

Depending on the political strategy of expansion, belief systems, practices, and rituals of the client population may become patterned in terms either of orthodoxy or orthopraxy, according to Kolata (2006). Societies under direct rule experiences responses involving orthodoxy. The intense presence of instruments of state control transforms historical consciousness, thoroughly converts belief systems, and subjects are made into citizens who emulate values promoted by state authorities. Local identities may not be so simply erased, but are transformed and hybridized. Orthopraxy is thought to be the response to cases of indirect rule, and involve social practices that are similar to dominant patterns but do not adopt underlying worldview or meanings. Orthopraxic action is strategically mimetic, and subjects behave at least publicly in a manner consistent with the expectations of the state authorities (Kolata 2006: 215). The result is a political strategy in and of itself, a synthesis of dominant foreign and subordinate local beliefs manipulated by local interests.

In Mórrope – a setting of relatively direct foreign rule – a different set of relationships may be at play. Syncretism via orthopraxy seems to have resulted as the Mochica attempted to recover and reconstitute themselves following the collapse of
indigenous sociopolitical systems. While some limited true orthodoxy probably did exist among a few Morropanos as Kolata’s model would predict, the majority of the response appears to have been overwhelmingly orthopraxic. This model is contains a further weakness in its conception of material culture embodying dichotomous acceptance or rejection of ideologies. In Móróppo, local beliefs, core value systems, and precontact spiritual understandings of time, space, and the universe appear reconfigured and incompletely transformed in Móróppo as much by the Mochica as by European religious customs. Adherence to European components may be some manifestation of orthodoxy did emerge, but such apparent practice may have been a function of mimicry while embedded pre-Hispanic rituals and meanings could be engaged just below the surface.

It is also worthwhile to think about what role subtle Andean-European alliances and cooperation may have played a role, especially in the early Colonial period. Some general models may be derived from Ramírez (1996:133-151) who discusses how, in the mid-sixteenth century Moche valley, Chimú chiefs took initiative or collaborated with Spaniards in looting *huacas*. Around the same time in highland Huamanga, Stern (1981) describes the dynamic rise and fall of “Indian-white alliances.” These case studies reveal expressions of native Andean agency which forces us to rethink of the typical vision of Spaniard-native relationships.

Varying degrees of postcontact religious syncretism as perceived in Mórrope may have echoed a wider creative indigenous cultural response to contact and colonialism in the Americas. Excavations of the multiple mission cemeteries in Spanish Florida reveal a similar set of Catholic burial practices in practice at Santa Catalina de Guale, San Juan...
del Puerto, (Larsen 1990), Santa Catalina de Guale de Santa María, Santa María de los Yamassee (Larsen 1993), Mission Santa Catalina (Saunders 1993), and the Fig Springs Mission (Hoshower and Milanich 1993), for example, indicate close adherence to Spanish Catholic burial styles. Bodies are generally laid out under the floor of the church, hands clasped, facing the altar in typical Christian style. In the Santa Catalina de Guale mission, Larsen (1990) found among the unusually rich assemblage of grave goods derived European material culture, indigenous offerings were also present among the dead. These included chunky stones, Mississippian-style shell rattlesnake gorgets, chipped stone tools, and projectile points. At Santa Catalina de Guale de Santa María, San Juan del Puerto, ossuaries consisting of disarticulated human remains mirrored exactly the primary mode of precontact burial rituals (Larsen 1993). As such, future excavations of postcontact burial contexts probably should be approached to testing hypotheses on the nature, configurations, and the common extent of syncretic reactions.

*Ideological “Warfare” and Ritual Resistance*

In the previous section, rituals linking the living and the dead practiced inside a Catholic chapel illustrate the continuation and modification, rather than annihilation, of funerary customs and discourses of identity associated with the pre-Hispanic Mochica ethnic group. Agency of the Colonial Mochica is reflected in the practice and reproduction of burial patterns many of which originate some 2,500 years earlier. Moreover, this agency may have been deployed partially to resist Spanish rule, if not on symbolic levels alone. Identity and ritual can become powerful weapons of conflict for
marginalized or powerless social groups in settings where great asymmetries of political and social power emerge.

The interaction between the living and the dead at Mórrope may have been part of a constellation of indigenous responses to negative consequences of Spanish colonialism. Maintenance in some form of pre-Hispanic soul-transfer and fertility rites could have been intentionally, though subtly, juxtaposed against Christian beliefs. Orthopraxic contact with and manipulation of the dead in traditional modes could have been a vehicle to create intra-group cohesion to strengthen constructions of identity and ethnicity from the practice of collective social memory. Symbols such as a disinterred cranium, a secondary burial, or a reburied femur could be shaped to codify experience, values, and ideology while conveying an emotional force stimulating the reflexive construction of group identity (Bawden 2005).

Secondary burials have long been interpreted as the disaggregation of an individual body as social collectivity and cohesion is asserted (Hertz (1903[1960]). Creating a concrete physical metaphor of group unity may well have been an intended symbolism of secondary burial at Mórrope as traditional culture and identity fell under fierce assault. As Gold (2000:196) points out, secondary burials often require the collaboration and collective work of large numbers of living individuals, that in liminal time and space, brings the living and the dead together in powerful ways.

The sharing of this experience, like other performances of precontact ritual, probably articulated with the deepest cognitive levels of social awareness that all the Mochica participants shared, those strong yet vaguely defined understandings of “group”
and “self” bound together by shared experience in time and space (Bawden 2001: 13). In other words, altered burials and other traditional practices reflect aspects of a Colonial Mochica “practical consciousness” (Giddens 1979) as well as being a source of communitas conditioned by deep habitus. This practice also held considerable danger and risk for the Mochica participants, as the Spanish did their best to expunge indigenous beliefs and rituals when detected.

These elements were the components that, during this period of social instability and discord, became an embedded ideological weapon of group conflict (sensu Bawden 2005:14). Ritualized contact between the living and the dead based on ideas of the pre-Christian past may have not just maintained aspect of indigenous tradition, memory, and identity boundaries by communicating intentional juxtaposition with Christian rituals. Contact between the living and the dead was likely an expression of symbolic resistance against European colonization. Every time a burial was opened, a cranium exhumed, or a femur reburied, the act could have embodied concrete and symbolic sedition resisting foreign rule and religion. At the same time, traditional rituals and tethered notions of identity were conserved but also transformed by the Colonial setting.

Similar to the events that transpired at Moche V Galindo, Spanish colonialism represented a sudden emergence of asymmetrical power and ideological crisis. Like the commoner residents of Galindo, the people of Mórrope confronted a profound social and structural crisis using their identity as a tool. They created their own distinct social practice, a set of hybrid funerary rituals with embedded pre-Hispanic features, to attempt to create a secure social reality while events around them were turning the world “upside
down.” Instead of inserting the dead directly into the social space of the household as done earlier at Galindo, Spanish influence was powerful enough to pull the dead into the space of the Chapel making that the space and place of ideological negotiation.

On the other side, Spanish evangelism and sociopolitical programs were tools used to reconfigure indigenous society and their conception of history. The aim was to create habituated indigenous social actions that Kolata (2006: 213-214) likens to a measure of Orwellian “mind control” through its involvement in the production and consumption of spatial, temporal, and material values. The Mochica response to these actions involved formation of syncretic mortuary patterns. The Mochica of Mórrope reconstituted elemental relationships that historically formed the core of their social lives. This process involved creative innovation and a reflexive, dialectic interaction between shifting concepts of identity and the cosmos within indigenous cultural thought and an imposed religious system.

Ultimately, simplistic questions of the acceptance or rejection of Christianity draw attention away from the more essential issue. Pre-Hispanic elements integrated into European religious material culture as a form of resistance must be complemented by considerations of Colonial Mochica imagination and the re-ordering of their conceptual universe. Graham (1998) argues for a more proactive, rather than reactive, stance: postcontact responses aiming to thwart domination also were paralleled by creative and dynamic attempts to “fashion an understanding and gain conceptual mastery over, a changing world” (Comaroff and Comaroff 1991:31). “Resistance and protest occur alongside active reexamination of former values, together with the development of new
concepts about the world that indeed receive European input, but are the product of indigenous minds” Graham 1998:29).

**HYPOTHESES II: SYSTEMIC BIOLOGICAL STRESS**

*Paleodemography and Female Fertility*

Changes in relative levels of female fertility can be informative measures of systemic stress. Clinical and epidemiological studies of human reproductive ecology reveal how increased stress and workload negatively impact female ovarian function (Ellison 1994). Female energy balance and overall fecundity among the Lese of Zaire (subsistence horticulturalists) decrease predictably during times of nutritional stress prior to harvests. Tamang women (Himalayan agro-pastoralists) experience lower luteal function and ovulatory frequency during periods of higher seasonal workloads as do well-nourished Polish women involved in physically demanding manual agricultural activities (Ellison 1994: 266-266). These studies highlight potential seasonal fluctuations in fertility and indicate female fertility in various subsistence economies is similarly impacted by stress, elevated activity levels, and energetic shortfalls. Further, females who experience greater degrees of infection or who are malnourished are likely to enter a nutritional state where the body’s energetic and nutritional resources are redirected to fight infection and plunge below the level required to become pregnant or maintain pregnancy (Bogin 2001: 58). Another factor to consider is when a population as a whole
experiences greater morbidity, people are less likely to engage in sexual intercourse when ill, and lowered birthrates result (Alchon 1991: 55).

In the Lambayeque Valley Complex, late pre-Hispanic female fertility was clearly the highest. The finding of overall depressed postcontact female fertility in Mórrope using $D_{30+}/D_{5+}$ ratios is consistent with ethnohistoric and skeletal indications of increased biocultural stress, morbidity, depopulation, and the inferred increased physical activity from nearly universally elevated prevalence of DJD in every joint system observed in the Mórrope female skeletons. The Middle/Late Colonial estimation of relatively increased female fecundity appears coincident with the documented, slow indigenous population size rebound in Mórrope and the Lambayeque region in general beginning in the early to middle seventeenth century. These data point to the possibility that Mórrope shared in this recovery to some extent and probably reflect female adaptation to biological stress or abatement of certain stressors during the latter Colonial phase.

*Childhood Metabolic Stress, Infection, and Growth*

Given the hypothesis and context of increased postcontact systemic stress, a decreased prevalence of dental enamel hypoplasias was surprising. To best interpret this finding, context must be carefully considered. Colonial Peru was a violent and rigidly hierarchical society where indigenous peoples suffered the compounded pressures of extreme poverty where a rise in enamel defects would be expected. At the same time, indigenous Andeans also endured waves of multiple high-mortality epidemic diseases

Late pre-Hispanic acute childhood stress has been hypothesized as generally survivable (weanling diarrhea and a lower nutrient, post-breastfeeding infant diet [Farnum 2002]). Colonial childhood experiences of stress may have been shaped more by catastrophic epidemics. In other words, stress events in the postcontact period took the form of smallpox, measles, influenza, mumps, rubella, and scarlet fever. It may be hypothesized that a majority of children did not survive these acute and high-mortality stress events to form enamel hypoplasias in the first place.

While enamel hypoplasias are generally more common in contact-era populations (Larsen 1994), others register no change from the precontact experience of stress. In historic Ecuador (Ubelaker1994:157) was puzzled as he registered a similar decline in enamel defect frequency. Larsen and colleagues (2002) also register a decreased prevalence of enamel defects especially in late contact Spanish Florida. As a working hypothesis, it can be proposed that acute epidemic disease mechanisms shaped the phenomenon of enamel hypoplasias in colonial settings that maintained regular contact and interaction with the Spanish (Larsen et al. 2001). This may begin to point to the how enamel hypoplasias are patterned among children who grew up in high-mortality disease environments. Cohen and Crane-Kramer (2007: 346) argue that an observation of lowered enamel defect prevalence in a setting such as Colonial Mórrope might seem like an example of the so-called “osteological paradox.” Yet, because of the above logic and the skeletal invisibility of epidemic diseases, in this setting fewer enamel hypoplasias
result in the underestimation of biological stress, rather than reflecting a healthier population.

Porotic hyperostosis is also significantly elevated in colonial Mórrope. Elevated anemia may might be expected as the analysis of oral health that indicates a greater postcontact consumption of iron-poor carbohydrates. Population aggregation and resettlement may have also played a role in porotic hyperostosis prevalence at Mórrope. Using Kent’s (1986) case study involving prehistoric Anasazi skeletal remains as a model, aggregation can increase exposure to a wide variety of bacteria (e.g., *Escherichia coli*, *Shigella*, or *Salmonella*) viruses, (e.g., paravo- and rotaviruses) parasites (e.g., helminth parasites; protozoal or amoebic infection) and their vectors such as flies, rodents, dogs, and toddlers (Kent 1986: 623). Population density and poor sanitation in a *reducción* (and potentially not dietary-induced iron stress) drives childhood iron-deficiency anemia stemming from chronic gastroenteritis and other gastrointestinal diseases. This epidemiological model of porotic hyperostosis should be seriously considered for Mórrope. At the same time, it is difficult to disentangle whatever contributions terrestrial and marine dietary changes contributed as well. Isotopic evidence of diet is needed to better understand this pattern of porotic hyperostosis.

Considering the sensitivity of growth to environmental stress, unchanged terminal adult stature was contrary to expectations. However, the adolescent growth spurt is under a much higher degree of genetic control than childhood growth. Rapid and relatively prompt late childhood and adolescent growth, possibly related to increased net energy consumption, will erase any prior growth deficit if given the chance (Floyd and Littleton

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2006; Stinson 2000). The effects of so-called mini-growth spurts as a response to periods of growth arrest, intermittent illness, and hormonal disturbance may also be worthy to ponder (Hermanussen et al. 1988). Of course, growth spurts are biologically invisible, and cannot be tested as a hypothesis. If growth stunting was present among the Colonial Mochica of Mórrope, no traces appear to remain among those who survived childhood and lived into adulthood. Brachial and crural indices, along with male and female adult statures spanning north and central coast microenvironments and socioeconomic settings from AD 200-1950, is remarkably invariant. As Gaither (2004) suggests, we may be gaining an initial window on the degree to which body proportion and size is genetically canalized in the coastal Central Andes. Not even the greatest biocultural disruption in history could significantly alter adult stature.

Prevalence of non-specific periosteal inflammation increases for the Mochica in Mórrope – most sharply centered during the Early/Middle Colonial phase. Spanish economic policies resettled many small, isolated hamlets and villages into inherently unhealthy reducción settlements and towns of unprecedented population density. Greater risk of exposure to infectious disease vectors – humans, human waste, poor sanitation, contaminated water supplies, animal-born zoonoses, and animal waste – would have promoted conditions ideal for increased non-specific infectious disease in Colonial Lambayeque Valley Complex. However, this change most clearly impacted women in Mórrope, reinforcing the possibility that women endured the most negative biocultural consequences of colonial society. Higher prevalence among postcontact women suggests a confluence of greater degree of exposure to infectious vectors, elevated underlying
levels of biocultural stress that would weaken immunocompetence and a more sedentary lifestyle in comparison to males.

Child Care

Another factor indirectly supporting the interpretations of elevated childhood morbidity in terms of enamel hypoplasias and porotic hyperostosis is artificial cranial deformation. Given the scarcity of deformed crania and the deep stratigraphic positions of four of the five individuals from Colonial Mórrope who exhibited fronto-occipital cranial binding, it is not implausible they were born during the terminal pre-Hispanic period and died as subjects of Spain. Since head immobilization seems integral to the concept of cradle binding, it is implausible that cradle binding continued without this feature. Instead, the lack of deformed crania among the Early/Middle Colonial burials attests to an extremely rapid and complete termination of infant cradle boarding – a practice which can be traced back at least to Cupisnique times (1500-750 B.C.). Why this change transpired is unknown, but a major discontinuity with pre-Hispanic practices of child care is clear. Greater infant and toddler mobility probably resulted, and increased the possibility of young children, particularly newly-mobile toddlers, to be exposed to a wide variety of disease-bearing vectors such as garbage, animal and human waste, and zoonoses in colonial reduccion “disease reactors” as inferred in Mórrope.

Given these five lines of data which document independent and complementary evidence of systemic biological stress experienced by subadults and adults, Hypothesis II is accepted.
HYPOTHESIS III: LIFESTYLE AND PHYSICAL ACTIVITY

As a reflection of long-term patterns of physical activity and biomechanical loading, degenerative joint disease (DJD) was examined in every load-bearing joint system of the skeleton (excluding the temporomandibular joint). A change in lifestyle is evident, from a physically active behaviors inferred from pre-Hispanic pattern to physically destructive activity patterns in the postcontact pattern. Starkly elevated DJD prevalence is overwhelmingly clear among Colonial Morropanos in the shoulder, elbow, wrist and knee. These changes, along with elevated prevalence of DJD of the hand, cervical, thoracic, lumbar vertebrae, and intervertebral herniation appear temporally centered in Early/Middle Colonial phase. Middle/Late Colonial DJD prevalence does not significantly depart from this plateau. Examination of prevalence by age class indicates the many of the highest rates are found in younger age classes indicating the joints of young adults were more severely biomechanically loaded as stress was introduced to these joints earlier in life than their pre-Hispanic predecessors.

Consistent and excessive habitual mechanical loading of upper extremities, spine, and knee joint is recorded following European colonization. The likely cause of this phenomenon is Spanish labor extraction. Age-corrected analysis by time period also reveals increased prevalence of DJD and intervertebral disk herniation among Early/Middle Colonial adults at Mórrope, probably a function of compression of the vertebral column from loading. Carrying objects of heavy weight may be one plausible correlate of activity. While great caution must be considered, the activity of shoveling
(coincident with a known mining focus of the Mórrope economy) and adoption of certain postures for prolonged periods can load the spine on par with activities such as lifting water and threshing grain (Knüsel 2000: 392, 395).

Higher DJD prevalence is generally associated with the Mórrope males who may have been more active than the women of this community. Yet, in comparison to late pre-Hispanic females, the women of Colonial Mórrope experienced nearly universally greater prevalence of DJD. The distribution of increased female DJD in Colonial Mórrope points to the entire body being loaded more than their pre-Hispanic predecessors. While DJD lesion has not yet been formally qualified, DJD lesions among these women from Mórrope are often more severe and destructive than those of the late pre-Hispanic period. These lesions indicate that colonial Mochica women were engaged in physically strenuous labor much like the men of the society. As a corollary to Hypothesis III, elevated postcontact female DJD prevalence is clearly associated with depressed female fertility. At least in some joint systems, a general trend toward decreased DJD and mechanical loading is inferred in several joint systems during the Middle/Late Colonial period (see Table 10.10). When in the future Middle/Late Colonial adult female sample sizes increase, it will be further possible to examine the nature of female physical activity, fertility, and demographic rebound.

The nature of female activity patterns in Colonial Peru are hinted at by drawings by the Bishop of Trujillo Martínez Compañón (1936) during the eighteenth century depict women and men both tending livestock and working in agricultural fields. Inferentially, weaving was quite certainly not the exclusive or principle female economic
activity as often portrayed by European sources (Graubart 2000). While men were considered the sole tributaries often leaving their village or town under mita labor obligations, women contributed as well but without the same kind of mobility. Graubart (2000:554) envisions Colonial-era indigenous women as a kind of captive labor force manipulated by the needs of *encomenderos*, *corregedores*, priests, merchants, and *curacas*. As a cash-based economy emerged, economic intensification further drove women into the commercial economy as active participants.

