Community Identity and Social Diversity on the Central Peruvian Coast:

A Bioarchaeological Investigation of Ychsma Diet, Mobility, and Mortuary Practices

(c. AD 900-1470)

by

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ABSTRACT

This dissertation focuses on the diversity inherent to the process of social community construction. Building upon previous archaeological and bioarchaeological studies of community identities, the current project emphasizes the need for consideration of the impact of diversity on community identity formation in the past and illustrates the utility of a bioarchaeological approach for undertaking this task. Three specific aspects of community formation are addressed: (1) the relationship between symbolic community boundaries and geographic space, (2) the influence of diverse discourses of intra-community sub-groups on community formation, and (3) the negotiation of community boundaries by outsiders. To investigate these aspects of community construction in the past, dietary practices and mortuary rituals of the Late Intermediate Period (c. AD 900-1470) Ychsma society of the central Peruvian coast are examined as a case study. Previous anthropological and sociological studies demonstrate that diet and burial customs are common mechanisms used in processes of group identification around the world, including the Andes.

In the current study, analyses of materials from Armatambo and Rinconada Alta in the Rimac Valley are used to examine the ways in which isotopic and dental indicators of diet and archaeological contextual indicators of mortuary rituals correspond with or crosscut spatial burial patterns and additional groups based on sex, age at death, and biogeochemically reconstructed residential origins. Observed patterns are interpreted using a theoretical framework that incorporates sociocultural theory of identity with pre-Columbian Andean ideology of the body, self, and social environment.

Results reveal differences in large-scale trends in diet and mortuary practices associated with burial at each site that are interpreted as evidence of symbolic community boundaries between sites. Complexities within larger trends reveal evidence of internal diversity as well as fluidity across community boundaries. Specifically, evidence is presented for intra-community dietary differences, intra-community differences associated with age and sex, and finally evidence of external relationships. This consideration of diversity in community identity construction is concluded to profoundly refine current understandings of Ychsma social interactions. Consequently, this study demonstrates empirical investigation of social diversity is necessary for understanding the complex nature of the social construction of communities in the past.

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Chapter 1

INTRODUCTION

This dissertation examines the influence of social diversity in the social production of communities. An interdisciplinary bioarchaeological approach is used to investigate three specific aspects of community identity formation within the Ychsma society on the central Peruvian coast: (1) the relationship between symbolic community boundaries and geographic space, (2) the presence and influence of diverse discourses in the social construction of community identity, and (3) the permeability and negotiation of community boundaries. During the Late Intermediate Period (c. AD 900-1470), the Ychsma inhabited the Rimac and Lurín Valleys, an area that subsequently served as a key ceremonial and administrative center for the Inca Empire, later becoming the site of Lima, the capital city of the Spanish Vice Royalty, and a region of immense importance in Andean oral history today (Cornejo 2000; Díaz 2008; Feltham 1984; Patterson 1985; Rostworowski 2002b).

Despite the major significance of the Ychsma region and the Ychsma creator deity, the Pachacamac Oracle, relatively little remains known about the Ychsma people (Eeckhout 2004b). Models of Ychsma sociopolitical and socioeconomic organization rely heavily on ethnohistory and have previously been untested archaeologically (Eeckhout 2004b; Rostworowski 2002b). As a result, Ychsma communities have been portrayed as homogenous, territorially bounded, and isolated social units (Cornejo 2000, 2004; Eeckhout 2004b; Paredes 2004). Portraying Ychsma communities in this manner negates the agency of individuals, thus leading to unrealistic assumptions about diversity and the complexity of social identity formation in the past. In addition, the oversimplification of past social relationships has negative ramifications for understanding the intricacies of identity construction in the present. The aim of the current study is to test such portrayals of Ychsma communities through a bioarchaeological investigation of the dietary practices, mortuary rituals, and residential mobility of individuals buried at Armatambo and Rinconada Alta, two Ychsma sites associated ethnohistorically with fishing and farming economic specialist communities (Díaz 2002; Rostworowski 2002c, 2005b). The current research investigates empirically whether individuals buried at Armatambo and Rinconada Alta belonged to distinct socially constructed communities, whether internal social diversity existed within such communities, and whether certain individuals were able to negotiate community boundaries. To address these important aspects of community formation, an innovative theoretical framework is developed that draws together sociocultural theories of identity construction, previous archaeological and bioarchaeological approaches to identities and community construction in the past, and Andean ideologies of the body, self, and social environment in food- and death-related contexts.

Social Diversity and Community Identity Construction

Communities are socially produced by individual members, who are inherently diverse. Community identity is created through regular symbolic interactions that generate a shared sense of similarity among individual members through a simultaneously shared sense of difference from others (Barth 1969; Cohen 1985; Jenkins 2014). The symbolic nature of the practices used to define community boundaries allows for solidarity formation despite multiple, often diverse, perspectives of the symbols' meanings (Anderson 1991; Cohen 1985). As the current study demonstrates, bioarchaeology is well positioned to provide important time-depth to understanding this key social process, and in particular to reveal the complex social diversity underlying community identity formation in the past. Recent archaeological investigations of the social construction of communities have made large strides in challenging notions of past communities as natural social units associated isomorphically with archaeological sites (e.g., Canuto and Yaeger 2000; Owoc 2005; Varien and Potter 2008a). New approaches re-conceptualize communities as dynamic phenomena produced by the intentional and unintentional social practices of community members (Hegmon 2002; Isbell 2000; Owoc 2005; Varien and Potter 2008b; Yaeger and Canuto 2000). The archaeological record, as an aggregate of the remains of collective social actions over time, is well suited to examine community formation processes in the past (Owoc 2005; Shennan 1993). Yet, because most features of the archaeological record represent the combined actions of numerous individuals over long time spans, the social diversity underlying communities is often obscured in archaeological approaches to community construction (Allison 2008; Isbell 2000; Shennan 1993). The current project demonstrates the utility of a bioarchaeological approach focused on the remains of individuals as a means to address this missing aspect of the social construction of communities in the past.

Bioarchaeologists, recognizing the human body as the site at which individual identities are formed, have demonstrated the utility of employing biological and chemical data associated with individual bodies and their life histories to investigate past identities (e.g., Blom 2005; Buzon 2006; Knudson and Stojanowski 2009a; Lozada and Buikstra 2005; Torres-Rouff and Knudson 2007; Tung and Knudson 2008). The use of multiple types of contextualizing data to inform interpretations generates sophisticated understanding of social experiences and relationships in the past (Buikstra 2009; Knudson and Stojanowski 2009a). The current project employs this bioarchaeological approach to identities at multiple scales to empirically identify socially created communities in the past and simultaneously reveal the social diversity underlying larger community identities. In this way, important nuances and complexities of past social relationships are brought to light with significant implications for understandings of social organization, group interactions, and processes of social change.

