

Bioarchaeology and Social Theory

*Series Editor:* Debra L. Martin

Bethany L. Turner

Haagen D. Klaus

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# Diet, Nutrition, and Foodways on the North Coast of Peru

Bioarchaeological Perspectives  
on Adaptive Transitions



Springer

# **Bioarchaeology and Social Theory**

## **Series Editor**

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Bethany L. Turner • Haagen D. Klaus

# Diet, Nutrition, and Foodways on the North Coast of Peru

Bioarchaeological Perspectives on Adaptive  
Transitions

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# Foreword

This engagingly written and important case study on the bioarchaeology of pre- and post-contact Peru is the first book in this series where food provides the nexus for answering a broad range of questions about how indigenous populations adapted to, resisted, and survived the immense impact of Spanish invasion. This study delves deeply into relationships between health and diet in the context of power and cultural crisis. Focusing on the indigenous communities in the Lambayeque River Valley of Peru in the time periods before, during, and after colonial domination, the authors present a nuanced and empirically driven interpretation of resistance and survival. The interpretations are not focused solely on the suffering that colonization inflicted (which it emphatically did) but also on the adroit and often ingenious ways that people adapted and endured.

Part of how they were able to survive was to fiercely protect their indigenous traditions regarding food and diet and to renegotiate and reinvent local ethnic identities in spite of Spanish attempts at erasure through assimilation. Thus, within the context of cultural crisis, disruption, and massive change, there was a continued and determined adherence to key traditions and ceremonies around food and foodways. This is a story about survival in the face of cruel circumstances, and it provides insight into how people simultaneously resist and adapt while enacting both agency and subservience to their advantage.

One of the trademarks of bioarchaeology is the capacity to draw on multiple lines of evidence to build robust interpretive frameworks. In this case, skeletal data provides one powerful line of evidence. Additional data is drawn from ethnohistory, archaeology, and biogeochemistry. In this way, a nuanced picture emerges around several key areas of interest: ethno-social identities, diet and foodways, patterns of sharing and consumption, and changes in demography and health. An integrated bioarchaeological study such as this one is ideal for clarifying what life was like on the ground before, during, and after European contact from the perspective of individuals and communities who lived through it.

What makes this study so formidable is the strong application of social theory at every step of the analyses so that complex ideas surrounding food, gender, identity, kinship, alliance-making, and subsistence are interpreted within compelling

theoretical lenses having to do with where power is located and how it is manifested and used prior to and during the colonial presence. The authors do not ask simple questions regarding what people ate. They frame a much broader set of questions involving every aspect of cuisine, from its nutritional content to its symbolic and cultural aspects.

The complexity and nuance brought to the multiple levels of analysis is innovative, compelling, and important. The bioarchaeology of diet and foodways sets an important research agenda for how to bridge complex social theory, innumerable datasets, and varieties of human agency into a cohesive analytical framework that sheds light on human behavior. This is bioarchaeology *and* anthropology at its best.

This volume joins a small number of published bioarchaeological books on the effects of Spanish conquest on local indigenous populations. As a deeply rendered case study situated in a particular place and historical moment, this study often reads like a complex historical novel set over many generations, with families and households using all of their resources and wits to find creative ways of formulating their new colonial identities while adapting and adopting their local traditions.

While many bioarchaeology studies reconstruct diet and its effects on health, this study is different. It interrogates the ways that food selection, preferences, gastronomies, and cooking are all laden with symbolic and cultural meaning. In great detail, the authors compellingly demonstrate that the food that people choose to produce, prepare, and eat is inextricably entangled with large social processes.

The touchstone of the book is the simple yet powerful dictum that the authors chose to open their narrative with: “If you can control your food, you can control your destiny” (Sean Sherman, Oglala Lakota Nation, see the chapter “[Introduction](#)” for full reference). Through the lens of foodways, the authors pull together multiple lines of evidence using human remains (isotopic and osteological data along with archaeological and ethnohistoric sources) that show that understanding the evolution of indigenous foodways in past populations provides a unique perspective on issues being grappled with in many parts of the world today. Rapid cultural change, foreign state intrusions, and imposed economic systems are threatening the diet and health of people all over the world. This case study could open up new ways of thinking about the scale of the problem and possible solutions.

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Debra L. Martin

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This book was years in the making, and we have many people to thank.

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This book is dedicated to our respective mentors, George J. Armelagos and Clark S. Larsen. It is also dedicated to our loving, supportive, and patient families: it takes a village to write a book, and we are so lucky to have you all as ours.