The individuals in Colonial Mórrope demonstrate a non-significant biological trend towards a greater prevalence of traumatic injury. Skeletal injuries in Mórrope included several individuals with well-healed broken ribs, well-healed and reduced fractures in the distal forearm (a location more likely to break during pathological overload rather than a defensive injury) and two cases of lumbar spondylolysis attributed to biomechanical overload of the lower back. One well-healed but massive femoral neck fracture was also noted. No examples of interpersonal violence were identified, and trauma appears exclusively related to physical activity. This finding also implies the Spanish did not administer the political economy of the Lambayeque region using violent force severe enough to break bone. In sum, physical activity and lifestyle appears to have substantively shifted during the Colonial era. Hypothesis III is accepted.
HYPOTHESIS IV: ORAL HEALTH AND DIET

The prevalence of dental caries is generally static from the late pre-Hispanic to the Colonial era, though it does increases significantly in a few age classes in favor of the postcontact era, and specifically during the Early/Middle Colonial phase. However, the postcontact sample monopolizes all statistically significant relationships of anterior and posterior antemortem tooth loss. Antemortem tooth loss is a highly multifactorial phenomenon, but clinical data clearly show it is most directly linked to advanced dental caries which penetrate the pulp chamber and force the body to exfoliate the dead, infected tooth (Harris 1968; Menaker 1980; Sutter 2005). Since dental wear actually decreases slightly in Mórrope, possibility of advanced wear-induced pulpitis cannot be considered a cause of tooth loss. Instead, many if not almost all antemortem tooth losses reported here were probably dental caries-induced.

Synchronic and diachronic analyses indicate that while late pre-Hispanic males universally shared worse oral health outcomes, a postcontact pattern shift is evidenced by pathological conditions more evenly distributed among males and females. This shift appears to stem from elevated female prevalence. The observed patterns of greater prevalence dental caries and antemortem tooth loss of Mórrope females over contemporaneous males and pre-Hispanic females spanning several age classes bears further discussion. Recent studies suggest a correlation between elevated female fertility and elevated dental caries (Lukacs and Largaespada 2006). Hormonal levels in pregnant women modify oral pH, salivary flow, and buffer capacity such that the growth and
reproduction of oral bacteria is promoted. In this case, increased female prevalence of
dental caries in the postcontact period occurs within the context of a significant drop in
relative female fertility as estimated by \( \text{D}_{30+}/\text{D}_{5+} \) ratios. Therefore, dietary and behavioral
changes appear to remain as chief causes of this pattern.

Following this logic, it is very likely these two sets of observations signify a
significant shift in postcontact dietary composition and subsistence economy. The
indigenous Mochica of Mórrope seem to have exploited greater quantities of starchy
carbohydrates in their daily diets, perhaps to make up for dietary shortfalls in other areas,
such as meat. Postcontact diet in Mórrope was also probably less nutritious and possible
less varied than the late pre-Hispanic period as well. Dental wear patterns tentatively
suggest the composition of postcontact diets were slightly, but consistently, softer.

It is also worthwhile speculating that readily available marine resources may have
been exploited more, given a slight rise in porotic hyperostosis prevalence. If this was the
case, a combination of aggregation, poor sanitation, marine food-borne parasites
synergistically acted to elevated the rate of childhood iron-deficiency anemia in Mórrope.
This working hypothesis is however nearly impossible to disentangle from other dietary
indicators and again, must be best tested by future stable isotope analysis.

Changing parameters of human-environment interplay can be considered in this
explanation of dietary outcomes in the Colonial Lambayeque Valley Complex. For one,
environmental constraints on diet did exist, though in part human creativity always
played a role in mitigating potential environmental stressors. However, this relationship
was likely transformed in the Colonial period involving Spanish economic policy and
environmental transformation. Postcontact landscapes were made over to accommodate transplantation of European agricultural practices and intensive animal husbandry. Soil exhaustion, water shortages (derived from cultivation of sugar cane and other introduced commercial crops) and episodic prolonged droughts placed unprecedented stress on local subsistence systems. Unsurprisingly, El Niño-related instability was also a factor in the Colonial period, but given the new configuration of human-environment interaction, its impacts were probably magnified, such as recorded in historic catastrophic flood events such as those in 1578 and 1721. Precipitation, dust, and $\delta^{18}O$ patterns locked in ice cores from the Quelccaya glacier in the south Peruvian highlands and changes in fossil diatoms in the sediment of Lake Yambo, Ecuador, provide a long record of regional climatic disturbances (Shimada et al. 1991; Stenitz-Kannan et al. 1992). Following the severe El Niño events and accompanying droughts occur in series from ca. 500 B.C., 580 A.D., and 1050 A.D., El Niño oscillations were recorded in an unusual back-to-back sequence spanning A.D. 1578, 1728, 1791, 1828, 1891, and 1925. Major droughts appear to have struck in the mid-sixteenth and early seventeenth centuries.

These factors represent a complex set of stressors on subsistence ecology and resource exploitation. In the case of the Lambayeque region, agriculture was reoriented towards the monoculture production of a nutritionally worthless good (sugar) and livestock were rendered into non-comestibles. Due to the extractive and redistributive nature of the colonial economy, that sugar probably never made it back to the local level. Access to foods was also controlled, such as how the ethnohistoric record indicates meat was a food that Peruvian elites enjoyed preferential consumption. Further, Modesto
Rubiños (1782 [1932]) described Morropanos involved in the principal cultivation of maize, beans, and peppers. If accurate, this observation, in concert with data on oral health, indicates a major decline in dietary diversity and nutritional value. Hypotheses IV is accepted.

**HYPOTHESIS V: POPULATION GENETIC VARIANCE AND GENE FLOW**

The results of the population genetic analysis represent the first possible step in the study of population history of the Lambayeque Valley Complex. Sample sizes are small, subpopulation divisions are the broadest that can be assembled, and the postcontact samples are derived from a single colonial community on the edge of the Motupe drainage. However, analytical assumptions of the R matrix are generally met. The pre-Hispanic and postcontact samples cover a similar range of contemporaneous time (ca. 200 years). All were all potential participants in regional mating networks, and the sampled cemeteries at least generally share overall burial catchment characteristics. That notwithstanding, these results are best interpreted as very preliminary. At the least, they are heuristically valuable and provide a testable model for future research. At the same time, clear correlations to archaeological and ethnohistoric data in the Lambayeque Valley Complex and settings further afield can be identified which helps justify the conclusion that real biological interaction patterns are being reported.

During the late pre-Hispanic period (essentially, the Middle Sicán era which represents the precontact baseline) a degree of subpopulation differentiation is inferred by
its $F_{ST}$ value (0.041). This value can be compared to a variety of other populations (Table 11.1). This value is very similar to that obtained for the late pre-Historic Chachapoya in Peru and the late Archaic Ohio Valley. Late Prehistoric Spanish Florida ($F_{ST} = 0.018$) is comparatively less differentiated perhaps due to its more fluid chiefdom-style organization. The degree of late pre-Hispanic differentiation in part would seem to stem from the very divergent degree of external gene flow experienced between the ethnic Sicán and ethnic Mochica groups. The ethnic Sicán appear to be highly restricted in terms of exogamy (residual = - 6.708) compared to the ethnic Mochica (residual = + 0.711) whose genetic variance and intake of genes from external sources is clear (Figure 11.1).

<table>
<thead>
<tr>
<th>Sample or Population</th>
<th>Minimum $F_{ST}$</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>South American Indians</td>
<td>0.33-0.39</td>
<td>Ousley 1995</td>
</tr>
<tr>
<td>Northwest Coastal Indians</td>
<td>0.26</td>
<td>Ousley 1995</td>
</tr>
<tr>
<td>Amerindians</td>
<td>0.1274</td>
<td>Powell and Neves 1999</td>
</tr>
<tr>
<td>Siberia</td>
<td>0.12</td>
<td>Ousley 1995</td>
</tr>
<tr>
<td>Late Prehistoric Ohio Valley</td>
<td>0.078</td>
<td>Tatereck and Sciulli 2000</td>
</tr>
<tr>
<td>Yanomamö</td>
<td>0.063</td>
<td>Jorde 1980</td>
</tr>
<tr>
<td>Iroquois</td>
<td>0.05</td>
<td>Langdon 1995</td>
</tr>
<tr>
<td>Late pre-Hispanic Chachapoya</td>
<td>0.047-0.090</td>
<td>Nystrom 2006</td>
</tr>
<tr>
<td><strong>Late pre-Hispanic Lambayeque</strong></td>
<td><strong>0.041</strong></td>
<td><strong>Table 10.18</strong></td>
</tr>
<tr>
<td>Late Archaic Ohio Valley</td>
<td>0.039</td>
<td>Tatereck and Sciulli 2000</td>
</tr>
<tr>
<td>Irish</td>
<td>0.027</td>
<td>Relethford and Blangero 1990</td>
</tr>
<tr>
<td>Papago</td>
<td>0.0198</td>
<td>Jorde 1980</td>
</tr>
<tr>
<td>Late Prehistoric <em>La Florida</em></td>
<td>0.018</td>
<td>Stojanowski 2005c</td>
</tr>
<tr>
<td>Jirels</td>
<td>0.017</td>
<td>Relethford and Blangero 1990</td>
</tr>
<tr>
<td>Interregional Mississippian Populations</td>
<td>0.010</td>
<td>Steadman 2001</td>
</tr>
<tr>
<td><strong>Postcontact Mórrope, Lambayeque</strong></td>
<td><strong>0.009</strong></td>
<td><strong>Table 10.19</strong></td>
</tr>
<tr>
<td>Interregional Late Woodland Populations</td>
<td>0.005</td>
<td>Steadman 2001</td>
</tr>
<tr>
<td>Late Mission <em>La Florida</em></td>
<td>0.002</td>
<td>Stojanowski 2005c</td>
</tr>
</tbody>
</table>

Table 11.1. Minimum $F_{ST}$ values for the Lambayeque Valley Complex and comparative populations.
Figure 11.1: Comparison of observed mean genetic variance versus distance to the centroid for late pre-Hispanic and Colonial samples. Points above regression line experienced greater-than-average extralocal gene flow while those below experienced less-than-average external gene flow.

The degree of late pre-Hispanic differentiation in part would seem to stem from the very divergent degree of external gene flow experienced between the ethnic Sicán and ethnic Mochica groups. The ethnic Sicán appear to be highly restricted in terms of exogamy (residual = -6.708) compared to the ethnic Mochica (residual = +0.711) whose genetic variance and intake of genes from external sources is clear (Figure 11.1).

Archaeological evidence and previous dental phenotype and genetic study (Corruccini and Shimada 2002; Shimada et al. 2005) indicates that the apparently
intrusive elite Sicán ethnic group was probably quite small, patrilocal, and genetically isolated, an observation that could owe to a confluence between founder effect and social rank and ideological structures that set up biological barriers to gene flow with the local population. The resulting lack of external gene flow probably contributed to ahomogenous, inbred, and genetically distinct Sicán group from the local Mochica subpopulation. Though not reported here for considerations of space, discriminant function analysis performed in SAS 9.1 provides a similar conclusion: ethnic Mochica and Sicán are two distinct biological populations, with only one ethnic Sicán individual incorrectly allocated to Mochica sample.

This degree of late pre-Hispanic population structure may have been shaped by these two different patterns of gene flow where strict endogamy was part of a strategy that maintained elite lineages, group identity, control of resources, and political power. While the local Mochica were ostensibly organized along the lines of the guild-like, endogamous parcialidad, their residual value indicates clear mate exchange with external subpopulations, most likely the adjacent coastal valleys or other Lambayeque Valley Complex subpopulations not sampled here.

A clear and dramatic reduction in postcontact minimum genetic heterogeneity is clear ($F_{ST} = 0.009$). Multiple features of the postcontact biocultural environment likely contributed to this observation. First, epidemic disease, out-migration to fulfill mita tax obligations, and fugitivism removed alleles from the gene pool and made it less diverse. Population aggregation brought together what may have been previously semi-isolated parcialidades and broke down barriers to mate exchange which would have contributed
to a more homogenous population. Third, intermarriage and resulting genetic homogenization between previously distinct groups or communities may have been part of an indigenous Mochica strategy involving an attempt to maintain group viability.

The Early/Middle Colonial period sample from Mórrope indicates that following contact and colonization with the Spanish, the degree of external gene flow increased some 1.6 times (residual = + 1.165) when compared to the late pre-Hispanic Mochica. This increase in external gene flow is conforms to biological expectations of the Spanish administration of the Lambayeque Valley Complex. The effects of ethnohistorically-known population aggregation seem to have broken down prior barriers to gene flow and essentially broadened indigenous mating networks and mate choices. The following Middle/Late Colonial period subpopulation, conversely, were observed to possess a negative residual (-2.214) indicating a stark reversal by nearly 190 percent. By this time, population aggregation had subsided and populations were consolidated.

The source of the increased gene flow probably did not involve substantial interbreeding with Europeans or Africans. While this practice is well known from a variety of sources, European or African genes would have served to increase tooth size, add foreign population-specific dental traits, or diminish expression of local non-metric patterns of tooth variation in their so-called mestizo descendants. This study finds no evidence of this pattern. Elevated gene flow appears restricted to other ethnically Mochica peoples.

However, some differences in tooth size and trait expression are observed in Mórrope. Stojanoswki (2004) found larger tooth size was associated with the diminished
genetic variance of indigenous Guale of La Florida. This phenomenon was argued as a function of the stochastic effects of random genetic drift driven by postcontact depopulation and aggregation. A statistical test of normalized tooth size means between the late pre-Hispanic and postcontact Mórrope Mochica individuals reveals a similar phenomenon, though the results are strongly statistically insignificant. As seen in Table 10.20, all but two of the pre-Hispanic measures fall are negative values falling below the standard deviation (smaller tooth size), while 11 of the 14 postcontact metrics from Mórrope dentition are positive values (larger tooth size). On the other hand, examination of non-metric dental traits using a linear discriminant function analysis indicates some notable differences between late pre-Hispanic and Colonial dentitions (Table 10.21). Fairly clear degrees of difference are seen in the morphology of upper and lower first molars, while traits of the lower anterior dentition are relatively similar between these two groups. Exactly why there is a difference in non-metric morphology is exceedingly difficult to pinpoint. Drift is one possibility. Qualitatively, the non-metric traits recorded in the Mórrope sample do not include any Caucasian or African traits, and seem to involve less variation of traits noted in pre-Hispanic samples, such as a highly consistent size expressions of the UM1 paracone or hypocone or the LM1 hypoconulid and entoconulid. Clearly, future work is required to resolve this issue, but considering the various lines of contextual evidence, genetic drift and a bottleneck effect may be the most parsimonious inference at this time.

In sum, the observed changes in this initial and preliminary study of population structure transformation and history in the pre- and postcontact Lambayeque Valley
Complex are indicative of marked transformations under Spanish colonial rule. The results appear to closely mirror the outcomes experienced in Spanish Florida even though Lambayeque samples sizes are indeed far smaller. These observation are suggestive the possibility that a common set of Spanish colonial economic policies shaped indigenous microevolutionary trajectories in a broadly similar way in southeast North America and the coastal Central Andes. Hypothesis V is provisionally accepted. These results are best reformulated into a new working hypothesis to be tested by but larger sample sizes, increased geographical intra-valley coverage, and more subpopulation subdivisions.

**HYPOTHESIS VI: INTRACEMETERY KINSHIP ANALYSIS**

Analysis of kinship based on dental phenotypic patterning reveals that in general, no one particular group of biologically-related individuals were consistently buried in exclusive, preferential, or prestigious locations in the Chapel of San Pedro de Mórrope. There appear to have been no reserved plots for families and their affines. This is contrary from the hypothesis based on local ethnohistory that describes indigenous elites and other indigenous colonial collectives.

Still, some broad spatial relationships can however be discerned; their meaning, if any, is clearly open to debate. In various locations, related adults and subadults do appear to cluster in groups of three or more within a unit, but they are surrounded by various other phenetically-distinct people. Perhaps some small-scale non-random or intentional pattern guided burial placement along kinship lines. The clearest examples are found with
E/MC Group A and M/LC Group A' and B'. The A and A' groups are mostly restricted to what was probably the less prestigious back and middle sections of the Chapel. M/LC B' is the single best-defined cluster, a tightly spaced group of closely related children buried in front of the altar. Within the context of colonial Peruvian society, it is unlikely that these patterns are random and the decision where to bury the dead was based on whim.

Given the hypothesis that kin-based cemetery structures were probably the norm during the late pre-Hispanic period among elites and non-elites alike, changes to mortuary patterning and concordant social structures may be evident in Mórrope. It is important to note that none of the following inferences are mutually exclusive.

First, given the apparent lack of widespread bio-spatial patterning of burials, it is possible that burial location may have been determined in part by some degree of achieved status. Kinship ties were less important in death. Individual variation in wealth or status played a greater role in access to socially acceptable burial location. The exceptions to this appear to be inferred lower status Group A and A' who were found consistently throughout the rear, middle and exterior (Sacristy) portions of the church and never in the front. This could indicate not only less social capital possessed by these collectives but less potential for mortuary status mobility as well. The most significant variable shaping burial placement in Mórrope, then, might have been the ability to pay for various fees charged for interment in different parts of the Chapel. The critical caveat here is that to properly assess questions of achieved status, rank must be measurable in some manner which remains very elusive in the Mórrope cemetery.
Still, a general lack of burial patterning by kinship – especially at the front of the altar where related higher-status individuals were expected to congregate vis-à-vis Saxe’s hypothesis 8 – may not be all that surprising. If one of the ritualized social functions of spatially-segregated pre-Hispanic cemeteries indeed extended to laying claim to resources, negotiating or reinforcing social boundaries, and the maintenance of socioeconomic power by practice and ostentation, colonial indigenous collectives may not have had the need for such practices. Disempowered and marginalized, even the more highly ranked Mochica of Mórrope and their curacas probably had far less rights and powers to claim and legitimize. A lack of kinship-based burial patterning in Mórrope may be a reflection of poverty, political subjugation, and a shift of the locus of social power from Mochica lords to the Spanish elites.

Second, kinship links and cemetery patterning was also apparently part of pre-Hispanic mechanism that involved the practice of identity, group solidarity, and other ritual functions. The breakdown of kinship-based patterning in Mórrope may reflect a conscious effort on behalf of the Spanish to deconstruct indigenous identity and disempower traditional groups as social groups were broken down and reformulated in the postcontact setting. Imposition of Catholic death rituals in Mórrope ended traditional use of grave goods. Access to metals continued to be controlled such that the pre-Hispanic display of different metals as status markers fell into immediate disuse at Mórrope. Similarly, controlling where people were buried and denying traditional identity and power practices would have broken apart kin groups in death. Intentionally
denying these aspects of mortuary behavior and identity could have weakened indigenous legitimacy and cohesiveness in the living world as well.

In the same vein, were the Spanish the only ones manipulating burial ritual, identity, and kin groups? Given the degree of precontact ritual reproduction, the local Mochica of Mórrope were probably also closely involved in manipulating cemetery structuring. Returning to the finding of increased postcontact genetic homogeneity and the small F_{ST} value that characterizes the Mórrope population, there is virtually no postcontact population structure. Stojanowski (2005c) hypothesizes that a similar result emerged in La Florida as groups became more biologically homogenous; cultural and ethnic barriers to mating were intentionally disassembled as part of an indigenous survival strategy. In Mórrope, a similar outcome may have taken shape as the colonial Mochica negotiated new configurations of identity. Pre-Hispanic forms of social differentiation and boundaries were no longer were perceived of or practiced with the same degree of importance. It may have been far less important where someone was buried given the broadened nature of the collective and group identity. Instead, it may be seriously proposed the degree and nature of individuals’ devotion to Catholicism, which also probably extended to their children, may have been the single most important variable determining where the dead were buried in Mórrope.

Third, what could be called the “Jacobi paradox” should be considered (Jacobi 2000). In Mórrope, widespread evidence of intentional and accidental burial alterations including exhumations and secondary burials are well-documented. As at Tipu mission in Belize, an originally kinship cemetery structure in Mórrope may have been disturbed to
the point where the remaining individuals are but a remnant of a once coherent and spatially segregated pattern involving defined kin groups, family plots, and corporate collectives. Yet, the generally widespread distribution of inferred biological groups of children and adults alike including the fully intact upper strata throughout the Chapel of San Pedro de Mórrope points to a lack of originally segregated structures.