Building upon previous work in the archaeology of communities and third-wave feminist archaeology (Isbell 2000; Meskell 1999, 2001, 2007; Stockett 2005; Varien and Potter 2008b; Yaeger and Canuto 2000), this project addresses three important aspects of community construction. First, socially created community boundaries are examined empirically rather than assumed to correlate with geographic boundaries (Anderson 1991; Goldstein 2000; Isbell 2000; Preucel 2000; Yaeger 2000). Second, explicit consideration is given to individuals' and subgroups' diverse enactment of community boundaries, which may be obscured in analyses of archaeological remains of social practices that represent the accumulation of multiple individuals' and groups' actions (Allison 2008; Cohen 1985; Isbell 2000; Shennan 1993). Third, the potential for outside individuals to penetrate community boundaries by changing their practices to align with those of the community is investigated (Barth 1969; Belote and Belote 1984; Galaty 1986). To operationalize these aspects of community construction using the bioarchaeological record, tensions between large-scale social norms and individual practices are the focus of analysis (Stockett 2005). To avoid imposing Western assumptions and narratives of social identity in interpretations of observed trends and the contradictions among them, the local ideology of identity is reconstructed from commonalities among widespread regional ethnographic examples (Meskell 1999, 2001, 2007).

The Ychsma Case Study

The Ychsma polity on the central Peruvian coast presents an important case study for an investigation of the influence of internal community diversity on community identity formation. Archaeologists use the ethnohistorically derived term *Ychsma* to refer to the archaeological cultural tradition spread throughout the lower and middle portions of the Rimac and Lurín Valleys during the Late Intermediate Period. This timespan is defined by the end of local influence of the Wari Empire (c. AD 900) in the region and the beginning of that of the Inca Empire (c. AD 1470) and its adoption of the Ychsma deity, the Pachacamac Oracle (Bueno 1983; Eeckhout 2000; Santillan 1968 [1563]; Segura and Shimada 2010; Takigami et al. 2014).

The nature of evidence used in previous research on Ychsma social organization has led unintentionally to portrayals of Ychsma communities as homogenous, static, and isolated social groups. Ethnohistoric documents recorded after the arrival of the Spanish (c. AD 1533) have stimulated considerable interest in the Ychsma polity (Díaz 2008; Eeckhout 1999b, 2003, 2004a, 2004b, 2008; Rostworowski 2002b, 2002c; Tello et al. 2006; Vallejo 2008). Current understanding of Ychsma sociopolitical and economic organization is derived largely from these ethnohistoric records (e.g., Cornejo 2000; Cornejo 2004; Eeckhout 2004b; Paredes 2004). For example, legal documents, records, and accounts from the early Spanish colonial period (c. AD 1533-1700) describe several situations in which groups of fisherfolk on the central coast, including the Rimac and Lurín Valleys, declared that their sole occupation was fishing and that they did not own any agricultural lands nor know how to farm (Rostworowski 1977, 2005b). Using such forms of information, Rostworowski (1977, 2002b) hypothesizes that, prior to the arrival of the Inca and Spanish, the Ychsma and many other coastal Andean polities were comprised of distinct groups, economically specialized in accordance with their locations among the valleys' diverse environmental zones. Product exchange among the specialist groups is proposed to have enabled polities to maintain economic self-sufficiency.

To further understand Ychsma social organization, archaeologists combine Rostworowski's model with additional ethnohistoric data describing Ychsma leaders during the colonial period along with information from Late Intermediate Period settlement patterns and monumental architecture (e.g., Bueno 1982; Díaz 2004a; Eeckhout 2004b, 2008; Feltham 1983, 1984). Archaeological sites with ramped platform structures are postulated to correspond to *curacazgos*, a Spanish term used to describe a specific type of community that had its own leader, or *curaca*, and ceremonial center (Cornejo 2000; Eeckhout 2004b). *Curacazgos* were further grouped into seven *señoríos*, or multi-community groups, six in the Rimac Valley and one in the Lurín Valley (Cornejo 2004). Modern toponyms link ethnohistorically described *curacazgos* and *señoríos* with specific sites and districts (Cornejo 2000, 2004; Eeckhout 2004b). As a result, Late Intermediate Period Ychsma communities are presumed to have been territorially delineated according to the environmental area exploited by each (e.g., Cornejo 2000; Paredes 2004; Rostworowski 2002b). Prior to the current study, internal diversity within Ychsma communities and interactions between Ychsma communities has been unexamined archaeologically.

Such heavy reliance on ethnohistoric records to understand sociopolitical and economic organization during the Late Intermediate Period is not unique to Ychsma research. Models of economic organization developed from ethnohistoric data are commonly projected onto Late Intermediate Period polities without archaeological testing (see Stanish 1992 for a review). Given that ethnohistoric accounts represent a European view of Andean life at a time subsequent to both Inca imperial expansion and Spanish colonization, ethnohistoric models must be used cautiously. An increasing number of archaeological studies reveal that such models conceal many nuances of the diverse polities occupying the Andean coast and highlands during the Late Intermediate Period (e.g., Lozada and Buikstra 2002; Parsons et al. 1997; Sandweiss 1988; Stanish 1992; Zaro 2007).

In the current research, Ychsma community identity formation and community diversity are investigated empirically through an examination of dietary practices and mortuary rituals as potential social mechanisms of identification. Diet and mortuary rituals are chosen for study because such practices are commonly employed in the construction and maintenance of social group identities as demonstrated by extensive studies of modern societies (e.g., Bastien 1995; Berger 1990; Calhoun 1999; Caplan 1997b; Chesson 2001; Chigateri 2008; Crowder 2001; Durkheim 1965; Galaty 1986; Harbottle 1997; Hertz 1960; James 1997; Metcalf and Huntington 1991; Parker Pearson 1982; Scholliers 2001; van Gennep 1960; Weismantel 1988; Wiessner and Schiefenhövel 1996). In addition, food and mortuary rituals appear to have been critical to the social and ideological aspects of Ychsma life as revealed in previous archaeological studies (e.g., Cornejo 1999; Díaz 2004a; Díaz and Vallejo 2005; Guerrero 2004; Vallejo 2004).