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# Introduction



*If you can control your food, you can control your destiny.*  
– Sean Sherman, Oglala Lakota Nation (Lee 2019)

The Spanish invasion and conquest of the Central Andes—a region encompassing Ecuador, Peru, Bolivia, and northern Chile—wrought profound and devastating changes to the lives of millions of indigenous people. The subsequent colonization of this and other regions of the Americas initiated centuries of profoundly complex biocultural processes that permeated every aspect of life (Koch et al. 2019). 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. However, an important dimension of this history, often overlooked in popular imaginings of a “New World” being “discovered” by technologically superior peoples, is the reality that the Central Andes and the rest of the Western Hemisphere had been host to countless complex societies adapted to particular landscapes and ecologies for over 9000 years. To understand the full, and variable, effects of European colonization across the Americas and Caribbean, one cannot begin the story when European boots landed on American beaches. Instead, the story must begin much earlier and provide a richer history of the indigenous civilizations who arose, expanded, declined, and sustained for millennia before European encounters.

This book presents one such story, set in the Lambayeque valley of Peru’s northern north coast, and centered on food. The Lambayeque Valley Complex is the largest coastal valley system in all of Peru; prior to the Spanish invasion, it was one of two centers of in situ cultural complexity—the Lambayeque Valley Complex and Jequetepeque Valley Complex to its south—on the north coast. By the time the Spanish arrived, the north coast had seen the rise and fall of chiefdoms such as the Cupisnique (1500–650 BCE), early states such as the northern Moche polity (100 CE–800 CE), technical and economic innovation by the theocratic Sicán state (900 CE–1375 CE), and foreign dominion by the coastal Chimú and highland Inka empires (1375 CE–1532 CE). The Lambayeque valley cultures produced sophisti-

cated political and economic systems, technologies, urban landscapes, and expansionist states distinct from those further south or up in the montane highlands or Altiplano high plateau; instead, these cultural systems were oriented and adapted to the resource base and ecology of the north coast. Adding to this dynamic is that underneath the surface of all these political, economic, and ideological changes, archaeological evidence indicates that a local ethnic population known as the Muchik or Mochica crystallized during the early Moche period and maintained cohesion well into the early Spanish Colonial Period (Klaus 2008). This makes the Lambayeque Valley Complex an excellent locus of local continuity within larger regional processes of change, all tied to a combination of maritime, agricultural, and wild food resources and burgeoning regional exchange networks.

In this context, we can more fully appreciate the cataclysmic changes brought about by Spanish conquest and colonization against the backdrop of long-term cultural development on the north coast. Moreover, we can situate the north coast in comparison to other regions of the Americas conquered by the Spanish or other European powers. This book therefore draws on established yet dynamic frameworks for reconstructing the processes and impacts of European contact to provide a view from an understudied region.

## 1 Contextualizing Contact Studies in Bioarchaeology

European contact in the Americas has been examined in modern times with the works of Alfred Crosby (1972) and others (Dobyns 1966, 1983; Ramenofsky 1987; Thomas 1989, 1990, 1991; Viola and Margolis 1991; Zubrow 1990). These classic studies often frame European contact as a one-way, multi-species “Demographic Takeover” (Crosby 1993), whereby European weeds, microbes, rodents, insects, livestock, and people terraformed the Western Hemisphere and devastated their indigenous American counterparts. The above-referenced works do provide ample evidence supporting waves of ecological, epidemiological, and cultural devastation throughout the Americas, as do the rare surviving indigenous accounts (Hackett and Shelby 1942: 23–24; León-Portilla 2007). However, this unilateral framing largely glosses over the ways in which Native peoples had transformed landscapes and created immensely complex societies for millennia prior to Columbus’s accidental encounters with islands in the Caribbean. More recent research has sought to address this (Van Buren 2010), using postprocessual frameworks of identity, agency, and cultural practice to study variation in colonial lived experiences (Lightfoot and Simmons 1998) and, importantly, the emergence of creole cultures in the Americas (Deagan 1996; Deagan 2003; Deagan and Cruxent 2002; Silliman 2005; Smith 1997; Van Buren 1999).

Historical documents, oral histories, and archaeological material culture represent invaluable sources of information about life prior to, during, and in the aftermath of successive invasions and colonization by the Spanish, British, French, Portuguese, and Dutch. However, the information preserved bones and teeth make

the human skeleton possibly the most informative and data-rich category of archaeological material (Gowland and Knüsel 2006). Moreover, to study a human skeleton is to study an individual, and studies of large-scale trends that rely on individuals as the foundational units of analysis provide critical “bottom-up” perspectives (Erickson 1993) on what are often thought to be top-down processes. Bioarchaeology is therefore ideally suited to investigate the commonalities and particularities of indigenous life before and after European contact.