Hypothesis 6 is rejected based on these results. Though some degree of spatial-biological patterning is observed in the cemetery of the Chapel of San Pedro de Mórrope, it is too small in scale and too spread out over space to provide compelling evidence of spatially segregated areas for the dead members of any group of people. However, extrapolating these findings to the rest of the Colonial Lambayeque Valley Complex is not yet warranted: more individuals from other cemeteries must be sampled before any solid conclusions can be considered. As of now, we can only speak of the pattern at Mórrope and model expectations elsewhere.

SOCIAL AND THEORETICAL SIGNIFICANCE OF COLONIAL MÓRROPE

HEALTH OUTCOMES

In Chapter 2, it is argued that bioarchaeological studies can and should engage social theory and cultural explanations for the phenomena they describe. Postcontact Mórrope is an excellent setting for such interpretation thanks to relatively rich contextual understandings and multiple lines of biological data.
Lacking a comparative sample of elite, urban, or European individuals from the Colonial-era Lambayeque Valley Complex, it is currently impossible to gauge how health gradients correlate to social structures or ethnic groups. As colonial Peru was a rigidly hierarchical society, it is very reasonable to hypothesize the evidence of morbidity and stress in Mórrope sits somewhere in the lower end of the spectrum of health outcomes in this society. These findings probably also point to colonial Peru as a more holistically dysfunctional and maladaptive society. The effects of social inequality on health are not just limited to discrete groups of poor people, but reverberate across entire populations (Nguyen and Peschard (2003). Poor health in ranked societies exacerbates the very inequalities that create it, and spirals into a vicious circle of an “illness poverty trap” (Whitehead et al. 2001) such that “people are sick because they are poor and they get poorer because they are sick” (Winslow 1951). Mórrope found itself within a society that embodied and practiced extreme asymmetric socioeconomic relationships so as to become a fundamentally sick society – inherently unequal, and inherently pathological.

As the first point, embodiment of asymmetrical social relations appears to have involved social inequality transcribed into the biology of the people of Mórrope. Whenever people constrained by being denied access to a society’s resources, physical, psychological, and social violence exists in a very real manner. Structured inequalities lead to suffering and death as often as direct violence does, though the damage inflicted is slower, more subtle, widespread, and is difficult to buffer against.

Empirical bioarchaeological evidence of decreased well-being can be interpreted as an expression of socially engineered structural violence; bioarchaeology in this way
can make visible the normally invisible forms of political and economic constraints embedded in socioeconomic patterns. In this case study, they were normalized by colonial institutions and an emergent colonial *habitus*. Structural can lead to direct violence with the chronically marginalized violently resisting inequality. Conversely, structural violence can also potentially strip autonomy and terrorize subject populations where individual and group agency is constrained and people become unwilling or unable to confront social discrimination.

Children are often the most vulnerable, invisible, and innocent victims of structural violence, and the evidence of increased health stress among Colonial-era Mórrope subadults in the form of porotic hyperostosis and dental enamel defects testify to this relationship. Indigenous colonial women were also clear recipients of structural violence. Considering a between-period female comparison, Colonial females demonstrate a statistically elevated prevalence or biological trend in all but one of the 16 skeletal biological variables examined reflecting systemic stress and activity along with nine of 16 comparisons of carious lesion and antemortem tooth loss prevalence. The constructed social experience of colonial Mochica women appears to have placed them in contact with greater risk factors for physical suffering and illness. Throughout the world, women are confronted with sexism and cross-culturally, it is especially poor females who control the least resources and generally suffer the most. Biological patterns among the Mórrope women may serve as reflections of sexism, sexual discrimination, and patriarchal values that underscored colonial societies. This is not to minimize the suffering of Colonial indigenous men, who were also recipients of structural violence
demonstrated in even greater prevalence of pathological conditions than coeval females in Mórrope. Men may have borne far more than just the brunt of the biological effects of Spanish colonialism, but the increased levels of morbidity among the postcontact women from precontact times embodies entirely different dimensions of social configuration, inequality, and violence.

Now arriving at the second point, it is possible to characterize the large-scale socioeconomic relationships between the Spanish and the indigenous Mochica population in the Lambayeque Valley Complex as a manifestation of “macroparasitism.” This intriguing concept, developed by Brown (1987) and McNeil (1976), has enjoyed attention by mostly by medical anthropologists and a few physical anthropologists (Armelagos and Brown 2002). In this perspective, microparasites, such as bacteria, viruses, protozoa, or helminths consume food energy produced by individuals, produce conditions of stress and recuperation for the host which limits population health and growth (Brown 1987: 159). This model can be extended not just in metaphorical terms but in concrete ones as well to microparasites –specifically large bodied human organisms.

Human macroparasites exploit their local human hosts for food and other forms of energy such as labor almost universally via indirect means that involve the coercion of the host to give up a portion of their food and energy production (in contrast, direct human macroparasitism would be defined as cannibalism) (Brown 1987: 160). In essence, indirect macroparasitism is a form of asymmetrical economic power and exchange. Macroparasitism may be a uniquely human phenomenon possible due in large part to the development of social inequality, economic surplus, and ownership following
the domestication of plants and animals. The term parasite is not used here in any way to
denote a political polemic or to pass moral judgment. Rather, it is intended to describe a
way of living and mode of resource usage.

Macroparasitism is probably a common characteristic of state-level societies with
agrarian economies. In such a setting, microparasites are also likely to coexist and
compete with the microparasites as “most human lives [are] caught in a precarious
equilibrium between the macroparasitism of disease organisms and the macroparasitism
of large bodied predators, chief among which have been other human beings” (McNeill
1976:5). In other words, a colonial population like that of Mórrope was wedged in
between the nutritional demands of intestinal flatworms and the tribute demands
mandated by invasive Spanish authorities: “When microparasites and macroparasites
coexist, there are always three mouths to feed, and the host nearly always gets fed last”
(Brown 1987:161). In the fullest sense, poor health outcomes in Mórrope and similar
settings are a consequence, rather than a cause of, poverty.

SYNTHESIS: BIOARCHAEOLOGY OF ETHNOGENESIS

The various archaeological, biological, and genetic lines of evidence examined in
this work ultimately converge into a large-scale, “total biosocial phenomenon” that is the
final issue examined in this work: the ethnogenesis of a Colonial Mochica culture and
population in the Lambayeque Valley Complex.
Ethnogenesis is a valuable concept that can illuminate complex interactions between global and local histories. It is not merely a label for the emergence of a new kind of culture that defines itself in relation to a social or linguistic heritage; ethnogenesis embodies a social and political struggle to create the one of key the foundations of social operations – an enduring group identity – in contexts of radical change and discontinuity (Hill 1996b:1). Ethnogenesis is a dialectical synthesis that involves a “reflexive awareness on the part of social actors of their ability to make situational and more lasting adjustment to social orderings…and an ability to understand that ordering as it is situated in larger, more encompassing spatiotemporal orders that include others who are socially different” (Hill 1988: 7).

The current reconstruction of life in postcontact Mórrope portrays a major shift in experience of daily life, health, activity, and diet that involved chronic, widespread, and socially destabilizing biological stress stemming ultimately from colonial Spanish economic policies. These data and ethnohistoric contexts point to a stereotypical postcontact experience of ethnocide, powerlessness, and assimilation.

Yet, the meeting of the Iberian and Andean worlds in Mórrope altered the local social fabric through imposition of foreign customs, religion, and language in a way that did not simply replace Mochica traditions but instead entered into a dialectic engagement with local culture, belief, ritual, and historic contingencies. This process produced both biological and ritual phenomena, and it occurred in two stages. First, indigenous population genetic structures were transformed and hybridized. Second, material correlates of a hybrid Euro-Andean mortuary pattern embody cultural hybridization.
In Mórrope, a precipitous fall in estimated genetic heterogeneity is interpreted as decline of between-group genetic variability that stems from a proximal synergism between (1) the loss of alleles due to the stochastic sampling effects of random genetic drift as population size declined, and (2) alteration of traditional mating networks through aggregation, depopulation, and an imposed religious system. The Colonial Mórrope population with its very low $F_{ST}$ closely resembles the Late Mission samples in La Florida composed of remnant Apalachee-, Guale-, and Timucua-speaking populations: no evidence of population structure is detected (Stojanowski 2005c). Should the outcome in Mórrope be extrapolated to the Lambayeque Valley Complex as a whole, the strong possibility exists that the Mochica had become a single biological population following conquest. The timing of this biological homogenization appears quite clear. Estimation of differential gene flow from the R matrix indicates the Early/Middle Colonial individuals experienced a magnitude of external gene flow was nearly twice as great as late pre-Hispanic population. This pattern reverses some 190 percent by the later Middle/Late Colonial phase with clearly negative external gene flow signatures. This is to say the biological transformation of the Mochica was relatively rapid, and they became a homogenized, hybrid population within perhaps the first 100 years following conquest, and by the Middle/Late Colonial phase, hybridization was complete, populations had been completely aggregated, and gene flow subsided.

The process of genetic homogenization was likely contributed in part by Spanish economic policy. In order to create manageable pools of tribute and labor, they provided the physical and cultural setting for biological hybridization of indigenous gene pools to
occur as they aggregated large numbers of previously socially or geographically semi-
isolated groups in a single location. In an engrossing essay, Cummins (2002) helps
elucidate at broad conditions that were operating in the space and place of social
transformation and the physical locus of the postcontact cultural interface: the reducción
and the colonial town. Reducciones were a powerful model of divine order and normalcy.
These settings contained a locus of religious experience that defined a legal community –
at the center of which was the church surrounded by an organization of civil space
viewed to represent God’s design of social order.

Domestic spaces were completely reconfigured under the purview of the
reducción. Concepts of “decency” and Spanish norms of the family were enforced by the
creation of domestic spaces with single entrances and private sleeping rooms subdivided
by generation (Cummins 2002: 217). This was a response to native polygamy or
concubinage and settings where multiple extended family members slept in a single
space. The Spanish aimed to instill a greater sense of shame regarding sexuality; even in
Mórrope, Modesto Rubiños comments on attempts to alter traditional marriage patterns
enforcing what might seem analogous to a nuclear family model. Cummins (2003) argues
marriage rites in the Andes were attached and performed around Catholic practice in such
a way that matrimony rituals were a direct vector between the space of the reducción, the
changes in consciousness it fostered, and the community in which native Andeans
notionally became ideological and psychological supplicants of the Catholic priest
(Cummins 2002: 227).
Spanish policies within the _reducción_ allows us to model possible population genetic outcomes. Indigenous people, accepted by marriage into the colonial Catholic community and subsequent residence within the rules and tightly controlled spaces of the colonial town, seems as though it would have prevented widespread or multiple mate exchanges throughout the lifetimes of these individuals. An increase genetic isolation and population heterogeneity would be expected. Since this is clearly not the case in Colonial Mórrope, the principle factor driving biological homogenization was likely operating outside of Spanish control.

The greatest driving force behind Early/Middle Colonial period biological transformation may have been the Mochica themselves. One possibly motivation for the Mochica to alter inferred pre-Hispanic _parcialidad_ boundaries that set by mate exchange norms and hybridize was an adaptive response to the stress of demographic contraction and lowered female fertility. A reduced number of available mates (most likely, absentee males meeting _mita_ obligations or fugitivism) was another variable. Homogenization would have been promoted in part by opportunistic or compulsory mate exchange as previous configurations of social relationships were replaced by new alternative connections in the colonial setting were established and fortified. This is a liminal stage of ethnogenesis where so-called hybridized group coalitions emerge as a response to demographic and biological stress where the basis of ethnicity is widened to the lowest common denominator in the effort to survive (Albers 1996; Hikerson 1996; Kopytoff 1976). The homogenization effects of the imposed concept of “_El Indio_,” which had come to be used by native southern Andeans as a self-descriptive term by the 1560s,
probably aided this process of traditional identity boundary deconstruction. The lack of bio-spatial patterning the Mórrope cemetery is quite discontinuous with non-random pre-Hispanic traditions and probably reflects boundary deconstruction as well. Maintenance of social group distinctions may have ceased to bear any real meaning. However, tooth size and dental trait data indicate that at least in Mórrope, the definition of ethnicity had not been altered to include Black Africans or Europeans.

Once this primarily biological phase was over by the close of the Early/Middle Colonial sequence, a second stage of ethnogenesis took over. As population fertility increased and systemic biological stress generally stabilized, a cultural adaptive response is seen. This involved the creation and practice of syncretic Euro-Andean cultural patterns found mostly in the Middle/Late Colonial mortuary record. While the Mochica buried their dead in sanctified ground, often in European-style coffins sometimes decorated with the Christian cross, the reproduction of precontact rituals inside the Chapel of San Pedro de Mórrope modification of a conscious indigenous identity intimately linked to precontact rituals and their meanings. The deeply rooted and conservative pre-Hispanic Mochica substratum, which weathered Moche and Sicán collapses and conquest by the Chimú and Inka, remained viable if not however driven somewhat ‘underground’ following contact.

Mortuary rituals at Mórrope may be the first glimpse of a hybrid Euro-Andean mortuary pattern, and by extension, a syncretic Euro-Andean Mochica culture the material manifestations of which bloomed primarily during the Middle/Late Colonial phase following the completion of biological transformation. Exactly who was
manipulating this cultural process is unclear, but reproduction of multiple traditional mortuary rituals points directly toward the active role of Mochica cultural imagination and agency. On deep levels, pre-Hispanic ritual patterns and identity symbolisms practiced at Mórrope would have been set within an isochrestic plane where stylistic variation is set by enculturation and *habitus*, but the active use of these symbols in this colonial context appears very much emblemic as burials functioned as consciously manufactured socio-ethnic markers (see Reycraft 2005 for other Andean examples).

The clergy no doubt contributed to this hybrid pattern as well. At least two of the priests by the mid-1650s were Augustinians, a liberal order that saw finding a mix between Catholic and Andean beliefs and ‘gentle persuasion’ was they key to conversion. They would have been far more tolerant of local funerary performances combined with Catholic ritual. It is also possible that some activities were conducted surreptitiously, such as when a priest periodically would have left Mórrope to visit Pacora, leaving the Chapel unattended. Absenteeism of priests from rural parishes appears to have been quite common as they preferred to live in more urban, Hispanic settings. In this sense, there probably were many opportunities to practice traditional rituals. Also, these priests probably did not fully understand or have access to emic significance of a red face cloth, a disinterred femur, or a secondary burial. The meaning of these features would have been shared on a very basic level by Mochica funeral participants. After a generation or two, this hybrid pattern became embedded. Perhaps these are among the entrenched “errors” and “misunderstandings” Modesto Rubiños lamented in the late eighteenth century.
In comparison, a similar process of ethnogenesis transpired in Spanish Florida and was in the process of passing though its liminal stages. The birth of a new identity – a consciously perceived pan-Spanish/Indian identity where the natives had become agents of their state sponsors, was never fully realized as conflict with English-allied tribes and slave raiding destroyed the Spanish mission system on the southeast U.S. coastline in 1704-1706 (Stojanowski 2005c: 427-428). In Peru there was no such arrest of indigenous ethnogenesis by global power struggles. Within the walls of the Chapel of San Pedro de Mórrope is contained biocultural evidence of a more fully formed and reintegrated hybrid Euro-Andean configuration, parts of which coalesced rather rapidly while other elements seem negotiated into existence during the Middle/Late Colonial phase. These biocultural adaptations to systemic biological stress would seem overall successful. The Mochica survived contact. By the time the Chapel was abandoned sometime during the early or mid-eighteenth century, a new kind of person and a new kind of culture that had never existed before – the Colonial Mochica – had come into existence.

CONCLUSION

This initial bioarchaeological study of colonial north coast Peru indicates burial patterns at Mórrope did not encode a simple acceptance or rejection of the Colonial reality or the Catholic mortuary patterns. Instead, pre-Hispanic Mochica identity engaged in a dialectical struggle with the European world where syncretic burial patterns, driven by the agency of the local Mochica, developed and linked pre-Hispanic traditions –
including living-dead interactions – with Christian ritual. These rituals may have also simultaneously encoded resistance against the Spanish as well as creative Mochica efforts to reconceptualize themselves and the social order during a time of historically unparalleled instability. Compared to the late pre-Hispanic baseline, skeletal biological data from Mórrope portray elevated levels biological stress, DJD, and oral health.

The same Spanish socioeconomic transformations that promoted increased morbidity and suffering were key factors that drove Mochica biocultural adaptation to the colonial experience. In particular, biological distance analyses and burial patterns reveal aspects of these changes, including a two-stage process of ethnogenesis transpired; the first stage was biological, and involved group hybridization. A second stage of ethnogenesis followed situated in ritual and material domains.

Life for the Mochica in twenty-first century Mórrope continues. Today, mourners bring the dead to the Church of San Pedro. Following a short service, the coffin is taken to the modern cemetery and sealed in a crypt. At some point between the eighteenth century and today, Colonial Mochica rituals seem to have faded into the past. Still, colonial legacies persist and challenge this rural community. Recalling the colonial Quechua saying “out of daylight, came darkness,” the Mochica of Mórrope emerged from the darkness as a transformed people. But ethnogenesis continues. Over the past 30 years, archaeological study of the Lambayeque region’s history in particular is contributing to a reawakening and revitalization of local perceptions, questions, and embodiments of Mochica identity. The early twenty-first century will no doubt be seen as a time when the birth of yet another Mochica identity was on the horizon.
CHAPTER 12

CONCLUSIONS, UNRESOLVED ISSUES, AND DIRECTIONS FOR FUTURE RESEARCH

The major findings of this work involve an emerging understanding of a total biocultural phenomenon experienced by the indigenous Mochica of the Colonial Lambayeque Valley Complex of north coast Peru: how and why unprecedented biocultural stress, negative environmental transformations, cultural synergisms, Spanish economic policies, and microevolutionary forces contributed to the ethnogenesis of a hybrid Euro-Andean Mochica culture that survived European conquest and colonialism.

SUMMARY OF MAJOR FINDINGS

Analyses of archaeological and biological patterns from Mórrope indicate a complex set of local consequences to Spanish colonialism on the north coast of Peru:

1) Mortuary ritual syncretism, particularly in the Middle/Late Colonial phase
2) Decreased female fertility, followed by a modest increase
3) Decreased prevalence of dental enamel hypoplasias
4) Increased prevalence of porotic hyperostosis
5) Increased prevalence of non-specific infectious disease (periostitis)
6) no change in terminal adult stature
7) altered child care and child mobility patterns (termination of cradle boarding)
8) increased prevalence of DJD in especially in joint systems of the upper limb and the knee
   a.) overall greater DJD prevalence among postcontact males
   b.) almost universally elevated DJD prevalence for postcontact females compared to precontact females
9) trend towards elevated postcontact traumatic injury
10) no clear increase in dental caries or dental abscesses
11) strongly significant elevation in the prevalence of antemortem tooth loss
   a.) worse oral health outcomes among postcontact women
12) slightly decreased dental wear
13) rapid indigenous biological hybridization probably within the first 100 years of contact
14) termination of kin-based intracemetery patterning

These findings are consistent with the current body of research which indicates a hemispheric decline in indigenous health and well-being but is not always clear-cut (Larsen 1994; Larsen et al. 2001). Mórrope appears to have participated in this larger pattern of declining historic health. In particular, specific outcome are shared with peoples elsewhere in New Spain, specifically, *La Florida* (Larsen et al. 2002) and historic Ecuador (Ubelaker 1994; Ubelaker and Newson 2002). It can be argued that disparate populations of Native Americans were in a way united through a similar application of Spanish economic policy that shaped negative biological outcomes.

**OVERARCHING THEMES AND PERSISTANT QUESTIONS**

One of the overarching themes of this work is Mochica identity. Multiple lines of evidence including a systematically constructed contextual background were assembled to show that despite so-called collapse events (i.e., the Moche V and Middle Sicán
termination, or invasion by Chimú, Inka, and Spanish), practice and reproduction of ethnically Mochica identity persisted from ca. A.D. 900 to 1750. These discourses of identity appear fundamental to what Bawden (1996: 338) sees as:

“the substratum to a succession of native dominions… had a long and kin-based structural foundation of Andean social life despite the endeavors of systems like that of the Moche [elite] to subordinate to a more hierarchical and exclusive political system. Ultimately, the commoners, with their primary conception of social order outlasted all of the imposed political systems.”