Here, burials from Armatambo and Rinconada Alta, two Ychsma sites in the Rimac Valley, are examined for evidence of the use of dietary practices and mortuary rituals in the demonstration of group affiliation. Ethnohistoric documents associate Armatambo with a specialized fishing community and Rinconada Alta with an agricultural specialist community. Analyses of bioarchaeological materials from these two sites are used to examine the ways in which dental pathological and stable carbon and nitrogen isotopic indicators of diet and archaeological contextual indicators of mortuary rituals correspond with or crosscut burial site location and individual characteristics including age at death, sex, and residential origins reconstructed from radiogenic strontium and stable oxygen isotopes.

Results reveal evidence of substantial internal diversity within two socially constructed communities associated with burial location at the sites of Armatambo and Rinconada Alta. Specifically, deviations within large-scale trends in diet, residential mobility, and mortuary treatments suggest evidence of intra-community economic specialist groups, intra-community differences associated with age and sex, and fluidity between communities, including non-local communities. Using archaeological and environmental contextual evidence and pre-Columbian Andean concepts of body, self, food, death, and the natural and social environment, reconstructed from regional ethnographic and ethnohistoric surveys, it is argued that diverse subgroups and individuals were linked under a community identity forged in the context of death, likely out of concern for the livelihoods of the living.

These findings have significant implications for current understandings of Ychsma sociopolitical organization and relationships. In particular, previous portrayals of Ychsma communities as strict economic specialist groups, territorially bounded to particular ecological zones and ceremonial centers controlled by the elite, and socially isolated from other groups require re-assessment. Instead, results of the current study suggest a more complex picture of Ychsma community construction in which socially diverse individuals, including outsiders, were linked under shared community identities forged in the context of death. Empirical investigations of social diversity in community formation are thus demonstrated to be necessary to understand the complexities and nuances of community construction in the past.

Structure of the Dissertation

In the following dissertation, Chapter 2 provides a focused overview of the theoretical perspective that frames the current study. First, the social construction of community identity is discussed. The relationship between the individual and the collective in the formation of both individual and collective identities is reviewed. This review is followed by an examination of the theoretical approaches of previous archaeological and bioarchaeological studies of identities, which are combined and built upon in the current study. Then, the development of the concept of community as a socially constructed phenomenon is reviewed focusing on archaeological investigations of communities. The second part of Chapter 2 examines dietary practices and mortuary rituals as potential mechanisms of social identification through a review of examples from sociocultural anthropology and anthropological archaeology and bioarchaeology.

To ensure that the theoretical framework presented in Chapter 2 is relevant for the Ychsma case study and avoids imposing Western assumptions, Chapter 3 reconstructs Andean ideology of identity in relation to concepts of food and death. Widespread ethnographic examples from across the Andean region as well as the Amazonian region are surveyed for commonalities. Dietary practices are shown to be especially significant in the formation of social ties, and are frequently closely linked with funerary rituals and other activities surrounding death or the deceased. An examination of conceptualizations of the body and self, the dead, and plants and animals used as food reveal important distinctions from Western worldviews and identification processes. Distinct from biomedical perspectives, the physical body and metaphysical and social self are intricately interdependent in many Andean worldviews. Furthermore, individual bodies are not completely separable from others in the social environment, having the potential to influence and be influenced by other humans and other embodied beings in the historic landscape. The dead are often attributed characteristics of living humans and influence the livelihoods of the living, thus requiring their care and attention. Domesticated plants and animals used as food in the Andes often also share bodily features, actions, and emotions with humans and require concern and guardianship from humans, the earth, and/or the ancestors. Thus, in contrast to Western individualistic, compartmentalized perspectives of the world, Andean worldviews intimately link individuals with one another, their dead, and their environment. Consideration of such concepts enables a refined understanding of the significance of dietary practices and mortuary rituals in Andean social identification processes.

The focus of Chapter 4 is narrowed to the case of the Ychsma polity and its communities. A review of the regional and social context is provided through descriptions of the natural environment of the central Peruvian coast and of the social environment in this region during the Late Intermediate Period. Previous ethnohistoric, archaeological, and bioarchaeological research that provides current understandings of Ychsma communities is presented next and includes a review of studies specific to the social groups associated with the sites of Armatambo and Rinconada Alta investigated here. This chapter ends with an elaboration of the research questions addressed in the current study with more details given regarding the particular Ychsma case and the sites of Armatambo and Rinconada Alta.

Chapter 5 describes how the study samples analyzed in the current investigation were defined. The first section of this chapter focuses on the selection process and demographic structure of the total study sample of archaeological human remains and associated mortuary contexts used in osteological and mortuary contextual data analyses. Next, the selection process and nature of the sub-sample of individuals chosen for biogeochemical analysis is presented.

To assess for the presence of foreign immigrants among the individuals buried at Armatambo and Rinconada Alta, Chapter 6 describes the reconstruction of residential mobility through radiogenic strontium and stable oxygen isotopes. Following a review of the background of use of these techniques, methods are given for the collection of modern environmental samples to create a regional baseline and for the laboratory processing and analysis of all modern and archaeological samples. This chapter ends with the presentation of the radiogenic strontium and stable oxygen isotope results.

Next, to reconstruct dietary practices among the Ychsma individuals buried at Armatambo and Rinconada Alta, Chapters 7 and 8 assess stable carbon and nitrogen isotopes and dental wear and pathology, respectively. Chapter 7 reviews the background for the use of stable carbon and nitrogen isotopes in the reconstruction of diet and describes the methods used in the collection of modern baseline samples and in the laboratory to process and analyze all samples. Results of all stable carbon and nitrogen isotope analyses conclude this chapter.

As a complement to the dietary information obtained from stable carbon and nitrogen isotopes, Chapter 8 describes use of dental wear and pathology to assess for dietary differences. Dental wear, dental calculus, dental caries, dental abscesses, and antemortem tooth loss are examined. The background for these techniques, the methods used in the collection and analysis of data in the current study, and the results obtained are presented in Chapter 8.

To reconstruct mortuary rituals at Armatambo and Rinconada Alta, an analysis of archaeological mortuary contexts is given in Chapter 9. The use of archaeological contexts to reconstruct mortuary rituals and the application of mortuary theory to the specific case study are first briefly reviewed. Next data collection and analytical methods used in the current study are given followed by a presentation of the results.