In the 1990s, the first generation of bioarchaeological contact studies emerged (Baker and Kealhofer 1996; Larsen 1994, 2001; Larsen and Milner 1994; Verano and Ubelaker 1992), drawing on many of the analytical frameworks and population perspectives pioneered in bioarchaeological studies evaluating the biological effects of the shift to agriculture (Cohen and Armelagos 1984). In a foundational work, Larsen and Milner (1994) assembled bioarchaeological studies of indigenous cultures across North and Central America and the impacts of European colonialism on their diets, health, and well-being. Consequently, much of the comparative picture of postcontact Native American population biology is skewed toward North America, where contact appeared to have had highly variable effects on indigenous populations (Hutchinson 2016).

Bioarchaeological studies of archaeological remains associated with European contact in North America include those of the Iroquois (Pfeiffer and Fairgrave (1994), Omaha and Ponca (Reinhard et al. 1994), the Chumash (Walker et al. 1989), the Pueblo (Spielmann et al. 2009, Stodder 1994), and tribes in Massachusetts (Baker 1994), the Dakotas (Kelley et al. 1994), Georgia (Garland et al. 2018; Larsen and Harn 1994; Larsen et al. 2001), Florida (Hutchinson and Norr 1994), and the Pacific Northwest (Cybulski 1994). In Central America, similar studies include the Maya in Guatemala (Story et al. 2002) and Belize (White et al. 1994; Cohen et al. 1997). These studies underscore the significant variation in population size and density, subsistence regimes, infectious disease ecology, and other factors prior to European contact and equally significant variation in the localized effects of contact and conquest over the next several centuries. This perspective has continued with more recent studies in Barbados (Shuler 2011), Panama (Rojas-Sepúlveda et al. 2011), and elsewhere (below).

Contrary to earlier models of uniform demographic and cultural collapse (Dobyns 1983; Sale 1990), many of these bioarchaeological studies point to oppressive colonial policies rather than—or at least equal to—infectious epidemics as the causes of population decline. Indeed, ethnohistorical and archaeological research indicates that the nature of Spanish colonization of Central Andes was substantively different from colonization or hegemonic control of earlier indigenous empires. Spanish colonization represented wholly different paradigms related to economic networks, reciprocity, roles of *kurakas*, and local institutions of authority (Ramírez 1996).

The nature of Spanish colonialism in the Andes also appeared distinct in comparison to other colonized regions. In the Caribbean, Venezuela, and tropical regions of Mesoamerica, European species were less successful. In contrast, temperate and mountainous regions that more closely resembled the environments of southern Europe, such as the Western Cordillera of the Central Andes, experienced more of a

“demographic takeover” (Crosby 1994). The Central Andes was also particularly tumultuous during the sixteenth century, first under the control of conquistadores and then, later, under Toledo’s reforms. Many of the policies enacted in the late sixteenth century by the Toledo government were outmaneuvered by both Spanish and indigenous groups but also resulted in crowded and often unsanitary settlements known as *reducciones* (Andrien 1991). Despite these extended periods of upheaval, however, not much is known regarding the health and resilience of indigenous Andeans as they navigated oppressive colonial policies. Moreover, bioarchaeological research in North and Central America also points to adaptability and flexibility among indigenous populations in maintaining their cultural identities and practices despite the yoke of oppression, exploitation, and religious conversion.

It is unfortunate, then, that bioarchaeological studies of Spanish conquest and colonization of South America are rare. The first and, for many years, only research was by Douglas Ubelaker in Ecuador (Ubelaker 1994; Ubelaker et al. 1995; Ubelaker and Newson 2002). Ubelaker’s expansive survey of some 1500 individuals from 20 sites spanning 9000 years provides a glimpse not only of contact and early colonization but patterns of morbidity and mortality across the Spanish Colonial Period. Moreover, these Colonial Period patterns are richly contextualized within a much broader temporal context and show that health and well-being among indigenous populations had already declined with increased sedentism and agricultural production. The declining health indicated in colonial remains therefore was not a sudden and aberrant event, but rather another example of the long-term effects of steadily increasing social and structural complexity. More recently, Melissa Murphy and Catherine Gaither have studied patterns of violent trauma related to Spanish conquest and early colonization of Peru’s central coast at the site of Puruchuco-Huaquerones (Gaither and Murphy 2012; Murphy et al. 2010, 2011). They and Jocelyn Williams have also contextualized their analyses of contact period remains by analyzing the much larger sample of Inka remains from the same cemeteries (Murphy and Boza 2012; Murphy 2004; Williams and Anne Katzenberg 2012; Williams and Murphy 2013). From roughly the same time, bioarchaeological studies identifying systematic malnutrition and stress among enslaved Africans from Plantation Waterloo in Suriname (Okumura 2011) and of dental modification among enslaved Africans in Brazil (Liryo et al. 2011) count among the only published bioarchaeological studies of Africans brought to South America. In the southernmost region of the continent, Guichón et al. (2017) provide another rare bioarchaeological study of colonial South America, that of the Selk’nam peoples of nineteenth-century Tierra del Fuego.