At least in Colonial Mórrope, this primary conception of social order was transformed both by the imposed Spanish sociopolitical system and the Mochica response to those conditions. The latter point highlights Dillehay (2001)’s call for greater recognition and study of non-elites. In particular, non-elite ideologies, such as those maintained through time by the Mochica of the Lambayeque Valley Complex, existed as not reflecting the ideas and values of ruling elites but competed or contradicted them instead. The agency of rural communities such as Huaca Sialupe, Caleta de San José, and Mórrope is indeed evident. They were not some kind of acephalous unit waiting for another urban elite to come along and give them orders, but had ways to negotiate their own identity and political-economic affairs by their own accord (Dillehay 2001: 263, 274). Local communities were thus preserved such that a healthy, viable peasant or commoner substratum weathered the arrival of the Chimú, Inka, and Spanish.

A second theme linked to the first is how group identity was encoded and reproduced in funerary rituals. This is not an argument endorsing either representationalist or postprocessual position, but one that pursues a multidimensional approach involving the complementary nature of the material and non-material.
dimensions in mortuary practices. Such an approach is able to define the durability and conservative nature of the ethnic Mochica funerary rituals from traditional burial grammars to interactions of the living with the dead. Evidence from Mórrope strongly cements the argument for living-dead interactions on the north coast of Peru by showing how long-lived pre-Hispanic living-dead interactions were incorporated into Colonial rituals. Burial at Mórrope existed at a crossroads of habit, ritual, and strategic decisions made by the Colonial Mochica. Mochica identity is a genuine material ‘tradition,’ the physical correlates of which can be traced through time and space. This tradition follows in the sense of Pauketat (2001) as it embodies a *châine opératoire* as traditions were built, rebuilt, and re-imagined along the lines of power, accommodation, and resistance.

A third theme revolves around the bioarchaeology of colonialism. Rarely have postcontact studies of human skeletons been framed in terms of colonial contexts and colonialism (e.g., Lyons and Papdopolous 2002). In this setting, it is beginning to become evident how similar Spanish socioeconomic policies resulted in both shared and divergent biological outcomes for client populations, namely the Guale of Spanish Florida and the Mochica of Lambayeque. Here, similar indigenous experiences of increased morbidity (specifically, increased prevalence of skeletal infection, iron-deficiency anemia) were evidently shared among these two client populations, one a chiefdom before contact and the other a complex state. More strenuous lifestyles shaped elevated experiences of degenerative joint disease. Diets also appear to have decreased in their nutritional value and variety.
Postcontact indigenous biological and social hybridization also appears to have occurred commonly, and not necessarily by Spanish accord. Ethnogenesis was more likely the rule rather than the exception among postcontact native societies. However, the two major variables probably promoted the survival of the Mochica to the present day when compared the extinction of the Guale in the eighteenth century. Mochica population size was large enough to withstand demographic stressors and they were not ultimately dispersed by another competing colonial power such as the British.

Still, many specific questions remain about the consequences of contact in the Lambayeque Valley Complex. In essence, every question posed in this dissertation must be asked again on a regional scale within and beyond the Lambayeque region. Culturally, did other communities with a greater colonial presence such as Túcume, Lambayeque, or Zaña create syncretic mortuary patterns? Were findings at Mórrope a product of the town’s rural borderland positioning? Was Mochica identity and practices as ritually pliant or evident elsewhere? A regional perspective on these phenomena will be a critical question pursued by future work.

Key biological questions remain to be resolved as well. Of paramount interest is a larger sample of Colonial period adult teeth required to more fully evaluate the questions surrounding the patterning of dental enamel defects in the region – did LEH for example truly decrease in frequency over time and what was the mechanism(s) that drove this? While the current data are concordant with findings further afield by Larsen and colleagues (2002) and Ubelaker (1994), sample size and geographic coverage must be increased to more fully evaluate this issue. The issues surrounding disruption to growth
and development are only superficially examined in this initial investigation. One specific area for future research involves increasing the sample size of pre-Hispanic subadult long bone measurements such that a valid pre- versus postcontact comparison of femoral growth velocities across age cohorts can be made – currently, this is not possible.

While DJD prevalence can be relied upon as evidence of a lifestyle shift in Colonial Mórrope, did all Mochica populations experience similar changes? Moreover, it will be necessary to integrate understandings of cross-sectional geometry data to more holistically and precisely characterize this shift in physical activity. Central to this endeavor should be attention to the geometric properties of the long bones of adults and children. The roles and intensity that children participated in colonial political economies may have differed significantly from pre-Hispanic times. Micro-CT studies of subadult trabeculae in particular hold extensive promise for such behavioral reconstructions of children (Gosman 2007). Additionally, gross indicators of diet in the Colonial Mórrope skeletal population are imprecise. Stable isotope studies of carbon and nitrogen coupled with trace elements such as strontium are required to more precisely define the nature of postcontact diets in Mórrope and the degrees to which plants, animal proteins, and marine resources comprised the balance of indigenous foodways preceding and following Spanish colonization, as well as examine questions of residential mobility.

Population genetic and other biodistance studies using dental morphology and paleomolecules is in its infancy on the north coast of Peru, and the study of gene flow and genetic variance in particular may hold significant promise in elucidating populations’ biological interaction patterns through time and space. Strong concordance with
Stojanowski’s (2004, 2005c) findings of F$_{ST}$ and patterns of gene flow in Spanish Florida point to a similar consequence in Lambayeque which the Mórrope population probably reflects. However, more pre- and postcontact individuals, subpopulations, and populations must be integrated into this effort. The population genetic findings reported here represent the most preliminary and broad observations; more samples and larger sample sizes can lead to superior resolution and detail are imperative.

**DIRECTIONS FOR FUTURE RESEARCH**

The future of bioarchaeology in the Andes is indeed bright, but will not be necessarily easy or straightforward. As Shimada observed (1978: 533), it is a certainty that the self-correcting nature of science will take these several initial simplistic questions and assumptions and evolve them into discouragingly complex and numerous problems. Many of the investigator’s questions, methods, and interpretations in this dissertation may be quite naïve. Still the field, stands to transition into a regional, diachronic, and population biology paradigm. Hypothesis-driven and problem-based questions can and should be at the forefront of these efforts. Descriptive and case-study oriented work plays an important role, but may be best integrated into problem-based frameworks.

It goes without saying that the study of the basic historical parameters, patterning, and evolution of human biology in the pre-Hispanic Andes and historic Andes is in its infancy. Basic questions surrounding paleodemography, the phenomenology of disease, lifestyles, diet, violence, population genetic structures, and human adaptation and
microevolution are just beginning to come into focus. In particular, quantitative population genetic models must be a part of future research agendas as they have the potential to bring evolutionary theory into the regional discussion (and is indeed critical to the development of bioarchaeology in general). Models of pre-Hispanic and historic biological interaction patterns on intra- and inter-valley levels and the macro-sociopolitical bipartition of the biological interaction patterns between the northern north coast and southern north coast are particularly valuable subjects for future research.

One of the key thematic issues for future bioarchaeological research must pull itself away from the current romance with societies of later prehistory (i.e., the Moche) and focus on those formative cultural developments of early prehistory, beginning with paleoindian populations. In particular, the consequences of the adaptive transition to agricultural economies remain an urgent research problem in the Lambayeque region and the Central Andean coast as a whole. This topic has been essentially in stasis since Benfer’s concerted research program that ended in the 1980s. Were paleoindians the healthiest populations of Andean history, as Steckel and Rose (2002a) might extrapolate? Did the transition to agriculture have generally negative effects as inferred for most global populations, or did local Andean cultural systems successfully buffer undue biological consequences? Some of the first archaeological steps in this direction are underway on the northern central coast in the Supe-Fortaleza area with the ongoing work of Ruth Shady and her colleagues, Rafael Vega-Centeno, and the team led by Jonathan Haas and Winifred Creamer. Bioarchaeological windows on this transition are being explored by Pechenkina and co-workers (2007) on the central Peruvian coast south of
Lima. They suggest a significant decline in oral health transpired with the intensification of maize agriculture, while other stress indicators were not as dramatically impacted. However, this set of questions may be the most difficult to pursue in Lambayeque, given millennia of intensive agricultural activity that has erased a grand portion of this evidence. Special effort will be required to identify and understand what traces remain.

Secondly, the bioarchaeology of the emergence of social complexity is topic ideal for bioarchaeological study. Biocultural examination of Andean social organization through time can stand to shed new light on the richly non-western in structure and functions of Andean social configurations. Even more basically, how, when, and why did social classes develop? How did the emergence of specific biocultural groups, social collectives, and political-ritual specialists affect population biology, access to resources, group autonomy, and group identity and ethnicity? How did later state institutions and ideologies contribute to the configuration of biocultural patterns? Were approaches to Andean empire, such as with Chimú and Inka imperial administration, non-intrusive to the point of not impacting health? How did European conquest condition more recent and modern health outcomes? Has population health improved in recent generations? Does modern indigenous health status compare to the Colonial or late pre-Hispanic eras?

Third, how did dynamic human-environment interplays shape Andean populations over time? Significant effort must be devoted to detailed, diachronic reconstructions of the natural setting and understandings of human technology – this serves as one of two fundamental baselines of bioarchaeological interpretations. Multiple lines of archaeometric, paleobotanical, zooarchaeological, and paleoclimatological data
must be assembled. In other words, detailed paleoenvironmental reconstructions, akin to that developed by the Sicán Archaeological Project, must be extended back in time if the bioarchaeology of the Andes is to have any explanatory power.

To achieve these goals, multi-individual and multidisciplinary collaboration is required. Specialists would include archaeologists, chemists, conservators, and skeletal biologists. It requires clear goals from the outset and a coherent theoretical stance on the nature of data and how to interpret it. Such a research program requires a sufficiently long-term research focus spread out over a defined geographic region and temporal span. Archaeological study (technology, paleoenvironment, settlement patterns, art styles, ideology) provides the other fundamental baseline spoken of earlier, as it provides all-important cultural and historic contexts. Explicitly representative bioarchaeological sampling strategies would be carefully formulated and executed. The river valley-level unit is the appropriate starting point for more regional studies.

From a methodological and theoretical point-of-view, it should become common practice to integrate one or more physical anthropologists or bioarchaeologists in Andean field archaeology programs. Moreover, this will assist in the practice of integrated burial analysis as defined in Chapter 2. The role of properly and thoroughly contextualized bioarchaeological data cannot be emphasized enough.

Still, Dillehay (2001: 277) cautions we must be vigilant not to mold interpretations into conformity with centralized state models of social organization and cosmology. Recent bioarchaeological work by Tung (2003) and Gagnon (2006) seem to do this to certain degrees. Andean social configurations, including states, may be far
more complex non-Western entities featuring biologically significant relationships between elites and non-elites, the rural and urban, institutionalized systems of land tenure, local and non-local traditions, historical contingencies, and the ephemeral expressions of states and the social universe.

In essence, the above discussion outlines the basic agenda for the Lambayeque Valley Biohistory Project, which aims to examine a number of specific local questions and tasks in this region: (1) understanding the nature of lifeways practiced by the first inhabitants; (2) gauge the biocultural transition from foraging to intensive agriculture and sedentism, including its social, economic, ecological, and political dimensions; (3) the consequences of developing complex social organization; (4) the significance of the postcontact adaptive transition, which this work has initiated its basic study, and finally; (5) health outcomes among modern indigenous Lambayeque peoples, the study of which will involve establishment of an ethnобioarchaeological approach.

It is hoped this dissertation can help stimulate in some small way future directions and thinking in bioarchaeology and Andean studies as our community of scholars continues to pursue an understanding of this remarkable piece of the human past. To close this dissertation, it is appropriate to reiterate Shimada’s (1976: 536) intentions and words that concluded his dissertation 32 years ago: “Our work in the Lambayeque region has just begun.”
**2005 Proyecto Arqueológico Capilla de San Pedro de Mórrope**  
**Burial Excavation Recording Form**

<table>
<thead>
<tr>
<th>Burial No.</th>
<th>Date Excavated</th>
<th>Date Recorded</th>
<th>Excavator(s):</th>
</tr>
</thead>
</table>

| Photo No.: | Drawing No.: |

**PROVENIENCE**
- Stratification: Burial Assoc. w/ level/floor:
- Associated Architecture/Features:

**Depth from Datum:**
- cm to bone
- cm to bone

**MATRIX:**
- Description:
- Color:

---

**BURIAL DESCRIPTION**

**Funerary Context:**
- Pit Length cm
- Pit Width cm
- Pit Depth cm
- Grave Shape:
- Burial Type/Body Position:
- Body Orientation
- Head Orientation
- Limb Position:

**Coffin:**
- Max Length cm
- Width @ head cm
- Width @ foot cm
- Max Height cm

- Decorated? (yes no); If yes, please describe and sketch on back
- Coloration:

**Taphonomy:**
- Preservation:
  - Missing Elements
  - Disarticulated Elements
  - Entomological Activity
  - Clothing Remains
  - (Describe)
SKELETAL BIOLOGICAL DATA

Sex Estimation/Criteria_________________________
Age Estimation/Criteria_________________________
Path. Conditions___________________________________________

Other:___________________________________________

GRAVE GOODS: (for each type, record no., horizontal and vertical locations, preservation, and any other features; use reverse side if necessary)

<table>
<thead>
<tr>
<th>Sample Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hair</td>
</tr>
<tr>
<td>Soft Tissue</td>
</tr>
<tr>
<td>Brain Tissue</td>
</tr>
<tr>
<td>Fly Puparia</td>
</tr>
<tr>
<td>Matrix (head)</td>
</tr>
<tr>
<td>Matrix (Abdomen)</td>
</tr>
<tr>
<td>Matrix (Pelvis)</td>
</tr>
<tr>
<td>OTHER___________</td>
</tr>
</tbody>
</table>
APPENDIX B

MULTIVARIATE STATISTICAL PROGRAMS
1. Summary Age

DATA ONE;
INPUT BUR$ STAGE DLI1 DL12 DUI1 DUI2 DLM1 DUM1 DLC DUC DLM2 DUC2 LM1 LM2 LI1 LI2 UI1 UI2 LC UC LP3 UP3 LP4 UP4 LM2 UM2 UM3 UM3 HUM RAD UL FEM TIB FIB SCAP IL CLAV MAND NA NABOD HUMD ACET RDP FEMP TIBD FIBD TIBP FIBP FEMD RADD ULD HUMP;
CARDS;

{DATA SET OF DEVELOPMENTAL STAGE VALUES HERE}

DATA ONE; SET ONE;

IF DLC=3 THEN DCAGE=.18; IF DLC=4 THEN DCAGE=.35; IF DLC=5 THEN DCAGE=.57; IF DLC=6 THEN DCAGE=.75;

IF DLC=7 THEN DCAGE=.92; IF DLC=9 THEN DCAGE=1.15; IF DCL=10 THEN DCAGE=1.50; IF DLC=11 THEN DCAGE=1.90;

IF DLC=12 THEN DCAGE=2.23; IF DLC=13 THEN DCAGE=2.78;

IF DLM1=4 THEN DM1AGE=.18; IF DLM1=5 THEN DM1AGE=.29; IF DLM1=6 THEN DM1AGE=.48;

IF DLM1=7 THEN DM1AGE=.62; IF DLM1=9 THEN DM1AGE=.77; IF DLM1=10 THEN DM1AGE=1.01; IF DLM1=11 THEN DM1AGE=1.20;

IF DLM1=12 THEN DM1AGE=1.42; IF DLM1=13 THEN DM1AGE=1.73; IF DLM1=8 THEN DMAGE=0.7;

IF DLM2=4 THEN DM2AGE=.38; IF DLM2=5 THEN DM1AGE=.29; IF DLM2=6 THEN DM2AGE=.79; IF DLM2=7 THEN DMAGE=1.12;

IF DLM2=9 THEN DM2AGE=1.43; IF DLM2=10 THEN DM2AGE=1.73; IF DLM2=11 THEN DM2AGE=1.98; IF DLM2=12 THEN DM2AGE=2.21;

IF DLM2=13 THEN DM2AGE=2.67; IF DLM2=8 THEN DM2AGE=1.25; IF DLM2=3 THEN DM2AGE=0.21;

IF LM1=1 THEN LM1AGE=.15; IF LM1=2 THEN LM1AGE=.45; IF LM1=3 THEN LM1AGE=.85; IF LM1=4 THEN LM1AGE=1.30;

IF LM1=5 THEN LM1AGE=1.85; IF LM1=6 THEN LM1AGE=2.45; IF LM1=7 THEN LM1AGE=3.15; IF LM1=8 THEN LM1AGE=4.05;

IF LM1=9 THEN LM1AGE=4.85; IF LM1=10 THEN LM1AGE=5.45; IF LM1=11 THEN LM1AGE=5.00; IF LM1=12 THEN LM1AGE=6.75;

IF LM1=13 THEN LM1AGE=8.25;

IF LC=1 THEN LCAGE=.60; IF LC=2 THEN LCAGE=1.0; IF LC=3 THEN LCAGE=1.65; IF LC=4 THEN LCAGE=2.50;
IF LC=5 THEN LCAGE=3.45; IF LC=6 THEN LCAGE=4.35; IF LC=7 THEN LCAGE=5.10; IF LC=9 THEN LCAGE=6.55;

IF LC=10 THEN LCAGE=8.25; IF LC=11 THEN LCAGE=9.25; IF LC=12 THEN LCAGE=10.20; IF LC=13 THEN LCAGE=11.50;

IF LP3=1 THEN LP3AGE=2.05; IF LP3=2 THEN LP3AGE=2.55; IF LP3=3 THEN LP3AGE=3.25; IF LP3=4 THEN LP3AGE=4.05;

IF LP3=5 THEN LP3AGE=4.80; IF LP3=6 THEN LP3AGE=5.50; IF LP3=7 THEN LP3AGE=6.20; IF LP3=9 THEN LP3AGE=7.60;

IF LP3=10 THEN LP3AGE=9.00; IF LP3=11 THEN LP3AGE=9.90; IF LP3=12 THEN LP3AGE=10.85; IF LP3=13 THEN LP3AGE=12.15;

IF LP4=1 THEN LP4AGE=3.30; IF LP4=2 THEN LP4AGE=3.90; IF LP4=3 THEN LP4AGE=4.50; IF LP4=4 THEN LP4AGE=5.10;

IF LP4=5 THEN LP4AGE=5.80; IF LP4=6 THEN LP4AGE=6.60; IF LP4=7 THEN LP4AGE=7.30; IF LP4=9 THEN LP4AGE=8.40;

IF LP4=10 THEN LP4AGE=9.80; IF LP4=11 THEN LP4AGE=10.80; IF LP4=12 THEN LP4AGE=11.80; IF LP4=13 THEN LP4AGE=13.20;

IF LM2=1 THEN LM2AGE=3.70; IF LM2=2 THEN LM2AGE=4.20; IF LM2=3 THEN LM2AGE=4.70; IF LM2=4 THEN LM2AGE=5.30;

IF LM2=5 THEN LM2AGE=6.00; IF LM2=6 THEN LM2AGE=6.70; IF LM2=7 THEN LM2AGE=7.50; IF LM2=8 THEN LM2AGE=8.60;


IF LM2=13 THEN LM2AGE=13.70;

IF LM3=1 THEN LM3AGE=9.70; IF LM3=2 THEN LM3AGE=10.20; IF LM3=3 THEN LM3AGE=10.80; IF LM3=4 THEN LM3AGE=11.40;

IF LM3=5 THEN LM3AGE=11.90; IF LM3=6 THEN LM3AGE=12.50; IF LM3=7 THEN LM3AGE=13.00; IF LM3=8 THEN LM3AGE=14.10;

IF LM3=9 THEN LM3AGE=15.5; IF LM3=10 THEN LM3AGE=15.90; IF LM3=11 THEN LM3AGE=16.40; IF LM3=12 THEN LM3AGE=17.60;

IF LM3=13 THEN LM3AGE=19.3;