The final chapter, Chapter 10, combines the results from the reconstructions of mobility, dietary practices, and mortuary rituals to address community formation within the Ychsma society. Large-scale trends are examined for evidence of community boundary formation associated with site location, and irregularities within such trends are investigated for evidence of social diversity within the communities linked with intra-community economic specialization, sex, age, and residential mobility. A proposed refinement of concepts of Ychsma community formation and interactions is presented and recommendations are offered for furthering the bioarchaeology of community construction as a field of research.

Chapter 2

DIVERSITY, DIETARY PRACTICES, AND MORTUARY RITUALS IN THE SOCIAL CONSTRUCTION OF COMMUNITY IDENTITY

The Social Construction of Community Identity

Individual and Collective Identities

The present study examines the relationship between individual and collective identities to provide new insights about the complexities and nuances of social interactions and relationships in the past. Identity, broadly defined, is the process of "systematic establishment and signification...of relationships of similarity and difference" (Jenkins 2014:19). The individual and the collective both play central, interactive roles in the construction of both individual and collective identities (Cooley 1902; Hogg et al. 1995; Jenkins 1996, 2014; Mead 1962 [1934]; Stryker 1980; Stryker and Burke 2000; Tafjel and Turner 1979; Turner 1982). Individual and collective identities can be understood to be formed through analogous processes, characterized by a dialectical interaction between the internal self or internal group and external others (Barth 1969; Cooley 1902; Goffman 1959; Jenkins 2014; Mead 1962 [1934]).

Individual identities are formed at the site of the embodied self (Jenkins 2014). The human body is the location of the articulation between the self and society, specifically the place at which individual actions both constitute and are shaped by human relationships and the external social environment (Csordas 1994; Jenkins 2014; Shilling 2003; Turner 1996). Through the body then, individual identity is constructed via a continuous interplay between an individual's perspective of her or himself in relation to others and others' perspectives of him or her (Jenkins 2014). Importantly, application of this conceptualization of embodied individual identity to non-Western cultures requires researchers to recognize that the embodied self need not necessarily be a discrete, bounded, and fixed entity (Csordas 1994; Hallam et al. 1999; Stewart and Strathern 2000). Ideologies of the body, the self, and the location of the self in relation to the collective influence the specific nature of the embodied experience as well as perspectives of who and what is considered an embodied self (Becker 1995; Hallam et al. 1999; Stewart and Strathern 2000). For example, embodied individuals may include bodies in transformative states, such as the sick or dying, and/or human-like agents that lack a living human body, such as the recently deceased or ancestors (Hallam et al. 1999).

Like individual identity, collective identity is also formed through a continuous interplay between outside individuals' or groups' perspectives of the group in question and the group's perspective of itself in relation to others (Barth 1969; Cohen 1985; Jenkins 2014). Through this interaction, the boundaries of a collective group are socially constructed through both the differences that separate the group from others and the similarities shared among its own members (Barth 1969; Cohen 1985; Jenkins 2014). The community is thus understood as a collective identity socially created by individuals who share a sense of similarity to one another through a simultaneously shared sense of difference from others (Barth 1969; Cohen 1985; Jenkins 2014). It is important to note that the boundaries that define a community are symbolic in nature, enabling a sense of solidarity to be generated despite multiple, often diverse, perspectives and understandings of the symbols' meanings (Anderson 1991; Cohen 1985). Symbolic community boundaries may take the form of language, practices, or materials (Anderson 1991; Cohen 1985; Jenkins 2014). Because of the symbolic nature of its boundaries, a community thus serves as a means by which diverse discourses may be unified without loss of the multivocality of its members (Cohen 1985).

Archaeological and Bioarchaeological Studies of Identities

Studies of identities in the past have proliferated in recent years (e.g., Arnold and Wicker 2001; Díaz-Andreu et al. 2005; Gilchrist 1999; Graves-Brown et al. 1996; Hubert 2000; Insoll 2007; Jones 1997; Knudson and Stojanowski 2008, 2009a), developed within a broader historical trend in archaeology that emphasizes goal-oriented human actions versus ecosystems as the principal mechanisms of cultural change (e.g., Blanton et al. 1996; Brumfiel 1992; Cowgill 1975). Such identity research has provided critical time-depth perspectives to key social concepts developed in sociology and anthropology, such as ethnicity (e.g., Emberling 1997; Graves-Brown et al. 1996; Jones 1997, 2007; Lucy 2005b; Stojanowski 2005; Sutter 2005), sex and gender (e.g., Díaz-Andreu 2005; Geller 2008; Gilchrist 1999; Joyce 2000; Stockett 2005; Wylie 2007), age (e.g., Gilchrist 2004; Lucy 2005a), status (e.g., Babić 2005; Coningham and Young 2007), religion (e.g., Edwards 2005), and disability (e.g., Cross 2007; Hubert 2000). As a result, archaeological and bioarchaeological studies of identities simultaneously add important perspectives to many public discussions surrounding these various forms of identities today.

Meskell (1999, 2001, 2007) has critiqued archaeological studies of identity for focusing on only one aspect of identity at a time, such as gender, age, or disability. She points out that studies with such one-dimensional foci often presume the relevance of modern Western identity categories in past societies. Naturalization of modern identity issues risks oversimplification of the complexities of past social interactions and relationships (Meskell 2007). Bioarchaeological approaches reconstructing the detailed life histories of particular individuals or small sub-groups by combining multiple lines of osteological, isotopic, and mortuary contextual evidence have made progress towards correcting this issue (e.g., Knudson and Stojanowski 2009a; Stodder and Palkovich 2012; Torres-Rouff and Knudson 2007). To evaluate and understand identities in the past, bioarchaeologists integrate human osteological, dental anthropological, paleopathological, and/or biogeochemical data with various lines of evidence from archaeological burial contexts (e.g., Blom 2005; Buzon 2006; Knudson and Stojanowski 2009a; Lozada and Buikstra 2005; Stojanowski 2005; Torres-Rouff and Knudson 2007). Observed patterns are interpreted through innovative theoretical frameworks that blend sociocultural theory, ethnography, and ethnohistory to create nuanced understandings of identities in the past (Buikstra 2009; Knudson and Stojanowski 2008, 2009b).