Finally, one of us (HDK) has undertaken over 15 years of systematic excavation, mortuary analysis, and osteological analysis study of cemetery and ritual contexts throughout the Lambayeque Valley Complex of Peru’s northern north coast. This project, known as the Lambayeque Biohistory Project, has included over 3,000 individuals, spans over 3000 years, and is the largest examination of pre-Hispanic and Spanish colonial lives in South America. Our decade-long collaboration has expanded the Project to include the largest stable isotope dataset—over 300 individuals from 4 sites—associated with Spanish contact and colonialism in South America.

## 2 Key Aims of This Book

This book adds to a new wave of studies in the bioarchaeology of conquest and colonialism, in the Americas and worldwide. In a recent volume, Murphy and Klaus (2017a) assemble research on archaeological human remains from Sudan, Peru, the southeastern United States, the Yucatán Peninsula, southern Europe, and the Near East to explore the dialectical relationships between colonizers and the colonized. A similar theoretical framing underlies this book, drawing on processual and postprocessual perspectives to delve into the biocultural history of the Lambayeque Valley Complex, beginning in the Formative period and continuing through the Colonial Period. While the primary focus of this study is an examination of the transformative aspects of Spanish conquest and colonization, it is only possible to do so within a broader view of the *longue durée* of cultural development in Lambayeque. We present a synthesis of stable isotopic and osteological data within a specific, and somewhat novel, analytical framing: that of foodways or food culture more broadly. The overarching questions that we investigate in this book include:

1. *How variable, or consistent, are diets through time in pre-Hispanic Peru's northern north coast? Specifically, how did the foods that people consumed shift between the earliest phases of cultural complexity and agricultural intensification and ensuing periods of in situ and foreign state formation, consolidation, and decline? How does the evolution of indigenous foodways in the millennia before the Spanish invasion inform our perspective on postconquest diets, diet-related stress, and foodways?*
2. *How did the Spanish invasion, conquest, and colonization of Andean South America affect the way that people ate in the Lambayeque Valley Complex? Was there a shift toward consumption of European comestibles, a persistence of traditional foodways, or some combination of the two?*
3. *Were there any changes in indigenous diets between the first century and second century following Spanish conquest? What do these changes (or lack thereof) tell us about Lambayeque foodways over the course of the Colonial Period?*

Bioarchaeological studies of diet and nutrition have revolutionized our understanding of subsistence and consumption as well as the dynamic and variable relationship between diet and overall nutritional status (Buikstra and Beck 2017; Cohen and Armelagos 1984; Goodman et al. 1995; Martin et al. 1981; Sobolik 1994; Vargas 1990; Wright and White 1996, to name a few). However, a less explored area of bioarchaeology is the intersection of subsistence, nutrition, and the cultures of food: the ways in which food choices, preferences, cuisines, and other culturally mediated forms of meaning-making reflected, performed, and even framed larger processes of tradition and transformation. In the colonized Andes, and indeed the Americas as a whole, diets represented entanglements of choice, necessity, resistance, oppression, stigma, and pride. Foodways in the Colonial Periods of the Americas were likely fraught with ambivalence among indigenous, enslaved, and colonizing people alike, reflecting the literal internalizing of foods rich with symbols

used to frame identity and status. In discussing archaeological and historical evidence of the enduring nature of food practices among indigenous groups during periods of contact, Graesch et al. (2010: 213) argue, “If ‘you are what you eat,’ then what you eat carries even greater significance when ‘who you are’ is thrown into question.”

A major force behind the transformation of indigenous foodways—indeed, of indigenous life in general—was a fundamental reorganization of regional macro-economics (for northern Peru, see various chapters in Contreras and Hernández, 2017). In nearly all settings of Spanish colonialism in the New World, there were clear economic motivations that drove the Europeans. Spanish authorities from California to Georgia, the Yucatán Peninsula, and throughout South America generally conducted their business to three ends: extractive exploitation of resources and human labor, conversion of indigenous peoples to Roman Catholicism, and consolidation of military control to deter competing colonial powers (Walker 2001; Weber 1992). This agenda unfolded quite differently in nearly every setting. Changes were inevitable, but the timing, degree of transformation, and speed of change all varied widely (Larsen and Milner 1994; Murphy and Klaus 2017a). The same was likely true of changes to indigenous food cultures, as new creole identities and cuisines emerged. In tropical regions less accommodating of European crops and livestock, Spanish colonists were more likely to adopt local food resources out of necessity, often unwillingly and with much complaint; in the Andes, however, Spanish and Creole were co-opting indigenous foods even when they did not need to (reviewed in deFrance 1996: 23; Staller and Carrasco 2010).