IF LI1=10 THEN LI1AGE=5.50; IF LI1=11 THEN LI1AGE=6.60; IF LI1=12 THEN LI1AGE=7.30; IF LI1=13 THEN LI1AGE=7.70;

IF LI2=10 THEN LI2AGE=6.00; IF LI2=11 THEN LI2AGE=7.40; IF LI2=12 THEN LI2AGE=8.10; IF LI2=13 THEN LI2AGE=8.60;

DATA TWO; SET ONE;
TITLE1 'STAGE 1 AGES';
PROC PRINT; VAR BUR STAGE DCAGE DM1AGE DM2AGE LM1AGE LM2AGE LCAGE LP3AGE LP4AGE LM3AGE LI1AGE LI2AGE;
RUN;
/*PROC G PLOT; PLOT HUM*STAGE; RUN;*/
/* TITLE1 'PCA 1-9';*/
PROC PRINCOMP DATA=ONE COV;
VAR LM2AGE LM3AGE;
RUN;
DATA TWO; SET ONE;
SUMAGE=((LM2AGE*0.78)+(LM3AGE*.62))/1.40;
RUN;
PROC PRINT DATA=TWO; VAR BUR LM2AGE LM3AGE SUMAGE; RUN;
/* TITLE1 'FEMUR LENGHT VS AGE STAGE'; TITLE2 'STAGES 1-9';*/
SYMBOL1 V=PLUS I=RLCI95;
PROC GPLOT DATA=ONE; PLOT FEM*STAGE/VAXIS=AXIS1 HAXIS=AXIS2;
AXIS1 LENGTH=3.1 IN ORDER= (50 TO 375 BY 10) LABEL=('FEMUR LEN');
AXIS2 LENGTH=5.0 IN ORDER= (0 TO 9 BY 1.0) LABEL=('STAGE');
RUN;*/
QUIT;
2. Odds Ratios

PROC IML;
RESET PRINT;
/* abs pres tot, abs pres tot, gtot * /
/* Pre- vs. Postcontact Lambayeque POROTIC HYPEROSTOSIS*/;

A={23 8 31 97 60 157 188};
B={5 11 23 2 8 14 37};
C={9 34 43 10 32 42 85};
D={8 21 29 12 39 51 80};
E={18 9 17 7 13 20 37};
F={14 15 29 12 15 27 57};

Q1=((A[1,2]*A[1,4])/A[1,7]); Q2=((A[1,1]*A[1,5])/A[1,7]); Q3=((B[1,2]*B[1,4])/B[1,7]); Q4=((B[1,1]*B[1,5])/B[1,7]); Q5=((C[1,2]*C[1,4])/C[1,7]); Q6=((C[1,1]*C[1,5])/C[1,7]); R1=((A[1,1]*A[1,5])/A[1,7]); R2=((B[1,1]*B[1,5])/B[1,7]); R3=((C[1,1]*C[1,5])/C[1,7]); R4=((D[1,1]*D[1,5])/D[1,7]); R5=((E[1,1]*E[1,5])/E[1,7]); R6=((F[1,1]*F[1,5])/F[1,7]);

PRINT Q1 R1 O1 Q2 R2 O2 Q3 R3 O3 Q4 R4 O4 Q5 R5 O5 Q6 R6 O6;

QT=Q1+Q2+Q3+Q4+Q5+Q6; RT=R1+R2+R3+R4+R5+R6; COR=QT/RT;

PRINT COR;

V2=(((B[1,1]+B[1,4])*(B[1,2]+B[1,5]))*(B[1,3])* (B[1,6]))/(((B[1,7])**2)* (B[1,7]-1));
V3=(((C[1,1]+C[1,4])*(C[1,2]+C[1,5]))*(C[1,3])* (C[1,6]))/(((C[1,7])**2)* (C[1,7]-1));
V4=(((D[1,1]+D[1,4])*(D[1,2]+D[1,5]))*(D[1,3])* (D[1,6]))/(((D[1,7])**2)* (D[1,7]-1));
V5=(((E[1,1]+E[1,4])*(E[1,2]+E[1,5]))*(E[1,3])* (E[1,6]))/(((E[1,7])**2)* (E[1,7]-1));
V6=(((F[1,1]+F[1,4])*(F[1,2]+F[1,5]))*(F[1,3])* (F[1,6]))/(((F[1,7])**2)* (F[1,7]-1));

VT=V1+ V2+ V3+ V4+V5+V6;
PRINT V1 V2 V3 V4 V5 V6 VT;
SD=SQRT(VT/(QT*RT)); COF=EXP(1.645*SD); LL=COR/COF; UL=COR*COF;
PRINT SD COF LL UL;

CHI= ((QT-RT)**2)/VT;
PRINT CHI;
QUIT;
DATA ONE;
/*/ ABSCESS AML, PRECONTACT MALES VS. FEMALES AGE =4*/

INPUT R C COUNT;
DATALINES;
1 1 167
1 2 0
2 1 220
2 2 5
;

PROC FREQ DATA=ONE;
WEIGHT COUNT;
TABLES R*C / ALL;
RUN;
QUIT;
DATA ONE;

INPUT BURIAL$ POP SEX UM1MD UM1BL UP3MD ULP3BL UCBL UI1BL LM1MD LM1BL LP3MD LP3BL LCMD LCBL LI1MD LI1BL;
CARDS;

{DATASET HERE}
;

PROC SORT; BY SEX;
PROC STANDARD MEAN=0 STD=1 OUT=NEW; BY SEX;

VAR UM1MD UM1BL UP3MD ULP3BL UCBL UI1BL LM1MD LM1BL LP3MD LP3BL LCMD LCBL LI1MD LI1BL;
PROC SORT; BY pop;
PROC MEANS DATA=NEW MAXDEC=2 N MEAN STD; by pop;
PROC DISCRIM DATA=NEW WCOV PCOV;
CLASS pop;

VAR UM1MD UM1BL UP3MD ULP3BL UCBL UI1BL LM1MD LM1BL LP3MD LP3BL LCMD LCBL LI1MD LI1BL;

RUN;
QUIT;
PROC IML;
RESET PRINT;
/*X IS THE GXM MATRIX OF STANDARDIZED MEANS OF THE SAMPLES*/
X={ MATRIX OF STANDARDIZED MEANS HERE };

/* W IS THE VECTOR(population size)...*/
W={ .5  .5 };

/*ID IS THE NUMBER OF SUBPOPULATIONS*/
ID=I(2);
O={ 1  1 };

/*DELTA IS THE MATRIX OF MEAN DEVIATIONS*/
DELTA=(ID-(O`*W))*X;

/*PW IS THE POOLED WITHIN COV MATRIX*/
PW={ POOLED WITHIN SAMPLE COVARIANCE MATRIX HERE };

GW=.25*(PW);
/*C IS THE CODIVERGENCE MATRIX*/
C=DELTA*INV(GW)*DELTA`;
K=J(2,2,1);
MAHD=((C#ID)*K+(K*(C#ID))-(2*C));

/*RO IS THE MIN FST*/
RO=XX/(XX+28); /*28=2x number of traits*/

/*RR IS THE R MATRIX 28=2x number of traits*/
RR=(C*(1-RO))/28;

/* NN IS THE DIAG MATRIX OF 1/2*NI*/
NN={ 0.01470 0,
     0 0.03125 };

/* RBC IS THE BIAS CORRECTED R MATRIX*/
RBC=RR-NN;

/* ROC IS THE CORRECTED FST*/
ROC=(SUM(DIAG(RBC)))/2;

/* RCDIS IS THE MIN GENETIC DIST MATRIX FORM RBC*/
RCDIS=((RBC#ID)*K+(K*(RBC#ID))-(2*RBC));

/*FOR CANONICAL VARIANCE PLOT*/
CALL SVD(U,Q,V,C);
COR1=U[,1]*(SQRT(Q[1]));
COR2=U[,2]*(SQRT(Q[2]));
/* VI IS THE OBSERVED AVG GENETIC VARIANCE PER SAMPLE, OR THE TRACE OF EACH POP'S W/IN CLASS COV MATRIX */
VI= (14.86346109 11.71485547);

/* VW IS THE TRACE OF THE Pooled W/IN COV MATRIX */
VW=13.81392588;
EV1=VW*((1-RBC[1,1])/(1-ROC));
EV2=VW*((1-RBC[2,2])/(1-ROC));
DIF1=VI[1]-EV1;
DIF2=VI[2]-EV2;
D1S=DIF1*DIF1;
D2S=DIF2*DIF2;
SSR=D1S+D2S;

/* EIGENVECTORS AND EIGENVALUES OF BIAS CORRECTED R MATRIX */
A=EIGVEC(RBC);
B=EIGVAL(RBC);
CR1=A[,1]*(SQRT(B[1]));
CR2=A[,2]*(SQRT(B[2]));
QUIT;
APPENDIX C

EXCAVATION UNIT PROFILES
AND
ARCHITECTURAL FEATURES OF THE
CHAPEL OF SAN PEDRO DE MÓRROPE
Figure C. 1: Unit 4 North Profile. Drawing by Haagen Klaus, based on original field drawings by Julio Fernández and Haagen Klaus.
Figure C. 2: Unit 7 South Profile. Drawing by Haagen Klaus, based on original field drawings by Rafael Palomino.

Figure C. 3: Unit 7 North Profile. Figure 2: Unit 7 South Profile. Drawing by Haagen Klaus, based on original field drawings by Rafael Palomino.
Figure C. 4: Unit 3 West Extension east profile. Drawing by Haagen Klaus, based on original field drawings Flor Carranza and Manuel Tam.
Figure C. 5: Unit 7 West Profile. Drawing by Haagen Klaus, based on original field drawings by Rafael Palomino.
Figure C. 6: Unit 3 West Extension west profile. Drawing by Haagen Klaus, based on original field drawings and notes by Flor Carranza and Manuel Tam.
Figure C. 7: Two views of the compact earthen access ramp under the atrium directly in front of the Chapel of San Pedro de Môrrope. Photos: Haagen Klaus.
Figure C. 8: Feature U3 03-1, an empty horcón columnar socket situated between Units 3 and 3 West Extension. Photo: Haagen Klaus.
Figure C. 9: Red-brick archway above the main entrance to the Chapel, added to Phase C Building 2. Photo: Haagen Klaus.
Figure C. 10: Excavation in progress in the interior of the Chapel of San Pedro de Mórrrope, 01 September 2005. Units 3, 3WX, 4, 10 and 12 are visible in this view from atop the southeast corner of the east wall of the structure. Photo: Manuel Tam.
APPENDIX D

MATERIAL CULTURE REMAINS
CHAPEL OF SAN PEDRO DE MÓRROPE
Figure D. 1: A metal Christian cross painted white found in the fill of Unit 7. Photo: Haagen Klaus.

Figure D. 2: Beads and clothing buttons found in the fill of Unit 10 likely proceeding from disturbed burials. Photo: Haagen Klaus.
Figure D. 3: Three views of an oxidized copper thimble in the fill of Unit 5. Photo: Haagen Klaus.

Figure D. 4: A cluster of oxidized decorative copper coffin tacks and nails present in Unit 10. Photo: Haagen Klaus.
Figure D. 5: Colonial vessel sherd from Unit 4. Photo: Haagen Klaus.

Figure D. 6: A probable fragment of a plate. Photo: Haagen Klaus.
Figure D. 7: A probable painted plate fragment recovered from Unit 3. Photo: Haagen Klaus.

Figure D. 8: Glazed jar or bottle rim fragments located in Unit 3 West Extension. Photo: Haagen Klaus.
Figure D. 9: Glazed colonial ceramic sherds, Unit 3. Photo: Haagen Klaus.

Figure D. 10: A late pre-Hispanic or Early Colonial ceramic vessel sherd, bearing a *paleteada*-impressed, Chimú-coid fish motif. Photo: Haagen Klaus.
Figure D. 11: Two views of the rim of a domestic *tinaja* or *porrón* recovered in the fill of Unit 6. Photo: Haagen Klaus.

Figure D. 12: A collection of *Donax* sp. shells located in Unit 3 West Extension. Photo: Haagen Klaus.
Figure D. 13: A large chunk of slag, the byproduct of metal smelting. This anomalous object was present in the fill of Unit 3 and was associated with no other object feature, or burial. Photo: Haagen Klaus.

Figure D. 14: A fragment of window glass. Photo: Haagen Klaus.
Figure D. 15: Iron nails apparently discarded in Unit 7. Photo: Haagen Klaus.

Figure D. 16: An oxidized copper medallion featuring an inlay of glass, and behind that, the probable almost completely faded image of a Christian saint. Photo: Haagen Klaus.
Figure D. 17: Remnant of an oxidized copper earring. Photo: Haagen Klaus.

Figure D. 18: Possible decorative coffin fixture featuring an anthropomorphic face found isolated in the fill of Unit 4. Photo: Haagen Klaus.
Figure D. 19: A probable clothing button featuring a relief of the insignia of the Peruvian state. The first coat-of-arms was designed in 1820, but was not long-lived. This design was officially adopted in 1825. Photo: Haagen Klaus.

Figure D. 20: Poorly preserved monedas found in Unit 10. Their poor preservation, irregular shape, and traces of surface relief are indicative of Early Colonial currency. The moneda to the left may date to the period between 1577-1592 (Dargent 2000: 6). Photo: Haagen Klaus.
Figure D. 21: Front and back views of a Republican-era two-cent (*dos centavos*) piece coined in 1876 recovered in the upper layers of Unit 4. Photo: Haagen Klaus.

Figure D. 22: Another Republican-era coin from 1880 located in the upper layers of Unit 5. Photo: Haagen Klaus.
Figure D. 23: One of several wax candle fragments found throughout the Chapel. Ethnohistoric sources indicate liturgical candles were manufactured primarily in Piura and exported to the Lambayeque region. Photo: Haagen Klaus.

Figure D. 24: A carved decorative wooden ornament, perhaps once adorning a pew or similar object. Photo: Haagen Klaus.
APPENDIX E

BASIC MORTUARY ARCHAEOLOGY DATA,
CHAPEL OF SAN PEDRO DE MÓRROPE
### Chapel of San Pedro de Mórrope: Unit 2 Burials