Such bioarchaeological approaches are often able to successfully integrate multiple aspects of identity, such as gender and age (e.g., Sofaer 1997), gender and social status (e.g., White 2005), gender, health status, and residential origins (e.g., Marsteller et al. 2011), political, ethnic, and religious identities (e.g., Knudson and Blom 2009), and age and religion (e.g., Scott 2011). While of course not fully able to depict the lives of individuals in the past, such approaches provide enriching details often unavailable through other lines of archaeological evidence.

In addition, third-wave feminist archaeological and bioarchaeological approaches, which eschew grand narratives of identity, favoring instead to interrogate the meaning of and intersections among identity categories, show immense promise as techniques to advance the field of identity studies (e.g., Geller 2008; Meskell 1999; Stockett 2005;

Stockett and Geller 2006). Particularly relevant to the present study is the emphasis such approaches place on the value of understanding the contradictions and ambiguities between large-scale social norms and individual practices (e.g., Stockett 2005). Especially successful approaches are those that consider identity within local reconstructions of ideologies of self and body (e.g., Meskell 1999; Stockett 2005).

The current study combines and builds on these two strategies by using a bioarchaeological approach incorporating multiple lines of evidence to focus on the relationship between collective community identities and the heterogeneous individual identities of community members. Observed patterns are interpreted through local concepts of body, self, and social environment reconstructed from commonalities among regional ethnographic and ethnohistoric works. The reasoning for this approach is best understood through consideration of the development of the concept of community as a socially constructed phenomenon and its investigation as such in archaeology.

Communities as Socially Constructed Phenomena

A key concept in anthropology and sociology, the community has long been recognized as central to understanding human social organization, social interactions, and social changes (e.g., Arensberg and Kimball 1965; Cohen 1985; Delanty 2010; Murdock 1949; Wilkinson 1991; Wood and Judikis 2002). The utility of the community lies in its intermediate position between individuals and families and the larger societal structure and culture (Arensberg and Kimball 1965). Historically, anthropological and sociological definitions of community have been highly contentious (Cohen 1985). A 1955 survey of 94 distinct definitions of community found that social interaction, a shared area for interaction, and one or more common ties were the most commonly shared criteria among community definitions (Hillery 1955). Later analyses recognized the community as a socially constructed process definable only in relation to other communities (Arensberg and Kimball 1965; Suttles 1972). Seminal work by Cohen (1985) highlights the symbolic boundary of the community as the location at which communities are constructed. In this perspective, any and all factors--practices, rituals, materials, totems, etc.--that distinguish one community from another are viewed as symbolizations of community boundaries (Cohen 1985). Because they are symbols, such factors may be interpreted and understood in different ways by diverse community members while simultaneously providing a means of group unification (Anderson 1991; Cohen 1985). This concept of the community as a dynamic phenomenon, actively constructed through shared symbolic boundaries continues to be an immensely influential perspective within the social sciences (Jenkins 2014), including archaeology.

Recent archaeological approaches to community construction combine social theory of communities with additional social theories such as theories of practice or *habitus* (Bourdieu 1977) and structuration or interaction (Giddens 1984) to invigorate understanding of past communities (e.g., Mac Sweeney 2011; Owoc 2005; Varien and Potter 2008b; Yaeger and Canuto 2000). Such studies underscore the need to consider the active roles of community members as agents with the capacity to forge and transform community identities through intentional and unintentional actions. Many scholars also promote consideration of the role of the historical social structure in shaping community members' actions. Through this ever-expanding body of work, the past community, once assumed as a natural social entity associated with an archaeological site, has come to be recognized as a dynamic social phenomenon worthy of explicit archaeological analysis (e.g., Canuto and Yaeger 2000; Mac Sweeney 2011; Owoc 2005; Varien and Potter 2008a; Varien and Wilshusen 2002).

It is only in recent decades, however, that archaeologists have directly questioned the constitution of past communities (Yaeger and Canuto 2000). Previously, communities were assumed as pre-existing samples, usually archaeological sites, within which studies were conducted, similar to the way in which ethnographic research previously presumed the existence of self-evident communities in the field (Arensberg 1961; Yaeger and Canuto 2000). Many initial studies explicitly focused on understanding communities defined the community in functionalist or behavioralist terms (e.g., Kolb and Snead 1997). Such approaches provide important contributions to the theoretical and methodological development in the identification of communities archaeologically, yet often make unrealistic assumptions about what criteria should be required in definitions of communities (Hegmon 2002; Yaeger and Canuto 2000). Social approaches to community construction avoid delimiting specific criteria for past communities, preferring instead to focus on analyzing the active process of community formation (e.g., Varien and Potter 2008b; Yaeger and Canuto 2000). Advocates of such social approaches emphasize social interaction as the most important feature of community construction, making salient the fluid nature of community boundaries (e.g., Isbell 2000; Yaeger and Canuto 2000).

Due to the spatially oriented nature of archaeology as a discipline, much archaeological discussion of community construction centers on the importance of place in community formation. Researchers emphasize that place has a significant role in community development as the setting for the social interactions of communities (Davis-

Salazar 2003; Isbell 2000; Knapp 2003; Mac Sweeney 2011; Owoc 2005; Yaeger and Canuto 2000). Both the scale and nature of the spatial setting involved in community formation are recognized to be highly variable (Hegmon 2008). For example, communities may have been formed within shared residential areas at the level of the site or adjacent sites, or may have developed through frequent “co-presence” or regular interactions across spatially separated residential areas in the form of larger multi-site or regional systems communities (Hegmon 2002; Mac Sweeney 2011; Varien and Potter 2008a; Yaeger and Canuto 2000). Several archaeologists emphasize and/or provide archaeological evidence for the existence of community boundaries that crosscut geographic boundaries (Goldstein 2000; Hegmon 2002; Isbell 2000; Preucel 2000; Yaeger and Canuto 2000).

Together, these archaeological studies of the social construction of communities have significantly enriched perspectives of the social relationships and experiences in past communities around the world and through time. In particular, the large range of variation in community structures has been highlighted and larger sociopolitical processes are increasingly better understood through the lens of community research. The archaeological record, as an aggregate of the remains of collective social actions over time, is well suited to examine community formation processes in the past (Owoc 2005; Shennan 1993). Yet, for the same reason, the social diversity underlying community construction is often obscured in archaeological approaches to community construction (Allison 2008; Isbell 2000; Shennan 1993). Thus, while most researchers recognize the importance of considering diversity present among community members, especially because of the influence such competing discourses would have had on the formation of community identities in the past, examples of archaeological studies addressing this issue empirically are rare (see, for example, Joyce and Hendon 2000).