Over the last decade or so, archaeological studies of ancient foodways via the paleobotanical and zooarchaeological records have begun to bloom in the Andes and elsewhere (reviewed in Cuéllar 2013), making it possible to parse these varied transformations of food cultures. Once largely neglected, such studies have been steadily increasing in number, increasingly positioned as integral elements of the research design of field projects (Biver 2019). These lines of information make it possible to reconstruct combinations of ingredients, preparation, and serving techniques and infer categories of everyday meals versus ceremonial foods. Moreover, they represent a key contextual pillar for any bioarchaeological study of diet—connecting the skeletal and isotopic record to physical food remains. However, household food preparation does not unequivocally translate to household consumption; even when it appears to do so, there remain nuanced intrahousehold dynamics that can have significant impacts on understanding the intersection between cuisines and consumption. Actual consumption also has implications for understanding nutrition, and thus the study of human remains becomes central in expanding a biocultural discussion of food in antiquity.

Our study of the Lambayeque Valley Complex is based entirely on human remains from cemetery or other interment contexts; There has been relatively limited excavation of household, village, and food remains-related contexts. Indeed, this articulation with foodways is less a “view from the kitchen” (Cutright 2014) than one from the grave. However, the isotopic and osteological data in this study

are presented, analyzed, and interpreted within a large and established corpus of pre-Hispanic archaeological research, and colonial-era ethnohistoric research, on the north coast and other Andean regions spanning over ten millennia. There is therefore ample contextual evidence of available food resources, subsistence regimes, and consumption in both household and feasting or other ceremonial contexts. Moreover, as noted above, this rich and prolific body of literature represents indirect evidence of what Muchik and other indigenous north coast peoples were consuming through time. The abundance or even ubiquity of a resource does not equate to its consumption, nor does its habitual preparation in a given household. For example, evidence from the colonial Colca valley in southern Peru indicates stark inequality and significant food insecurity despite abundant food surplus (Wernke 2006; Wernke 2013), underscoring the need to independently estimate consumption alongside production and availability.

This book presents direct evidence of diet composition through stable isotope analysis and links diet to indicators of nutritional or diet-related stress, such as markers of anemia and oral decay, building group-level inferences from analyses of individuals. While Klaus has undertaken in-depth analyses of biodistance, paleodemography, and paleopathology of Lambayeque cemetery samples elsewhere (Klaus et al. 2010; Klaus and Shimada 2016; Klaus and Tam 2009, 2010), the pathological conditions of interest discussed in this book are chosen specifically to examine the relationships between food, cultures, diets, and nutrition through time. We would refer interested readers to several excellent and extensive works on paleonutrition more broadly, referenced in Chap. 2. Instead, this study reports select pathological conditions, along with others previously published for some Lambayeque Valley Complex individuals (Klaus and Tam 2009, 2010). Many of the pathological conditions used to interpret diet and nutrition—such as linear enamel hypoplasia, porotic hyperostosis, and cribra orbitalia—are sensitive indicators of stress, but are nonspecific in that they can stem equally from stressors related to diet or to environmentally mediated variables such as infectious disease. Similarly, oral decay—cariious lesions, bony abscesses, and antemortem tooth loss—can stem from cariogenic diets, but that can apply to a range of resources and is partly mediated by circulating sex steroids. Isotope ratios are thus independent proxies of diet that, when analyzed with frequencies of pathological conditions, can provide insights into the associations of food choice, food preparation, and physiological outcomes.

Importantly, this particular study seeks to delve into relationships between diet and health that are not merely the before-after of Spanish conquest, based on the assumption of deprivation or forced assimilation. As Klaus (2008) discusses in detail, indigenous communities in the Lambayeque Valley Complex suffered profoundly but also adapted and endured over the centuries of Spanish colonial domination. This included the persistence of indigenous traditions and renegotiation of ethnic identity in spite of Spanish attempts at erasure. Therefore, this study specifically seeks to test the hypothesis that there was continuity in foodways and aspects of diets within overarching processes of disruption and change and to examine the nature of that continuity.