<table>
<thead>
<tr>
<th>Burial</th>
<th>Age/Sex</th>
<th>Level (Depth BD)</th>
<th>Coffin/ Shroud</th>
<th>Primary Burial</th>
<th>Altered Burial</th>
<th>Secondary Burial</th>
<th>Orientation</th>
<th>Grave Goods/Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>U2 03-26A</td>
<td>Subadult</td>
<td>4 (64.0 cm)</td>
<td>Indt.</td>
<td>●</td>
<td>---</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U2 03-26B</td>
<td>Subadult</td>
<td>4 (76.0 cm)</td>
<td>Indt.</td>
<td>●</td>
<td>---</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U2 03-26C</td>
<td>Subadult</td>
<td>5 (88.0 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Haphazard deposition of body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3 05-1</td>
<td>Subadult</td>
<td>8 (145.0 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>South-North</td>
<td>Clothing remains, shoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burial</td>
<td>Age/Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
<td>-----------------</td>
<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>U3 03-1</td>
<td>---</td>
<td>4 (76.0 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Largest secondary burial; MNI= 79</td>
</tr>
<tr>
<td>U3 03-2</td>
<td>Subadult</td>
<td>8 (142.0 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Red pigment, flowers on lower body</td>
</tr>
<tr>
<td>U3 03-3</td>
<td>Subadult</td>
<td>7 (133.0 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Data recorded but not recovered</td>
</tr>
<tr>
<td>U3 03-4</td>
<td>Adult M</td>
<td>8 (144.0 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Well-preserved adult</td>
</tr>
<tr>
<td>U3 03-5</td>
<td>Subadult</td>
<td>7 (135.0 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red painted coffin; flowers; bone/copper rattle placed as grave good</td>
</tr>
<tr>
<td>U3 03-6</td>
<td>---</td>
<td>8 (159.5 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Secondary burial</td>
</tr>
<tr>
<td>U3 03-7</td>
<td>Subadult</td>
<td>8 (159 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>None.</td>
</tr>
<tr>
<td>U3 03-8</td>
<td>Subadult</td>
<td>9 (162 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Prolonged primary burial; flowers</td>
</tr>
<tr>
<td>U3 03-9</td>
<td>Subadult</td>
<td>6 (112 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Perinatal individual w/ flowers</td>
</tr>
<tr>
<td>U3 03-10</td>
<td>Adult</td>
<td>8 (150 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Copper tacks form &quot;B J.&quot; on lid</td>
</tr>
<tr>
<td>U3 03-11</td>
<td>Subadult</td>
<td>10 (196 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Empty coffin; skeleton removed</td>
</tr>
<tr>
<td>U3 05-1</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Poorly preserved; drilled bead necklace</td>
</tr>
<tr>
<td>U3 05-2</td>
<td>Subadult</td>
<td>10 (183 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Prolonged primary burial</td>
</tr>
<tr>
<td>U3 05-3</td>
<td>Subadult</td>
<td>10 (181 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>---</td>
</tr>
<tr>
<td>U3 05-4</td>
<td>Subadult</td>
<td>10 (181 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Poorly preserved</td>
</tr>
<tr>
<td>U3 05-5</td>
<td>Adult M</td>
<td>10 (188 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>---</td>
</tr>
<tr>
<td>U3 05-6</td>
<td>---</td>
<td>10 (190 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Secondary burial</td>
</tr>
<tr>
<td>U3 05-7</td>
<td>Subadult</td>
<td>11 (203 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>---</td>
</tr>
<tr>
<td>U3 05-8</td>
<td>---</td>
<td>8 (152)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U3 05-9</td>
<td>Subadult</td>
<td>9 (178 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Extensive, elaborate textile remains</td>
</tr>
<tr>
<td>U3 05-10</td>
<td>Subadult</td>
<td>8 (150 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>West-East</td>
<td>Disturbed by U3 05-9</td>
</tr>
<tr>
<td>U3 05-11</td>
<td>Subadult</td>
<td>8 (156 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing skull, long bones</td>
</tr>
<tr>
<td>U3 05-12</td>
<td>Subadult</td>
<td>8 (155 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red textile on face; braided hair</td>
</tr>
<tr>
<td>U3 05-13</td>
<td>Subadult</td>
<td>7 (131 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing lower body; no intrusion</td>
</tr>
<tr>
<td>U3 05-14</td>
<td>Subadult</td>
<td>10 (186 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Flowers; textile cap</td>
</tr>
<tr>
<td>U3 05-15</td>
<td>Adult</td>
<td>10 (183 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Only lower left leg &amp; foot present</td>
</tr>
<tr>
<td>U3 05-16</td>
<td>Subadult</td>
<td>9 (168 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>East-West</td>
<td>Flowers</td>
</tr>
<tr>
<td>U3 05-17</td>
<td>Subadult</td>
<td>9 (171 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Flowers; disturbed by U3 05-18</td>
</tr>
<tr>
<td>Burial</td>
<td>Age/Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
<td>------------------</td>
<td>-------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>U3 05-18</td>
<td>Subadult</td>
<td>10 (192 cm)</td>
<td>Coffin</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Circular iron plate placed underneath head inside the coffin</td>
</tr>
<tr>
<td>U3 05-19</td>
<td>Subadult</td>
<td>9 (172 cm)</td>
<td>Coffin</td>
<td></td>
<td>*</td>
<td></td>
<td>North-South</td>
<td>Poorly preserved</td>
</tr>
<tr>
<td>U3 05-20</td>
<td>Subadult</td>
<td>10 (180 cm)</td>
<td>Coffin</td>
<td></td>
<td></td>
<td></td>
<td>NE-SW</td>
<td>Empty coffin; skeleton removed</td>
</tr>
<tr>
<td>U3 05-21</td>
<td>Subadult</td>
<td>10 (184 cm)</td>
<td>Coffin</td>
<td>*</td>
<td></td>
<td></td>
<td>East-West</td>
<td>Data recorded but not recovered</td>
</tr>
<tr>
<td>U3 05-22</td>
<td>---</td>
<td>9 (167 cm)</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
<td>Secondary burial</td>
</tr>
<tr>
<td>U3 05-23</td>
<td>---</td>
<td>9 (163 cm)</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
<td>Secondary burial</td>
</tr>
<tr>
<td>U3 05-24</td>
<td>Subadult</td>
<td>10 (182 cm)</td>
<td>Shroud</td>
<td>*</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Missing skull, long bones</td>
</tr>
<tr>
<td>U3 05-25</td>
<td>---</td>
<td>9 (168 cm)</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
<td>Secondary burial</td>
</tr>
<tr>
<td>U3 05-26</td>
<td>Subadult</td>
<td>10 (183 cm)</td>
<td>Coffin</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Data recorded but not recovered</td>
</tr>
<tr>
<td>U3 05-27</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Coffin</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Data recorded but not recovered</td>
</tr>
<tr>
<td>U3 05-28</td>
<td>Subadult</td>
<td>10 (197 cm)</td>
<td>Shroud</td>
<td></td>
<td>*</td>
<td></td>
<td>North-South</td>
<td>Drilled bead necklace; body missing below thorax</td>
</tr>
<tr>
<td>U3 05-29</td>
<td>Subadult</td>
<td>11 (200 cm)</td>
<td>Shroud</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Body missing below thorax</td>
</tr>
<tr>
<td>U3 05-30A</td>
<td>Subadult</td>
<td>10 (191 cm)</td>
<td>Coffin</td>
<td>*</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Elaborate textile remains</td>
</tr>
<tr>
<td>U3 05-30B</td>
<td>Subadult</td>
<td>10 (190 cm)</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
<td>Secondary burial of single adolescent on U3 05-30A coffin lid</td>
</tr>
<tr>
<td>U3 05-31</td>
<td>Adult</td>
<td>10 (198 cm)</td>
<td>Shroud</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Lower left leg present</td>
</tr>
<tr>
<td>U3 05-32A</td>
<td>Adult F</td>
<td>10 (199 cm)</td>
<td>Shroud</td>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Left os coxa and leg present; disturbed by U3 05-33?</td>
</tr>
<tr>
<td>U3 05-32B</td>
<td>Fetus</td>
<td>10 (199 cm)</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
<td>Disturbed fetal skeleton in pelvis of U3 05-32A</td>
</tr>
<tr>
<td>U3 05-33</td>
<td>Adult</td>
<td>10 (191 cm)</td>
<td>Shroud</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Lower left leg present</td>
</tr>
<tr>
<td>U3 05-34</td>
<td>Adult</td>
<td>11 (204 cm)</td>
<td>Shroud</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing multiple long bones</td>
</tr>
<tr>
<td>U3 05-35</td>
<td>Subadult</td>
<td>11 (207 cm)</td>
<td>Coffin</td>
<td>*</td>
<td></td>
<td></td>
<td>South-North</td>
<td>---</td>
</tr>
<tr>
<td>U3 05-36</td>
<td>Subadult</td>
<td>11 (217 cm)</td>
<td>Coffin</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Empty coffin; skeleton removed</td>
</tr>
<tr>
<td>U3 05-37</td>
<td>Adult</td>
<td>11 (205 cm)</td>
<td>Shroud</td>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Lower right leg present</td>
</tr>
<tr>
<td>U3 05-38</td>
<td>---</td>
<td>11 (202 cm)</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U3 05-39</td>
<td>Adult</td>
<td>11 (212 cm)</td>
<td>Shroud</td>
<td>*</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing left arm</td>
</tr>
<tr>
<td>U3 05-40</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td>---</td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U3 05-41</td>
<td>Adult M</td>
<td>12 (227 cm)</td>
<td>Shroud</td>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Most of upper body missing; associated w/ in situ burning</td>
</tr>
<tr>
<td>U3 05-42</td>
<td>Adult M</td>
<td>12 (232 cm)</td>
<td>Shroud</td>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Upper body recovered</td>
</tr>
<tr>
<td>U3 05-43</td>
<td>Adult M</td>
<td>13 (246 cm)</td>
<td>Shroud</td>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Associated w/ in situ burning</td>
</tr>
<tr>
<td>Burial</td>
<td>Age/ Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/ Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>------------------</td>
<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>U3 05-44A</td>
<td>---</td>
<td>12 (220 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U3 05-44B</td>
<td>Subadult</td>
<td>12 (222)</td>
<td>Shroud</td>
<td>North-South</td>
<td>Missing most of skeleton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3 05-45</td>
<td>Adult</td>
<td>12 (233 cm)</td>
<td>Shroud</td>
<td>North-South</td>
<td>Lower right leg present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3 05-46</td>
<td>Adult</td>
<td>13 (244 cm)</td>
<td>Shroud</td>
<td>North-South</td>
<td>Data collected but not recovered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3 05-47</td>
<td>Adult F</td>
<td>12 (227 cm)</td>
<td>Shroud</td>
<td>North-South</td>
<td>Missing most of mid and lower body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-1</td>
<td>Subadult</td>
<td>8 (140 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>Flowers; prolonged primary burial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-2</td>
<td>Subadult</td>
<td>9 (161 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>Red textile on face</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-3</td>
<td>Subadult</td>
<td>9 (176 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-4</td>
<td>Subadult</td>
<td>9 (161 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-5</td>
<td>---</td>
<td>9 (160 cm)</td>
<td>---</td>
<td>South-North</td>
<td>Missing lower half of coffin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-6</td>
<td>Subadult</td>
<td>9 (168 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>Flowers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-7</td>
<td>Subadult</td>
<td>9 (173 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>Textile cap; flowers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-8</td>
<td>Subadult</td>
<td>9 (177 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>Red pigment on face; flowers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-9</td>
<td>Subadult</td>
<td>9 (178 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>Missing most of skeleton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-10</td>
<td>Subadult</td>
<td>9 (183 cm)</td>
<td>Coffin</td>
<td>North-South</td>
<td>Missing most of skeleton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-11</td>
<td>Adult</td>
<td>10 (183 cm)</td>
<td>Shroud</td>
<td>North-South</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-12</td>
<td>Subadult</td>
<td>10 (183 cm)</td>
<td>Shroud</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-13</td>
<td>---</td>
<td>9 (166 cm)</td>
<td>---</td>
<td>---</td>
<td>Small secondary burial (infant?)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-14</td>
<td>---</td>
<td>9 (167 cm)</td>
<td>---</td>
<td>---</td>
<td>Secondary burial of multiple crania</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-15</td>
<td>Subadult</td>
<td>9 (173 cm)</td>
<td>Shroud</td>
<td>North-South</td>
<td>Flowers; missing l. femur, hands and feet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-16</td>
<td>---</td>
<td>10 (195 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-17</td>
<td>Adult</td>
<td>10 (184 cm)</td>
<td>Shroud</td>
<td>North-South</td>
<td>Missing most of skeleton</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-18</td>
<td>Adult</td>
<td>10 (196 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-19</td>
<td>Adult?</td>
<td>10 (198 cm)</td>
<td>---</td>
<td>---</td>
<td>Small secondary burial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3WX 05-20</td>
<td>---</td>
<td>11 (206 cm)</td>
<td>---</td>
<td>---</td>
<td>Small secondary burial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burial</td>
<td>Age/Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
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</tr>
<tr>
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<td>11 (202 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Flowers; Prolonged primary burial</td>
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</tr>
<tr>
<td>U3WX 05-22</td>
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<td>11 (201 cm)</td>
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<td>●</td>
<td></td>
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<td>Flowers; Prolonged primary burial</td>
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</tr>
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<td>Subadult</td>
<td>11 (209 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td>Subadult</td>
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<td>●</td>
<td></td>
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<tr>
<td>U3WX 05-25</td>
<td>Adult M</td>
<td>11 (213 cm)</td>
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<td>●</td>
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<td>11 (218 cm)</td>
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<td>●</td>
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<td>U3WX 05-27</td>
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<td>8 (155 cm)</td>
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<td>●</td>
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<td>Subadult</td>
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<td>●</td>
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<td>NE-SW</td>
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<td>●</td>
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<td>●</td>
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<td>Adult</td>
<td>13 (251 cm)</td>
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<td></td>
<td>North-South</td>
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<td>13 (250 cm)</td>
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<td>●</td>
<td></td>
<td>North-South</td>
<td>Missing rt. arm and leg elements</td>
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<tr>
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<td>Subadult</td>
<td>12 (222 cm)</td>
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<td>●</td>
<td></td>
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<td>Missing arm and leg elements</td>
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<tr>
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<td>Subadult</td>
<td>7 (124 cm)</td>
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<td>●</td>
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<td>Subadult</td>
<td>8 (144 cm)</td>
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<td>●</td>
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<td>North-South</td>
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<td>●</td>
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<td>9 (172 cm)</td>
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<td>●</td>
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<td>●</td>
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<td>Subadult</td>
<td>9 (178 cm)</td>
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<td>●</td>
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<td>South-North</td>
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<td>Subadult</td>
<td>10 (183 cm)</td>
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<td>●</td>
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<td>South-North</td>
<td>Missing forearms, feet</td>
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<td>Subadult</td>
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<td>Missing skull, l. arm, feet</td>
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<td>11 (201 cm)</td>
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<td>●</td>
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<td>11 (211 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td>South-North</td>
<td>Missing and disartulated bones</td>
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</tr>
<tr>
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<td>Subadult</td>
<td>11 (212 cm)</td>
<td>Shroud</td>
<td>●</td>
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<td>South-North</td>
<td>Missing and disartulated bones</td>
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<td>Adult</td>
<td>12 (235 cm)</td>
<td>Shroud</td>
<td>●</td>
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<td>North-South</td>
<td>Only rt. lower leg and foot present</td>
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<td>13 (248 cm)</td>
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<td>●</td>
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<td>North-South</td>
<td>Body in unit wall; not recovered</td>
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</tr>
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<td>Adult</td>
<td>13 (248 cm)</td>
<td>Shroud</td>
<td>●</td>
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<td>Body in unit wall; not recovered</td>
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</tr>
<tr>
<td>U3WX 05-52</td>
<td>Adult</td>
<td>12 (224 cm)</td>
<td>Shroud</td>
<td>●</td>
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<td>North-South</td>
<td>Body in unit wall; not recovered</td>
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<tr>
<td>U3WX 05-53</td>
<td>---</td>
<td>12 (223 cm)</td>
<td>---</td>
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<td>North-South</td>
<td>Large secondary burial; mostly long bones</td>
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<tr>
<td>Burial</td>
<td>Age/ Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/ Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
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<tr>
<td>U3WX 05-54</td>
<td>---</td>
<td>12 (221 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>North-South</td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U3WX 05-55</td>
<td>Adult</td>
<td>10 (198 cm)</td>
<td>---</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>North-South</td>
<td>Body in unit wall; not recovered</td>
</tr>
<tr>
<td>U3WX 05-56</td>
<td>Adult F</td>
<td>12 (231 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>---</td>
<td>---</td>
<td>North-South</td>
<td>Missing rt. forearm</td>
</tr>
<tr>
<td>U3WX 05-57</td>
<td>Adult M</td>
<td>14 (263 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>---</td>
<td>---</td>
<td>North-South</td>
<td>Missing head/ lower limbs</td>
</tr>
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</table>

### Chapel of San Pedro de Mórrope Unit 4 Burials

<table>
<thead>
<tr>
<th>Burial</th>
<th>Age/ Sex</th>
<th>Level (Depth BD)</th>
<th>Coffin/ Shroud</th>
<th>Primary Burial</th>
<th>Altered Burial</th>
<th>Secondary Burial</th>
<th>Orientation</th>
<th>Grave Goods/Comments</th>
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<tbody>
<tr>
<td>U4 03-12</td>
<td>Subadult</td>
<td>7 (126 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>North-South</td>
<td>---</td>
<td>Intrusive coffin of Santiago Germenio Cauxusoli, A.D. 1877</td>
</tr>
<tr>
<td>U4 03-13</td>
<td>Adult M</td>
<td>10 (191 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>North-South</td>
<td>---</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U4 03-14</td>
<td>Adult F</td>
<td>11 (212 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td>North-South</td>
<td>---</td>
<td>Red textile on face</td>
</tr>
<tr>
<td>U4 03-15</td>
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<td>9 (177 cm)</td>
<td>Coffin</td>
<td>●</td>
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<tr>
<td>U4 03-16</td>
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<td>11 (205 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td>North-South</td>
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</tr>
<tr>
<td>U4 03-17</td>
<td>Subadult</td>
<td>8 (155 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>South-North</td>
<td>---</td>
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</tr>
<tr>
<td>U4 03-18</td>
<td>Subadult</td>
<td>8 (159 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>North-South</td>
<td>---</td>
<td>Prolonged primary burial; copper/textile headband</td>
</tr>
<tr>
<td>U4 03-19</td>
<td>Subadult</td>
<td>9 (164 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td>South-North</td>
<td>---</td>
<td>Manipulated coffin</td>
</tr>
<tr>
<td>U4 03-20A-D</td>
<td>Subadults &amp; adults</td>
<td>8 (148 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td>South-North</td>
<td>---</td>
<td>Manipulated coffin</td>
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<tr>
<td>U4 03-21</td>
<td>Subadult</td>
<td>8 (155 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td>South-North</td>
<td>---</td>
<td>Manipulated coffin</td>
</tr>
<tr>
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<td>8 (159 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>South-North</td>
<td>---</td>
<td>Manipulated coffin</td>
</tr>
<tr>
<td>U4 03-23</td>
<td>Subadult</td>
<td>9 (164 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>North-South</td>
<td>---</td>
<td>Secondary burial</td>
</tr>
<tr>
<td>U4 03-24</td>
<td>---</td>
<td>9 (162 cm)</td>
<td>---</td>
<td>---</td>
<td>●</td>
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</tr>
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<td>U4 03-27</td>
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<td>10 (194 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td>South-North</td>
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<td>Manipulated coffin</td>
</tr>
<tr>
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<td>10 (180 cm)</td>
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<td>South-North</td>
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<td>Flowers; prolonged primary burial</td>
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<td>Shroud</td>
<td>●</td>
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<td>South-North</td>
<td>---</td>
<td>Missing head, arm, leg elements</td>
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<td>U4 05-3</td>
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<td>Shroud</td>
<td>●</td>
<td>---</td>
<td>South-North</td>
<td>---</td>
<td>Flowers; missing lower limbs</td>
</tr>
<tr>
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<td>7 (127 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>North-South</td>
<td>---</td>
<td>Data collected but not excavated</td>
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<td>North-South</td>
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<td>Missing lower limb elements</td>
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<td>8 (151 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>---</td>
<td>South-North</td>
<td>---</td>
<td>Red pigment on face; infant</td>
</tr>
<tr>
<td>Burial</td>
<td>Age/Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
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<td>Shroud</td>
<td>●</td>
<td>South-North</td>
<td>Missing rt. arm, skull</td>
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<td>South-North</td>
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<td>North-South</td>
<td>Extensive textile remains</td>
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<td>Shroud</td>
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<td>North-South</td>
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<td>U4 05-13</td>
<td>Adult M 11 (205 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Red pigment on face; comments</td>
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<td>North-South</td>
<td>Missing lower limbs</td>
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<tr>
<td>U4 05-15</td>
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<td>Coffin</td>
<td>●</td>
<td>South-North</td>
<td>Data collected but not excavated</td>
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<td>North-South</td>
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<td>Secondary burial</td>
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<td>U4 05-17</td>
<td>Subadult 11 (207 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Red pigment on face; textile cap</td>
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<tr>
<td>U4 05-18</td>
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<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Red pigment on face; Missing lower limbs</td>
<td></td>
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<tr>
<td>U4 05-19</td>
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<td>---</td>
<td>●</td>
<td>---</td>
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</tr>
<tr>
<td>U4 05-20</td>
<td>--- 11 (208 cm)</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>Small secondary burial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U4 05-21</td>
<td>--- 12 (220 cm)</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>Small secondary burial</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>U4 05-22</td>
<td>Adult 11 (218 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Only rt. os coxa and leg present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U4 05-23</td>
<td>--- 11 (201 cm)</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>Small secondary burial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U4 05-24</td>
<td>--- 11 (206 cm)</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>Secondary burial; not excavated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U4 05-25A</td>
<td>Adult F 12 (237 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Red pigment on face; semi-haphazard disposal?</td>
<td></td>
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</tr>
<tr>
<td>U4 05-25B</td>
<td>Fetus 12 (228 cm)</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>Fetal skeleton assoc. w/ 05-25A</td>
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</tr>
<tr>
<td>U4 05-26</td>
<td>Adult 12 (221 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Data collected but not excavated</td>
<td></td>
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<tr>
<td>U4 05-27</td>
<td>Adult 12 (225 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Data collected but not excavated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U4 05-28</td>
<td>Adult M 12 (238 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Missing skull</td>
<td></td>
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<tr>
<td>U4 05-29</td>
<td>Adult F 13 (248 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Missing cranium</td>
<td></td>
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<tr>
<td>U4 05-30</td>
<td>Adult M 12 (228 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Secondary burial directly superimposed on 05-31B</td>
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</tr>
<tr>
<td>U4 05-31A</td>
<td>--- 13 (244 cm)</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>---</td>
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<tr>
<td>U4 05-31B</td>
<td>Adult M 13 (254 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>Haphazard burial; probable treponemal infection</td>
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<tr>
<td>U4 05-32</td>
<td>Adult F 18 (340 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>North-South</td>
<td>---</td>
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### Chapel of San Pedro de Mörrope Unit 5 Burials

<table>
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<tr>
<th>Burial</th>
<th>Age/Sex</th>
<th>Level (Depth BD)</th>
<th>Coffin/Shroud</th>
<th>Primary Burial</th>
<th>Altered Burial</th>
<th>Secondary Burial</th>
<th>Orientation</th>
<th>Grave Goods/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>U5 05-1</td>
<td>---</td>
<td>4 (71 cm)</td>
<td>---</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>---</td>
<td>Large secondary burial</td>
</tr>
<tr>
<td>U5 05-2</td>
<td>Subadult</td>
<td>8 (155 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Textile cap</td>
</tr>
<tr>
<td>U5 05-3</td>
<td>Subadult</td>
<td>8 (157 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Prolonged primary burial</td>
</tr>
<tr>
<td>U5 05-4A</td>
<td>---</td>
<td>7 (127 cm)</td>
<td>---</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>---</td>
<td>Placed directly atop 05-4B</td>
</tr>
<tr>
<td>U5 05-4B</td>
<td>Adult M</td>
<td>7 (138 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Coffin lid removed</td>
</tr>
<tr>
<td>U5 05-5</td>
<td>Subadult</td>
<td>7 (134 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Flowers; Prolonged primary burial; naturally mummified infant</td>
</tr>
<tr>
<td>U5 05-6</td>
<td>Subadult</td>
<td>8 (151 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Missing both arms</td>
</tr>
<tr>
<td>U5 05-7</td>
<td>Adult</td>
<td>8 (144 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Intrusive Republican-era burial</td>
</tr>
<tr>
<td>U5 05-8</td>
<td>Subadult</td>
<td>9 (166 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Minor disarticulation of skeleton</td>
</tr>
<tr>
<td>U5 05-9</td>
<td>Subadult</td>
<td>8 (149 cm)</td>
<td>Coffin</td>
<td>●</td>
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<td></td>
<td></td>
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<tr>
<td>U5 05-10</td>
<td>Subadult</td>
<td>10 (193 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>In unit north wall; not recovered</td>
</tr>
<tr>
<td>U5 05-11</td>
<td>Subadult</td>
<td>6 (104 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>---</td>
</tr>
<tr>
<td>U5 05-12</td>
<td>---</td>
<td>7 (121 cm)</td>
<td>---</td>
<td>---</td>
<td>●</td>
<td>---</td>
<td>In unit south wall; not recovered</td>
<td>Lower third of coffin remaining after disruption by 05-07</td>
</tr>
<tr>
<td>U5 05-13</td>
<td>Adult</td>
<td>8 (140 cm)</td>
<td>Coffin</td>
<td>●</td>
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### Chapel of San Pedro de Mörrope Unit 6 Burials