Building on these archaeological approaches to communities, the current study reveals the enormous potential for bioarchaeology to contribute to the investigation of the social construction of past communities. Because bioarchaeological approaches to identities often are able to study social practices at the level of the individual, the discipline is particularly well suited for improving understanding of the impact of social diversity on community formation. By focusing on the community as a collective identity symbolically constructed by individuals with diverse perspectives, the present project examines the embodied practices of individuals for both large-scale patterns reflective of symbolized community boundaries, as well as for contradictions and ambiguities within overall patterns reflective of the diverse and competing discourses present within the community. Dietary practices and mortuary rituals are chosen for investigation because of their widespread salience as social identification mechanisms. The subsequent section reviews the extensive sociocultural and archaeological evidence of the use of these practices to demarcate group affiliation at multiple social scales. Theoretical perspectives of the social significance of dietary practices and mortuary rituals are used to argue that these practices may be understood as embodied symbolic practices valuable to processes of group identification.

Dietary Practices and Mortuary Rituals as Social Identification Mechanisms

To operationalize the bioarchaeological approach to the social construction of communities described above, dietary practices and mortuary rituals are examined as potential mechanisms of social identification. Various examples from sociocultural anthropology and anthropological archaeology and bioarchaeology reveal that these two practices are commonly used to denote group affiliation across multiple social scales. This evidence is reviewed below first for dietary practices and then for mortuary rituals.

Dietary Practices

As one of the fundamental requirements for the sustenance of human life, dietary choices are, of course, restricted by the physiological needs of the human organism for growth and maintenance (Grivetti 1978; Scrimshaw and Young 1976; Stinson 1992). Diet is further restrained by the resources available in the natural environment, technological manipulations of these resources, societal definitions of which resources are appropriate for consumption, and population specific nutrient utilization (Grivetti 1978; Stinson 1992). Within these constraints, dietary practices are influenced by the emotional and subjective meanings imbued in food and structured by the social environment (Messor 1984). Many scholars have argued that eating patterns can be understood as symbolic of instinctive and widespread characteristics of the social world (e.g., Barthes 1975; Douglas 1984; Lévi-Strauss 1966). Historical and political economic factors also require consideration in understanding the structuration of dietary practices (Caplan 1997a; Mintz 1997).

Because of the constitutive property of food for life, the act of eating is intimately linked to the body as food is literally incorporated into the human organism (Fischler 1988). This action provides a powerful metaphor for the incorporation of the symbolic meanings imbued in food to become figuratively incorporated into the embodied self (Lupton 1996). In this way, dietary practices can and frequently do serve as a means for both affirming, transforming, and contesting individual and collective identities (Falk

1994; Sørenson 2000). Across cultures through time and space, dietary practices have been shown to mark differences among numerous types of social groups, including genders (e.g., Bray 2003a; Calhoun 1999; Hastorf 1991), classes (e.g., Chigateri 2008; James 1997), status or prestige groups (e.g., Bray 2003a; Bray 2003b; Hastorf 2003; Ubelaker et al. 1995; Wiessner and Schiefenhövel 1996), ethnic groups (e.g., Harbottle 1997; Scholliers 2001; Twiss 2007; Weismantel 1988), and communities (e.g., Buikstra et al. 2005; Calhoun 1999; Hastorf 1991; Tomczak 2003; Ubelaker et al. 1995). Similarities in food habits also define family and community relationships with deities and ancestors (Calhoun 1999).

Mortuary Rituals

Mortuary rituals, like dietary practices, are shaped by both the natural and social environment and are intimately linked to an individual body. The natural world, as the venue for mortuary practices, may create spatial and/or climatic restrictions on processes of disposal of the dead. The social world is temporarily thrown into confusion at the time of a death, as social relationships are disrupted and social reality is called into question (Berger 1990). Mortuary rituals thus serve as a means for mourners to reaffirm or restructure the social environment. For example, mortuary rituals may serve to promote social solidarity (Durkheim 1965). Death may also provide an opportunity or necessity for the redistribution of social roles, and mortuary rituals provide a formal context for such changes to occur.

As mortuary rituals are generally focused on the body of a particular individual, these practices may serve to memorialize, venerate, or transform the identity of the recently deceased. In death, the embodied self exists in a liminal state between life and death or an afterlife, in its variously conceived forms (Turner 1969). Mortuary rituals accommodate passage through this transformative phase (van Gennep 1960). Mortuary rituals frequently assist with the transformation of the deceased self or soul to its new state of being or extinction (Hertz 1960). Simultaneously, mortuary rituals assist with the transformation of the identities of the mourners, from the identities constructed through relationships with the deceased individual to new identities constructed through these now-changed relationships (Hertz 1960).

Archaeological mortuary analyses provide additional relevant theoretical insights for the examination of mortuary rituals to infer social interactions and processes of social identification. Spatial location is one component of mortuary contexts used to make inferences about collective identities and relationships in the past. Early approaches to the spatial component of mortuary contexts viewed location as a representation of the organizational principles of a society (e.g., Goldstein 1981; Saxe 1970). Ethnographic evidence was surveyed to suggest that disposal of the dead in distinct, specialized areas is commonly associated with groups that legitimize rights to resources through lineal descent from the dead (Goldstein 1981; Morris 1991; Saxe 1970). More recent approaches to the spatial context of burials recognize both the landscape and space in general as social products of individual and collective actions and behaviors (Silverman and Small 2002). Formal, public burial locations provide a setting for "communicating and assessing group and individual identities and social memories" (Charles and Buikstra 2002; Chesson 2001:4). The spatial location of such identification processes may be particularly influential where burial location is simultaneously significant to the separation of the dead from the living (e.g., Arnold 2002).

Variation among mortuary treatments has also received considerable attention as a means to infer features of social organization and processes of social identification in the past. Processual approaches view variability in burial practices as the manifestation of various social factors of the deceased individual (Binford 1971; Chapman and Randsborg 1981). Specifically, particular burial treatments are viewed to reflect the aspects of the "social persona" or combined social identities held by the deceased in life that are considered appropriate for representation in death (Binford 1971:17; Goodenough 1965:2). To infer the specific nature of the social persona reflected in burials, researchers have utilized cross-cultural patterns in differential burial treatment (e.g., Binford 1971; Carr 1995; Saxe 1970, 1971), direct analogy from descendant groups of the archaeological burial population (e.g., Thomas et al. 2005), and/or analyses of formal-structural relations within an archaeological site (e.g., Brown 1971).