<table>
<thead>
<tr>
<th>Burial</th>
<th>Age/Sex</th>
<th>Level (Depth BD)</th>
<th>Coffin/Shroud</th>
<th>Primary Burial</th>
<th>Altered Burial</th>
<th>Secondary Burial</th>
<th>Orientation</th>
<th>Grave Goods/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>U6 03-25</td>
<td>Subadult</td>
<td>7 (126 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td>---</td>
<td>---</td>
<td>Intrusive Republican-era coffin; flowers; prolonged primary burial</td>
</tr>
<tr>
<td>Burial</td>
<td>Age/Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------</td>
<td>----------------</td>
<td>---------------</td>
<td>-----------------</td>
<td>-------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>U7 05-1</td>
<td>---</td>
<td>6 (115 cm)</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Large secondary burial including three partially articulated adults</td>
</tr>
<tr>
<td>U7 05-2</td>
<td>Adult F</td>
<td>6 (105 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Multiple skeletal elements removed and added</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-3</td>
<td>Subadult</td>
<td>6 (107 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Flowers; adult earrings and necklace on body; drilled bead necklace</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-4</td>
<td>Subadult</td>
<td>4 (74 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>East-West</td>
<td>Textile cap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-5</td>
<td>Subadult</td>
<td>7 (128 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>South-North</td>
<td>Probable late-term fetus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-6</td>
<td>Subadult</td>
<td>7 (133 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Prolonged primary burial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-7</td>
<td>Subadult</td>
<td>8 (140 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>East-West</td>
<td>Flowers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-8</td>
<td>Subadult</td>
<td>8 (154 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>NE-SW</td>
<td>Coffin opened and head, hands, lower legs removed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-9</td>
<td>Subadult</td>
<td>9 (160 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>South-North</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-10</td>
<td>Subadult</td>
<td>9 (138 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>West-East</td>
<td>Red pigment on face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-11</td>
<td>Subadult</td>
<td>9 (164 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>East-West</td>
<td>Flowers; disarticulated elements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-12</td>
<td>Subadult</td>
<td>9 (168 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>NE-SW</td>
<td>Red pigment on face; in unit wall; not recovered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-13</td>
<td>Subadult</td>
<td>8 (157 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>South-South</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-14</td>
<td>Adult F</td>
<td>9 (174 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Textile cap</td>
<td></td>
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</tr>
<tr>
<td>U7 05-15</td>
<td>Subadult</td>
<td>9 (166 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-16</td>
<td>Subadult</td>
<td>9 (164 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>South-North</td>
<td>Small secondary burial</td>
<td></td>
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</tr>
<tr>
<td>U7 05-17</td>
<td>Adult M</td>
<td>8 (156 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>East-West</td>
<td>Missing body below thorax</td>
<td></td>
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</tr>
<tr>
<td>U7 05-18</td>
<td>Subadult</td>
<td>9 (170 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Missing head, long bones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-19</td>
<td>Adult</td>
<td>9 (170 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>East-West</td>
<td>Missing pelvis and femora</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-20</td>
<td>Subadult</td>
<td>9 (164 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>South-North</td>
<td>Missing body above knees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-21</td>
<td>Subadult</td>
<td>9 (179 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>West-East</td>
<td>Missing feet &amp; body above femora</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-22</td>
<td>Adult F</td>
<td>9 (166 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Saint’s medallion on neck; missing body below thorax</td>
<td></td>
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</tr>
<tr>
<td>U7 05-23</td>
<td>Adult M</td>
<td>9 (170 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Missing head, l. arm, rt. leg</td>
<td></td>
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</tr>
<tr>
<td>U7 05-24</td>
<td>Subadult</td>
<td>9 (170 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Placed atop leg of 05-23</td>
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</tr>
<tr>
<td>U7 05-25</td>
<td>Adult</td>
<td>9 (185 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>North-South</td>
<td>Flowers; minor disarticulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U7 05-26</td>
<td>Subadult</td>
<td>9 (177 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>South-North</td>
<td>Textile cap</td>
<td></td>
<td></td>
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<tr>
<td>Burial</td>
<td>Age/ Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/ Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
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<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>U7 05-27</td>
<td>Adult F</td>
<td>9 (174 cm)</td>
<td>Shroud</td>
<td></td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Placed in ventral position, hands behind back</td>
</tr>
<tr>
<td>U7 05-28</td>
<td>Adult</td>
<td>10 (193 cm)</td>
<td>Shroud</td>
<td></td>
<td>●</td>
<td></td>
<td>West-East</td>
<td>Only lower limbs/feet present</td>
</tr>
<tr>
<td>U7 05-29</td>
<td>Adult</td>
<td>10 (191 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Large copper shoe fittings present</td>
</tr>
<tr>
<td>U7 05-30</td>
<td>Adult F</td>
<td>11 (200 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>L. hand drawn up to face</td>
</tr>
<tr>
<td>U7 05-31</td>
<td>Adult</td>
<td>11 (218 cm)</td>
<td>Shroud</td>
<td></td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Only l. os coxa and leg present</td>
</tr>
<tr>
<td>U7 05-32</td>
<td>Adult</td>
<td>12 (228 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Rt. foot, l. os coxa and leg present</td>
</tr>
<tr>
<td>U7 05-33</td>
<td>---</td>
<td>12 (223 cm)</td>
<td>---</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U7 05-34</td>
<td>---</td>
<td>12 (229 cm)</td>
<td>---</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U7 05-35</td>
<td>Adult M</td>
<td>12 (229 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Missing head and limbs</td>
</tr>
<tr>
<td>U7 05-36</td>
<td>Adult M</td>
<td>12 (231 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Possibly oldest coffin burial</td>
</tr>
<tr>
<td>U7 05-37</td>
<td>Subadult</td>
<td>12 (220 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>East-West</td>
<td>---</td>
</tr>
<tr>
<td>U7 05-38</td>
<td>Adult</td>
<td>11 (214 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Missing l. humerus</td>
</tr>
<tr>
<td>U7 05-39</td>
<td>Adult F</td>
<td>11 (204 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>●</td>
<td></td>
<td>East-West</td>
<td>Missing l. arm</td>
</tr>
<tr>
<td>U7 05-40</td>
<td>Adult M</td>
<td>12 (215 cm)</td>
<td>Shroud</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Missing l. arm, lower body</td>
</tr>
</tbody>
</table>

**Chapel of San Pedro de Mórrope Unit 10 Burials**

<table>
<thead>
<tr>
<th>Burial</th>
<th>Age/ Sex</th>
<th>Level (Depth BD)</th>
<th>Coffin/ Shroud</th>
<th>Primary Burial</th>
<th>Altered Burial</th>
<th>Secondary Burial</th>
<th>Orientation</th>
<th>Grave Goods/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>U10 05-1</td>
<td>Subadult</td>
<td>6 (115 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>South-North</td>
<td>Flowers; perinatal infant</td>
</tr>
<tr>
<td>U10 05-2</td>
<td>---</td>
<td>7 (122 cm)</td>
<td>---</td>
<td>●</td>
<td>●</td>
<td></td>
<td>---</td>
<td>Flowers; perinatal infant</td>
</tr>
<tr>
<td>U10 05-3</td>
<td>Subadult</td>
<td>8 (140 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Textile cap; copper ingot grave good; flowers</td>
</tr>
<tr>
<td>U10 05-4</td>
<td>Subadult</td>
<td>9 (160 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Flowers</td>
</tr>
<tr>
<td>U10 05-5</td>
<td>Subadult</td>
<td>9 (171 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Cut by placement of 05-39; lower two-thirds of coffin missing</td>
</tr>
<tr>
<td>U10 05-6</td>
<td>Adult F</td>
<td>8 (155 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Infant burial</td>
</tr>
<tr>
<td>U10 05-7</td>
<td>Subadult</td>
<td>9 (163 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Clothing remains</td>
</tr>
<tr>
<td>U10 05-8</td>
<td>Subadult</td>
<td>9 (163 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>---</td>
</tr>
<tr>
<td>U10 05-9</td>
<td>Subadult</td>
<td>8 (155 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Coffin opened, skull removed</td>
</tr>
<tr>
<td>U10 05-10</td>
<td>Subadult</td>
<td>6 (115 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>---</td>
</tr>
<tr>
<td>U10 05-11</td>
<td>Subadult</td>
<td>9 (163 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Textile cap</td>
</tr>
<tr>
<td>Burial</td>
<td>Age/Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>----------</td>
<td>--------------</td>
<td>------------------</td>
<td>---------------</td>
<td>----------------</td>
<td>----------------</td>
<td>-------------------</td>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>U10 05-12</td>
<td>Subadult</td>
<td>9 (164 cm)</td>
<td>Coffin</td>
<td></td>
<td></td>
<td></td>
<td>NE-SW</td>
<td>Manipulated coffin; body in face-down ventral position</td>
</tr>
<tr>
<td>U10 05-13</td>
<td>Subadult</td>
<td>9 (165 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-14</td>
<td>Subadult</td>
<td>10 (181 cm)</td>
<td>Coffin</td>
<td>●</td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U10 05-15</td>
<td>Subadult</td>
<td>8 (159 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td></td>
</tr>
<tr>
<td>U10 05-16</td>
<td>Subadult</td>
<td>8 (159 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Extensive secondary burial</td>
</tr>
<tr>
<td>U10 05-17</td>
<td>Adult</td>
<td>10 (188 cm)</td>
<td>Shroud</td>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing arm and leg elements</td>
</tr>
<tr>
<td>U10 05-18</td>
<td>Subadult</td>
<td>10 (194 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-19</td>
<td>Subadult</td>
<td>9 (173 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Prolonged primary burial; flowers</td>
</tr>
<tr>
<td>U10 05-20</td>
<td>Subadult</td>
<td>10 (195 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Heavily disturbed partial skeleton</td>
</tr>
<tr>
<td>U10 05-21</td>
<td>Adult M</td>
<td>12 (221)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Ornate coffin decoration</td>
</tr>
<tr>
<td>U10 05-22</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>West-East</td>
<td>In unit wall; not recovered</td>
</tr>
<tr>
<td>U10 05-23</td>
<td>Adult</td>
<td>10 (190 cm)</td>
<td>Shroud</td>
<td></td>
<td></td>
<td></td>
<td>North-South</td>
<td>In unit wall; not recovered; flowers</td>
</tr>
<tr>
<td>U10 05-24</td>
<td>Subadult</td>
<td>10 (195 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-25</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>West-East</td>
<td>In unit wall; not recovered; flowers</td>
</tr>
<tr>
<td>U10 05-26</td>
<td>Subadult</td>
<td>10 (182 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-27</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>East-West</td>
<td>In unit wall; not recovered</td>
</tr>
<tr>
<td>U10 05-28</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing arm and leg elements</td>
</tr>
<tr>
<td>U10 05-29</td>
<td>Subadult</td>
<td>7 (138 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>East-West</td>
<td>Flowers; excellent textile preservation; textile cap</td>
</tr>
<tr>
<td>U10 05-30</td>
<td>Subadult</td>
<td>8 (152 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>East-West</td>
<td>Textile cap</td>
</tr>
<tr>
<td>U10 05-31</td>
<td>Subadult</td>
<td>7 (122 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Good textile preservation</td>
</tr>
<tr>
<td>U10 05-32</td>
<td>Subadult</td>
<td>8 (152 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Good textile preservation</td>
</tr>
<tr>
<td>U10 05-33</td>
<td>Subadult</td>
<td>9 (163 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Red pigment on face; flowers</td>
</tr>
<tr>
<td>U10 05-34</td>
<td>Subadult</td>
<td>8 (143 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-35</td>
<td>Subadult</td>
<td>9 (173 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Small, dispersed secondary burial</td>
</tr>
<tr>
<td>U10 05-36</td>
<td>Subadult</td>
<td>10 (187 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Flowers; good textile preservation</td>
</tr>
<tr>
<td>U10 05-37</td>
<td>Subadult</td>
<td>10 (182 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Extensively disturbed</td>
</tr>
<tr>
<td>U10 05-38</td>
<td>Adult M</td>
<td>10 (182 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Braided hair; elaborate coffin decoration</td>
</tr>
<tr>
<td>U10 05-39</td>
<td>Adult F</td>
<td>13 (241 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-40</td>
<td>Adult M</td>
<td>12 (220 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-41</td>
<td>Adult M</td>
<td>12 (225 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U10 05-42</td>
<td>Subadult</td>
<td>12 (230 cm)</td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td>North-South</td>
<td>Small, dispersed secondary burial</td>
</tr>
<tr>
<td>Burial</td>
<td>Age/Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>-----------------</td>
<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>U12 05-1</td>
<td>Subadult</td>
<td>8 (155 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Flowers; textile cap</td>
</tr>
<tr>
<td>U12 05-2</td>
<td>Adult F</td>
<td>8 (145 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Outstanding preservation</td>
</tr>
<tr>
<td>U12 05-3</td>
<td>Subadult</td>
<td>8 (151 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U12 05-4</td>
<td>Subadult</td>
<td>9 (179 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Prolonged primary burial; flowers</td>
</tr>
<tr>
<td>U12 05-5</td>
<td>Subadult</td>
<td>9 (174 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U12 05-6</td>
<td>Subadult</td>
<td>8 (155 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing various long bones</td>
</tr>
<tr>
<td>U12 05-7</td>
<td>---</td>
<td>8 (145 cm)</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td>---</td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U12 05-8</td>
<td>Subadult</td>
<td>8 (142 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Interlocking w/ 05-6; missing various long bones</td>
</tr>
<tr>
<td>U12 05-9</td>
<td>Adult M</td>
<td>10 (189 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U12 05-10</td>
<td>Subadult</td>
<td>9 (173 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Flowers</td>
</tr>
<tr>
<td>U12 05-11</td>
<td>Subadult</td>
<td>9 (173 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Missing lower arms</td>
</tr>
<tr>
<td>U12 05-12</td>
<td>Subadult</td>
<td>10 (188 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Missing lower body</td>
</tr>
<tr>
<td>U12 05-13</td>
<td>Subadult</td>
<td>10 (196 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Textile cap</td>
</tr>
<tr>
<td>U12 05-14</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Missing lower body</td>
</tr>
<tr>
<td>U12 05-15</td>
<td>Subadult</td>
<td>11 (200 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Iron axe-head placed atop coffin</td>
</tr>
<tr>
<td>U12 05-16</td>
<td>Subadult</td>
<td>10 (185 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Lower limbs missing/disturbed</td>
</tr>
<tr>
<td>U12 05-17</td>
<td>Subadult</td>
<td>9 (169 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Textile cap; Limbs disturbed</td>
</tr>
<tr>
<td>U12 05-18</td>
<td>Subadult</td>
<td>10 (189 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>05-17 placed atop coffin</td>
</tr>
<tr>
<td>U12 05-19</td>
<td>Subadult</td>
<td>11 (201 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U12 05-20</td>
<td>Subadult</td>
<td>10 (195 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Missing rt. arm, legs</td>
</tr>
<tr>
<td>U12 05-21</td>
<td>Subadult</td>
<td>6 (116 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Drilled bead necklace about neck; missing lower body</td>
</tr>
<tr>
<td>U12 05-22</td>
<td>Subadult</td>
<td>10 (194 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>---</td>
</tr>
<tr>
<td>U12 05-23</td>
<td>Adult M</td>
<td>8 (144 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Lower legs, feet missing, red pigment on face</td>
</tr>
<tr>
<td>U12 05-24</td>
<td>Subadult</td>
<td>11 (201 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U12 05-25</td>
<td>Subadult</td>
<td>11 (210 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>L. arm, hands missing</td>
</tr>
<tr>
<td>U12 05-26</td>
<td>Subadult</td>
<td>11 (207 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Only thorax present</td>
</tr>
<tr>
<td>U12 05-27</td>
<td>Subadult</td>
<td>11 (202 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Head, arms, lower body missing</td>
</tr>
<tr>
<td>Burial</td>
<td>Age/ Sex</td>
<td>Level (Depth BD)</td>
<td>Coffin/ Shroud</td>
<td>Primary Burial</td>
<td>Altered Burial</td>
<td>Secondary Burial</td>
<td>Orientation</td>
<td>Grave Goods/Comments</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>------------------</td>
<td>-------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>U12 05-28</td>
<td>Adult M</td>
<td>11 (210 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>South-North</td>
<td>Flowers; left arm missing</td>
</tr>
<tr>
<td>U12 05-29</td>
<td>Subadult</td>
<td>10 (180 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>NW-SE</td>
<td>Minor disarticulation</td>
</tr>
<tr>
<td>U12 05-30</td>
<td>---</td>
<td>8 (144 cm)</td>
<td>---</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U12 05-31</td>
<td>Adult</td>
<td>11 (202 cm)</td>
<td>---</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td>Small secondary burial</td>
</tr>
<tr>
<td>U12 05-32</td>
<td>Adult</td>
<td>12 (227 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing above knees</td>
</tr>
<tr>
<td>U12 05-33</td>
<td>Adult F</td>
<td>12 (227 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Red pigment on face</td>
</tr>
<tr>
<td>U12 05-34</td>
<td>Adult M</td>
<td>11 (208 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Only skull, cervical verts present</td>
</tr>
<tr>
<td>U12 05-35</td>
<td>Adult M</td>
<td>11 (209 cm)</td>
<td>Shroud?</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Only skull, cervical verts present</td>
</tr>
<tr>
<td>U12 05-36</td>
<td>---</td>
<td>12 (223 cm)</td>
<td>---</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td>Secondary burial atop 05-33 and 05-37</td>
</tr>
<tr>
<td>U12 05-37</td>
<td>Adult M</td>
<td>12 (237 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>L. hand drawn to face</td>
</tr>
<tr>
<td>U12 05-38</td>
<td>---</td>
<td>12 (240 cm)</td>
<td>---</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Secondary burial atop 05-39</td>
</tr>
<tr>
<td>U12 05-39</td>
<td>Adult F</td>
<td>12 (222 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing upper body</td>
</tr>
<tr>
<td>U12 05-40</td>
<td>Adult F</td>
<td>12 (222 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U12 05-41</td>
<td>Adult</td>
<td>12 (258 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Missing above knees</td>
</tr>
<tr>
<td>U12 05-42A</td>
<td>---</td>
<td>12 (228 cm)</td>
<td>---</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Secondary burial atop 05-42B</td>
</tr>
<tr>
<td>U12 05-42B</td>
<td>Adult M</td>
<td>14 (262 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U12 05-43A</td>
<td>---</td>
<td>12 (235 cm)</td>
<td>---</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td>Secondary burial atop 05-43B</td>
</tr>
<tr>
<td>U12 05-43B</td>
<td>Adult F</td>
<td>14 (261 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
<tr>
<td>U12 05-44</td>
<td>Adult</td>
<td>13 (241 cm)</td>
<td>Shroud</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Rt. os coxa and leg present</td>
</tr>
<tr>
<td>U12 05-45</td>
<td>Subadult</td>
<td>12 (237 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Prolonged primary burial; body inverted</td>
</tr>
<tr>
<td>U12 05-46</td>
<td>Subadult</td>
<td>12 (222 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td>Cap and textile remains</td>
</tr>
<tr>
<td>U12 05-47</td>
<td>Subadult</td>
<td>13 (247 cm)</td>
<td>Coffin</td>
<td>●</td>
<td></td>
<td></td>
<td>North-South</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX F

BURIAL MAPS BY EXCAVATION LEVEL AND UNIT
Figure F. 1: Unit 3 Level 6. Illustration by Haagen Klaus.
Figure F. 2: Unit 3 Level 7. Illustration by Haagen Klaus.
Figure F. 3: Unit 3 Level 8. Illustration by Haagen Klaus.
Figure F. 4: Unit 3 Level 9. Illustration by Haagen Klaus.
La Capilla de San Pedro de Mórrope
Unit 3
Level 6
Plan View

Figure F. 5: Unit 3 West Extension, Level 6. Illustration by Haagen Klaus.
Figure F. 6: Unit 3, West Extension Level 7. Illustration by Haagen Klaus
Figure F. 7: Unit 3, West Extension Level 8. Illustration by Haagen Klaus.
Figure F. 8: Unit 3 West Extension Level 9. Illustration by Haagen Klaus.
Figure F. 9: Unit 4 Levels 5 and 6. Illustration by Haagen Klaus.