Critiques of these approaches point out that mortuary rituals are often employed in the creation, maintenance, transformation, and concealment of social relations, rather than simply a direct reflection of the social roles and organization of a past society (e.g., Curet and Oliver 1998; Hodder 1982a, 1984; Parker Pearson 1982; Shanks and Tilley 1982). Burial practices that emphasize the collective group, for example, may mask unequal power relations (e.g., Shanks and Tilley 1982). Burial treatment variability may also reflect attempts to legitimate control or maneuvers to bring to light underlying tensions within the social structure (e.g., Hodder 1982a).

In addition, mortuary rituals are shaped by their historical, cultural, religious, political, and situational contexts (Buikstra 1995; Carr 1995). Longstanding traditions may lose meaning over time but still be employed in mortuary rituals. Certain aspects of burial structures, grave goods, body treatments, and other variables of the mortuary context may reflect certain beliefs, particularly those specific to the context of death (Carr 1995; Hodder 1982b, 1987). The particular circumstances of death may also influence mortuary treatment, despite the nature of social roles or relationships held in life. Interpretations of archaeological evidence of mortuary rituals thus require consideration of all such factors as any may be salient dependent upon situational circumstances (Buikstra 1995).

Most recently, scholars emphasize the need to consider the influence upon mortuary treatments effected by relationships with the deceased themselves. Treatment of the body may reflect ongoing relationships between the living and the dead (e.g., Crandell and Martin 2014; Parker Pearson 1999; Rakita and Buikstra 2005). The dead themselves may be social actors in society influencing the lives of the living (e.g., Parker Pearson 1999; Rakita and Buikstra 2005; Tung 2014; Velasco 2014). Or, mortuary treatments may transform bodies in the construction of ancestors no longer associated with the corpse (e.g., Parker Pearson 1999; Rakita and Buikstra 2005). Additionally, treatment of the body in death may reflect religious beliefs about the transcendence of death (e.g., Naji 2005; Parker Pearson 1999; Scott 2011). Remnants of the body may also serve as important tools, such as in religious rituals (e.g., Malville 2005; McNeill 2005).

Mortuary analyses benefit by consideration of not only patterned differences associated with characteristics of the deceased in life, such as sex, age at death, health, and origins, but also large-scale similarities and small-scale differences or idiosyncrasies which may reflect societal beliefs about future expectations (Pollock 2011; Scott 2011). Similarities in mortuary treatments may reflect large-scale societal beliefs about the transformation of the body in death (e.g., Scott 2011), while idiosyncrasies in treatment of the corpse may indicate flexibility and/or improvisation in the performance of normative practices concerning beliefs about death and the afterlife (e.g., Beck and Sievert 2005; Pollock 2011). Chapter 3 highlights how a reconstruction of the local ideology of the body, self, and social environment in relation to concepts surrounding food and death can further aid in the refinement of archaeological interpretations of mortuary rituals as well as dietary practices.

Chapter 3

ANDEAN IDEOLOGY OF BODY, SELF, AND SOCIAL ENVIRONMENT IN FOOD- AND DEATH-RELATED PRACTICES

Using Ethnography to Inform Interpretations of the Past

Because the embodied self is experienced differently according to one's specific sociocultural context (Becker 1995; Hallam et al. 1999; Meskell 1999), investigations of social identification in the past must take into consideration local ideologies of the body, self, and social environment. In the current study of social identity through analyses of dietary practices and mortuary rituals in a pre-Columbian Andean society without written texts and with only limited pictorial representations, the regional ethnographic record is surveyed to reconstruct the pre-Columbian Andean ideology of body, self, and social environment in the food- and death-related contexts. Before presenting this reconstruction, it is imperative to explain the reasons for choosing this approach despite its recognized caveats and disadvantages.

Chapter 3 presents a survey of ethnographic descriptions from across the Andean and Amazonian region of practices involving food and the dead as well as conceptualizations of the body and self, the dead, and plants and animals used as food. Although the natural and social environments of the highland Andes and lowland Amazon exhibit many differences and are generally studied as separate regions, these areas are also highly interconnected through "the symbiotic flow of people, things, and ideas" (see also McDowell 1992; Moore 1995; Uzendoski 2009:128; Weismantel 2004). For this reason, and because of the many similarities encountered in the survey presented below, examples from both areas are included.

Additionally, despite the prolific ethnohistoric record in the Andes, a survey of ethnohistoric examples is beyond the scope of the current study. Future studies will benefit from and should incorporate an ethnohistoric survey of descriptions of relevant practices and concepts taking into account the additional set of caveats associated with the use of Spanish colonial documentation. Here, ethnography is chosen due to the richness of the descriptions available, including direct quotes from indigenous peoples, which are scarce in the ethnohistoric record.

The value of using ethnographic analogy and cross-cultural ethnology to inform interpretations of the past is increasingly recognized (e.g., Ascher 1961; Peregrine 2001; Wylie 1985). Importantly, because ethnographic data represents a singular moment in a society's constantly changing practices and ideas, which may be influenced by major historical transformations and recent sociopolitical developments, no single ethnographic example should be projected directly onto the past. In the approach employed here, ethnographic examples are surveyed for commonalities, which are taken to reflect broad underlying ideological concepts (e.g., Marsteller et al. 2011; Salomon 1991; Weismantel 2004). Through such an approach, underlying ethnocentric assumptions implicit to theories of identity are brought to light, strengthening interpretations of observed patterns.

Below, a review of widespread ethnographic examples from across the Andes and Amazon first demonstrates that dietary practices are particularly significant in the creation and maintenance of social ties within and between many indigenous Andean and Amazonian groups. Then, consideration is given to the recursive use of food and its production in indigenous funerary rituals, as well as festivals for the dead, and agricultural rituals. Finally, to understand how and why dietary practices are especially significant in the formation and affirmation of social ties and why dietary practices are particularly emphasized and social ties further reified in the context of death, conceptualizations of the body and self, the dead, and plants and animals used as food are next examined each in turn.

Food that Binds: Dietary Practices and Social Ties in the Andes

Much discussion of food practices in the Andes centers on the ways in which food is used to construct and define social identity, both between and within communities (e.g., Bourque 2001; Corr 2002; Ferraro 2008; Gow 2000; Weismantel 1988). Food connects the self to others on multiple social levels. It defines family members, the household, the community, and the integration of multiple communities. In this section, examples of these occasions are discussed for each level in turn. Where possible, examples are highlighted that introduce how the connections formed are not limited to living humans. The nature of these connections is then examined in further detail in subsequent sections.