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Figure F. 10: Unit 4 Level 7. Illustration by Haagen Klaus.
Figure F. 11: Unit 4 Level 8. Illustration by Haagen Klaus.
Figure F. 12: Unit 4 Levels 9 and 10. Illustration by Haagen Klaus.
Figure F. 13: Unit 5 Level 3. Illustration by Haagen Klaus.
Figure F. 14: Unit 5 Level 5. Illustration by Haagen Klaus.
Figure F. 15: Unit 5 Levels 7 and 8. Illustration by Haagen Klaus.
La Capilla de San Pedro de Mórrope
Unit 7
Level 6
Plan View

Figure F. 16: Unit 7 Level 6. Illustration by Haagen Klaus.

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Figure F. 17: Unit 7 Level 8. Illustration by Haagen Klaus.
Figure F. 18: Unit 7 Level 9. Illustration by Haagen Klaus.
Figure F. 19: Unit 7 Level 10. Illustration by Haagen Klaus.
Figure F. 20: Unit 7 Levels 11 and 12. Illustration by Haagen Klaus.
Figure F. 21: Unit 10 Levels 6 and 7. Illustration by Haagen Klaus.
Figure F. 22: Unit 10 Level 8. Illustration by Haagen Klaus.
La Capilla de San Pedro de Mórrope
Unit 10
Level 9
Plan View

North Wall

Archway to Church of San Pedro

Figure F. 23: Unit 10 Level 9. Illustration by Haagen Klaus.
La Capilla de San Pedro de Mórrope
Unit 10
Level 10
Plan View

North Wall

Archway to Church of San Pedro

Figure F. 24: Unit 10 Level 10. Illustration by Haagen Klaus.
Figure F. 25: Unit 10 Level 11. Illustration by Haagen Klaus.

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Figure F. 26: Unit 12 Level 8. Illustration by Haagen Klaus.
Figure F. 27: Unit 12 Level 9. Illustration by Haagen Klaus.
Figure F. 28: Unit 12 Level 10. Illustration by Haagen Klaus.
La Capilla de San Pedro de Mórrope
Unit 12
Level 11
Plan View

Figure F. 29: Unit 12 Level 11. Illustration by Haagen Klaus.
Figure F. 30: Unit 12 Levels 12 and 13. Illustration by Haagen Klaus.
APPENDIX G

SELECTED BURIAL DRAWINGS AND PHOTOGRAPHS,
CHAPEL OF SAN PEDRO DE MÓRROPE
Figure G. 1: Burial U3 03-1 (Layer 1), the largest secondary burial documented at the Chapel of San Pedro de Móroppe. Complete excavation revealed the 90 cm-deep conical pit contained 1,279 disarticulated bones corresponding to at least 79 individuals. Drawing by Haagen Klaus.
Figure G. 2: Burial U3 03-8. Uneven settling of grave fill contributed to the foot of the coffin settling more than 20 cm below the coffin’s head. Resultant inferior shifting of the head, disarticulation of the vertebral column, hands, and pelvis can be seen. This child also experience delayed primary burial as evidenced by entomological activity. Drawing by Haagen Klaus.
Figure G. 3: Burial U3 05-43, likely one of the first individuals buried at the Chapel of San Pedro de Mórrope. This old, edentulous adult male was placed into the stabilized Aeolian sand dune under the Chapel. Correlates of a strenuous lifestyle may be inferred from the patterns of DJD in his load-bearing joint systems and a well-healed fracture to the diaphysis of the right humerus. Drawing by Haagen Klaus.
Figure G. 4: Burial U4 03-12, a stratigraphically-intrusive Republican-era coffin. Written on the coffin lid in ink was inscribed the name of the deceased, Santiago Germenio Cajusoli, and the year of his death, 1877. Drawing by Haagen Klaus.
Figure G. 5: A collection of manipulated, altered, and reburied Middle/Late Colonial coffins and disarticulated remains in the southeast corner of Unit 4. Drawing by Haagen Klaus.
Figure G. 6: Early/Middle Colonial Period burials in Unit 4, including the U4 05-25A, women whose face bore remains of a red textile. U4 05-25B featured the disarticulated remains of a late-term fetus. Interment of U4 05-25A however disrupted U4 05-22 resulting in most of the skeleton’s removal. At some point later, a small secondary burial (U4 05-23) was placed and contained the remains of at least three people. Drawing by Haagen Klaus.
Figure G. 7: Burial U4 05-32. Like Burial U3 05-43, this woman was likely a very early interment (burial put placed in sterile sand) during the Early/Middle Colonial Period. The haphazard disposal of her body is quite clear, appearing as though thrown into the burial pit. Her bones revealed advanced chronic systemic infection, probably relating to a form of treponematosis. Drawing by Haagen Klaus.
Figure G. 8: Burial U6 03-25 was the only individual recovered from Unit 6. With its scalloped contours and painted-black surface, this intrusive Republican-era coffin containing the remains of a child is stylistically unlike any other early coffin design dating the Colonial Period in Mórrope. Drawing by Haagen Klaus.
Figure G. 9: Burial U7 05-2, an old adult female buried in the Sacristy during the Middle/Late Colonial phase. At some point following decomposition of her soft tissues, the coffin was opened (lid was absent), and her skull and upper body were removed while various other body parts including four crania and long bones were introduced before reburial. This burial features the quintessential elements of late pre-Hispanic living-dead interactions in postcontact Mórrope: grave re-opening, removal and manipulation of body parts, and reburial of crania and long bones. Drawing by Haagen Klaus.
Figure G. 10: Subadult Burial U7 05-9. Like Burial U7 05-2, the coffin lid was missing, and inside, the skull, lower limb bones, and right hand of this child were missing. Removal of the head disrupted the bones of the cervical vertebral column and superior ribs. Intentional opening of this grave and removal of specially selected bones appears exactly in accordance with local and regional pre-Hispanic practices. Bones would be “harvested,” possibly in rituals involving concepts of the fertility of the dead, and in particular, the bones of children. Drawing by Haagen Klaus.
Figure G. 11: A non-standard burial position seen with Burial U7 05-27, a middle-aged woman. Wrapped in a simple cotton burial shroud, she was placed face-down in the grave, with her hands behind her back. Drawing by Haagen Klaus.
Figure G. 12: Burial U2 03-25C, an apparent Middle/Late Colonial interment that appears as a haphazard disposal. Photo by Haagen Klaus.

Figure G. 13: Middle/Late Colonial Burial U3 05-9, featuring a textile cap decorated with strips of copper sheet. Photo by Haagen Klaus.
Figure G. 14: Evidence of grave-side fires were found in ash deposits adjacent to a handful of early burials, including Burial U3 05-42. Photo by Haagen Klaus.
Figure G. 15: Middle/Late Colonial burial of an adolescent female, (U3WX 05-2) one of only two individuals with crossed arms. Note red facecloth. Photo by Haagen Klaus.

Figure G.16: Burial U3WX 05-5. The coffin was placed directly on a secondary burial consisting of several crania and multiple long bones. Both were likely deposited during the same event. Photo by Haagen Klaus.
Figure G. 17: Unusual body position seen with Burial U3WX 05-35. Additionally, the entire right arm was missing, and in the absence of any kind of perimortem skeletal trauma, appears to have been removed post-interment. Photo by Haagen Klaus.

Figure G. 18: Burial U3WX 05-53, an Early/Middle Colonial secondary burial and the only one not to contain crania. Photo by Haagen Klaus.
Figure G. 19: Nineteenth century Republican-era remains of Santiago Gemenio Cajusoli, Burial U4 03-12. Photo by Haagen Klaus.

Figure G. 20: Burial U4 03-13, a Middle/Late Colonial interment. Photo by Haagen Klaus.
Figure G. 21: Burial U4 05-11. While in an excellent state of preservation, the frequent occurrence of coffin lid collapse following burial led to many burials with crush-damage to their skulls. Photo by Haagen Klaus.

Figure G. 22: Burials U4 05-29 (left) and U4 05-30 (right), whose graves had been opened and their skulls removed. Photo by Haagen Klaus.
Figure G. 23: Burial U5 05-1, the second largest secondary burial at the Chapel of San Pedro de Mórrope. Photo by Haagen Klaus.

Figure G. 24: Burial U5 05-4, demonstrating the pattern where a secondary burial would be placed directly atop a primary burial – in this case, inside a coffin. Photo by Haagen Klaus.
Figure G. 25: Another view of Burial U7 05-2, looking down towards the foot of the coffin. Photo by Haagen Klaus.

Figure G. 26: U7 05-5, with the remains of a copper headband. Photo by Haagen Klaus.
Figure G. 27: U7 05-30, a middle adult woman whose skeleton featured multiple healed traumatic injuries. Note non-standard arm positions in what is otherwise a quintessential Early/Middle Colonial Mochica burial. Photo by Haagen Klaus.
Figure G. 28: Middle/Late Colonial Burial U10 05-6, disturbed by the later interment of Burial U10 05-39 below. Note jaw tie. Photo by Haagen Klaus.

Figure G. 29: Burial U10 05-12. This child’s body was placed faced-down in the coffin. At some point, the coffin was moved and placed nearly on its side. Photo: Haagen Klaus.
Figure G. 30: Burial U10 05-15. Photo by Haagen Klaus.

Figure G. 31: The only large secondary burial in Unit 10, U10 05-16. Photo by Haagen Klaus.
Figure G. 32: Burial U12 05-2, the remains of a Middle/Late Colonial young adult woman. Photo by Haagen Klaus.
Figure G.33: Burial U12 05-22. Photo by Haagen Klaus.

Figure G.34: Burials U12 05-34 (top) 05-35 (bottom). Ritual activity left nothing but these individuals’ skulls *in situ*. Photo by Haagen Klaus.
Figure G. 35: Burial U12 05-40, an Early-Middle Colonial inhumation. Photo: Haagen Klaus.

Figure G. 36: Early Colonial burials U12 05-42B (-42A removed) (left), U12 05-43A and B (center) and U12 05-39 (right). Photo by Haagen Klaus.
Figure G. 37: An isolated subadult frontal bone in the fill of Unit 3 Level 3. Photo by Julio Fernández (2003).
APPENDIX H

MORTUARY MATERIAL CULTURE
AT THE CHAPEL OF SAN PEDRO DE MÓRROPE
Figure H. 1: Variations in copper tack decorative designs of coffin sideboards. Drawing by Haagen Klaus, based on original field drawings by Davis Aguilar, Flor Carranza, and Haagen Klaus.
Figure H. 2: Variations in copper tack decorative designs of coffin headboards. Drawing by Haagen Klaus, based on original field drawings by Davis Aguilar, Flor Carranza, and Haagen Klaus.
Figure H. 3: Variations in copper tack decorative designs of coffin footboards. Drawing by Haagen Klaus, based on original field drawings by Davis Aguilar, Flor Carranza, and Haagen Klaus.
Figure H. 4: Textile coffin liner. This single sheet of traditional-style woven cotton fabric lined the coffin of Burial U3 03-4. Photo: Haagen Klaus.

Figure H. 5: Typically, the only traces of clothing were glass, wooden, or copper button, as seen here on Burial U7 05-7. Photo: Haagen Klaus.
Figure H. 6: Leather shoe soles, Burial U6 03-25. Photo: Haagen Klaus.

Figure H. 7: Ribbon fragments, Burial U3WX 05-9. Photo: Haagen Klaus.
Figure H. 8: Blue, red and yellow beads that once formed a necklace around the neck of Burial U3 05-29. Photo: Haagen Klaus.

Figure H. 9: A large, embroidered textile headband covering the face and head of Burial U10 05-32. Photo: Haagen Klaus.
Figure H. 10: Unlike many other children adorned with textile caps, Burial U10 05-11 featured a cap that was not lined with copper sheet strips. Instead, this thin cap may have been adorned with painted curvilinear designs. Photo: Haagen Klaus.

Figure H. 11: Fragmented remains of possible copper strip decorations of a textile cap, Burial U7 05-7. Photo: Haagen Klaus.
Figure H. 12: An isolated subadult cranium atop Burial U12 05-1 bearing oxidized stains from a copper-strip decorated cap. Photo: Haagen Klaus.

Figure H. 13: Very frequently, only the imprints or pigments of a red face cloth were observable as in this case, Burial U7 05-37. Photo: Haagen Klaus.
Figure H. 14: Burial U3WX 05-39 with a large red facecloth that shifted down and away from the face. Photo: Haagen Klaus.

Figure H. 15: A child’s rattle, worked from bone, Burial U3 03-5. Single hollow copper bead was present inside the barrel. Photo: Haagen Klaus.
Figure H. 16: Oxidized iron disk found under the head of subadult Burial U3 05-18. Photo: Haagen Klaus.

Figure H. 17: Oxidized copper earrings placed on the chest of Burial U7 05-3. Photo: Haagen Klaus.
Figure H. 18: Desiccated flower stems atop the left ilium and femur of Burial U7 05-3. Photo: Haagen Klaus.

Figure H. 19: Flower bundle remains and associated orange ribbon, Burial U10 05-32. Photo: Haagen Klaus.
APPENDIX I

MORTUARY VARIABLE SERIATIONS AND DISTRIBUTIONS
Figure I. 1: Distribution of burial types through stratigraphic space at the Chapel of San Pedro de Mórrope. Drawing by Haagen Klaus.
Figure I. 2: Distribution of interment covering types through stratigraphic space at the Chapel of San Pedro de Mórrope. Drawing by Haagen Klaus.
Figure I. 3: Distribution of body orientations through stratigraphic space at the Chapel of San Pedro de Mórrope. Drawing by Haagen Klaus.
Figure I. 4: Distribution of coffin decoration types through stratigraphic space at the Chapel of San Pedro de Mórrope. Drawing by Haagen Klaus.
Figure I. 5: Distribution of body adornment variations through stratigraphic space at the Chapel of San Pedro de Mórrope. Drawing by Haagen Klaus.
Figure I. 6: Figure 1: Distribution of grave goods and related artifacts through stratigraphic space at the Chapel of San Pedro de Mórrope. Drawing by Haagen Klaus.
Figure I. 7: Line graph representation of mortuary variables through stratigraphic space at the Chapel of San Pedro de Mórrope. Illustration by Lai Wei and Haagen Klaus using a program written in R.
APPENDIX J

VISUAL SURVEY OF SKELETAL PATHOLOGICAL CONDITIONS AT THE CHAPEL OF SAN PEDRO DE MÓRROPE
Figure J. 1: Inactive periosteal inflammation; remodeling sclerotic surface of the left tibial diaphysis, Burial U4 05-29. Photo: Haagen Klaus.

Figure J. 2: Cranial vault fragment of Burial U4 05-32, one of several exhibiting cavitating lesions with margins marked by stellite scarring. Photo: Haagen Klaus.
Figure J. 3: Left clavicle of Burial U4 05-32 seen in cross-section; the entire diaphysis of the clavicle was marked by diffuse periosteal reactions and focal pitting while the medullary cavity obliterated by endosteal activity. Clavicular involvement such as this is probably pathognomonic of venereal syphilis. Photo: Haagen Klaus.

Figure J. 4: Distal end of the left humerus showing periosteal inflammation, Burial U4 05-32. Photo: Haagen Klaus.
Figure J. 5: Right femoral diaphysis (lateral view) of Burial U4 05-32, exhibiting massive periosteal reaction and sclerotic plaquing. Photo: Haagen Klaus.

Figure J. 6: Right femoral diaphysis seen in cross section (distal third) of Burial U4 05-32. Like humeral and clavicular fragments, medullary obliteration is noted here as well. Photo: Haagen Klaus.
Figure J. 7: Left and right tibiae, Burial U4 05-32, which exhibit periosteal inflammation and medial bowing in the distal one-third. Photo: Haagen Klaus.

Figure J. 8: A probable case of subadult tuberculosis, U10 05-29, left (A) and right (B) views of the bilateral lesions that perforated the child’s cranium. Photos: Analise Polsky.
Figure J. 9: Porotic hyperostosis lesions, Burial U3 03-1 JF 3. Photo: Haagen Klaus.

Figure J. 10: Healed porotic hyperostosis lesions, Burial U10 05-38. Photo: Haagen Klaus.
Figure J. 11: Healing porotic hyperostosis (cribra orbitalia) lesions, right orbital roof of Burial U10 05-39. Photo: Haagen Klaus.

Figure J. 12: DJD in the right shoulder joint of Burial U7 05-1 Individual C. Photo: Haagen Klaus.
Figure J. 13: Eburnation and erosion of the surface of the left glenoid fossa, Burial U7 05-1 Individual C. Photo: Haagen Klaus.

Figure J. 14: Erosive pitting and subchondral bone destruction, left glenoid fossa, Burial U12 05-33. Photo: Haagen Klaus.
Figure J. 5: Two isolated proximal ulnae recovered from the fill of Unit 7 Level 8, probably corresponding to the same individual. Severe joint modification and destruction is clear. Photo: Haagen Klaus.

Figure J. 16: Joint destruction and modification of an adult proximal radial epiphysis, Burial U7 05-1 IR 6. Photo: Haagen Klaus.
Figure J. 17: Unilateral degeneration seen in the destruction of the left zygapophysial C2-C3 joint, Burial U7 05-12. Photo: Haagen Klaus.

Figure J. 18: Degeneration of both articular surfaces and marginal lipping of the C3 vertebra (inferior view), Burial U4 05-16A. Photo: Haagen Klaus.
Figure J. 19: Osteophyte formation and marginal lipping, Burial U3 05-1. Photo: Haagen Klaus.

Figure J. 20: A large and irregular Schmorl’s node observed on a vertebral body, Burial U3 03-1. Photo: Haagen Klaus.
Figure J. 21: DISH (diffuse idiopathic skeletal hyperostosis) present on a group of fused T11 to L1 vertebrae, Burial U3 03-1. DISH, which involves a progressive ossification of spinal ligaments, was found among three individuals in Mórrope. The condition is chiefly related to age, body weight, and diet. Photo: Haagen Klaus.

Figure J. 22: Incipient lipping and marginal degeneration, proximal right tibia, Burial U7 05-29.
Figure J. 23: Well-healed lumbar spondylolysis, lumbar vertebra recovered from Burial U7 05-1. Photo: Haagen Klaus.

Figure J. 24: Well-healed rib fractures, Burial U7 05-29. Photo: Haagen Klaus.
Figure J. 25: Fractured left clavicle featuring a large bony callous, Burial U10 05-41.

Figure J. 26: Well-reduced and healed fracture of the diaphysis of the left ulna, U3WX IU 12. Photo: Haagen Klaus.
Figure J. 27: A variety of dental pathological conditions observed in the mandible of Burial U4 03-20A, including large dental caries, alveolar abscess, and impaction of a maloccluded LLM3. Photo: Haagen Klaus.

Figure J. 28: Buccal alveolar abscess corresponding to the LRM1 (tooth probably lost postmortem), Burial U3 03-1 M1. Photo: Haagen Klaus.
Figure J. 29: Maxillary buccal abscess, Burial U4 03-20A. Photo: Haagen Klaus.

Figure J. 30: Antemortem loss of left and right UP3s and UP4s in the maxillary arcade of U3 03-1 Cranium A. Photo: Haagen Klaus.
Figure J. 31: Advanced antemortem tooth loss and alveolar resorption observed in the mandible of Burial U12 05-33. Photo: Haagen Klaus.

Figure J. 32: Dental wear seen in the maxillary dentition of Burial U3 03-4. Photo: Haagen Klaus.
Figure J. 33: Though congenital variations and abnormalities in the Mórrope skeletal sample will be a topic for future work, it is worthwhile to share here a very unique congenital abnormality: four molars. Burial U7 05-7 featured bilaterally unerupted M4s just under a thin shell of alveolar bone. Photo: Haagen Klaus.
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