First, kin are often defined by feeding practices, rather than shared bloodlines (e.g., Ferraro 2008; Gow 2000; Weismantel 1988). The feeding of children is often what defines a parent, rather than birthing a child (Ferraro 2008; Weismantel 1988). Breastfeeding in Pesillo, Ecuador, may define a mother, whether or not she conceived the child "'who thus becomes of one's own'" (Ferraro 2008:268). Similarly, supplying food to a kitchen and then sharing in its consumption from the same hearth defines a "father", be he a new partner to a mother, a grandfather, or a biological father (Ferraro 2008:268). Among the Piro of the Peruvian Amazon, babies are not considered a "kinsperson" until they are fed “real food” (Gow 2000:47), which is often defined as cooked food (e.g., Lagrou 2000:166). Along the same lines, in Zumbagua, Ecuador, *viñachishka* means “children” but refers to all who are fed from a couple’s hearth and may include multiple generations and fictive kin (Weismantel 1988:171).

The gendered production of certain foods, such as manioc beer and meat by Napo Runa women and men, create “manifestations of the circulation of *samai*, things that, in order to be produced must also be socially related to and conceptualized through the domain of kinship” (Uzendoski 2004:898). Membership in a household as a whole may be defined and reaffirmed through the exchange of cooked food between houses or graves in celebrations for the dead (Bourque 2001; Ferraro 2008). Such exchanges among houses create important additional ties among households that are important in the exchange of reciprocal labor in agricultural fields (Bourque 2001). Exchanges among graves at the cemetery occur in the exact same manner, but with food explicitly given to and accepted on behalf of the dead of each specific household (Ferraro 2008).

At a larger scale, communal eating practices create links among members of a community. For example, in Salasaca, after blessings at social events, including masses for the deceased, each man in attendance takes a little bit of hominy in a “symbolic show of communal eating” followed by the serving of bowls to everyone (Corr 2004:389). Drinking to intoxication at a community festival in the presence of their local spirits is a “potent symbolic act of sharing and group relatedness” (Butler 2006:11). Communal feeding of the dead is symbolized by libations from two bowls, representing multiplicity, which is distinguished from the act of feeding a specific dead individual, which is symbolized by a libation from one bowl (Harris 1982). In these contexts, unification among members of the community, living and dead, is reified through the act of eating together.

Multiple communities, or *ayllus*, also may be integrated through communal sharing of food. For example, Qollahuayas of Mount Kaata, Bolivia, live in multiple *ayllus* at different ecological levels on the same mountain. Following harvest, a special banquet is held in which foods grown at each altitude are combined in a "common meal [that] symbolizes integration" (Bastien 1978:6). Parallel to this integrative meal eaten by the living is the one prepared for the dead to eat during the Feast of the Dead. On a multi-tiered table, food from each level of the mountain is offered to the dead, and the living sprinkle *chicha*, maize beer, on the ground and also drink it themselves, "forming a bond with the dead person" (Bastien 1978:180). Thus, food and drink symbolically and simultaneously link the multiple communities with their dead. At all of the above social levels, eating and other forms of food use reaffirm kinship and social ties among family members, household members, community members, and communities, all of which may include the dead among its members. In the next section, the connection between food and death in Andean ideology and practice is explored further.

The Integration of Food and Death in Andean Ideology and Practice

In Andean life, food and death are regularly juxtaposed and intertwined in a variety of practices. Examples include the preparation, serving, and consumption of food at funerals and feasts for the dead; food offerings to the dead; rituals structured around agriculture and the dead simultaneously; plowing and digging graves; sowing and burial; food use in funeral games; mummification and freeze-drying; and similarities in word meanings. Here, I briefly review examples of each of these occasions.

At funerals, meals often are an important part of burial rites. The family of the deceased serves multiple types of food in large quantities the night before and/or following burial (Abercrombie 1998; Bastien 1978; Corr 2002, 2008; Moya 1981). A "good burial" is considered one in which the family provides sufficient quantities of food so that all guests may eat during rituals that may last multiple days, and extra food for those who play games through the night (Corr 2008:6). In highland Ecuador, women relatives of the deceased make *cachun api*, "daughter-in-law's colada," a thick, sweet porridge, which is served between the wake and the funeral (Corr 2002:12-13). Other foods eaten often include the favorites of the deceased (e.g., Moya 1981).

Food and eating are also important in activities performed in honor and remembrance of the dead. Offerings of food and large meals are prepared and served at festivals of the dead, such as the Day of the Dead, or *Finados*, or All Saints, and the festivals of *Corporales*, and *Carnival* (e.g., Corr 2002; Ferraro 2008; Harris 1982). For example, in the Northern Andes, on the Day of the Dead, women sit in the cemetery, eat favorite foods of the recently dead, and among families exchange foods, which may include bread babies representing "little souls" of the "dear little dead" (*almitas*) (e.g., Corr 2002; Ferraro 2008:266; Moya 1981:69-70). Food is also placed on tables for the dead, and the dead are said to "eat the flavour" (Ferraro 2008:265). The living may eat this food the following day as a means of "establishing an intimate communion with the dead, while at the same time reaffirming their ties as members of the same family and household" (Ferraro 2008:269).

The dead are also incorporated within agricultural rituals. For example, *Finados*, in central Ecuador, takes place following maize planting and involves food offerings exchanged among households which creates cooperative links needed for future labor as well as remembrance and feeding of the dead (Bourque 2001). When the fields and the dead are well-fed, the crops do better and the dead help push the plants out of the ground (Bourque 2001). Similarly, during All Saints in highland Bolivia, the Laymi embrace the deceased within the agricultural cycle (Harris 1982). This festival also occurs during the time of planting, and marks a transition to a time of sadness that comes with the rains, and simultaneously a transition from the individuality of the recently dead to their collective gathering, which is the manner in which they remain present among the living until harvest time (Harris 1982). Libations and consumption practices during All Saints are used to symbolize this move from individual to collective. Libations for the individual dead are made from a single bowl prior to distribution of food to festival participants. Once food is distributed, libations are made from two bowls, the duality of which signifies “multiplicity” and “collective fertility...of flocks, crops and human beings” (Harris 1982:59). The end of All Saints and the rainy season is marked by another festival, Carnival, which begins the dry season and a time of happiness, in which the dead leave for the “land of the dead” (Harris 1982:60). A similar example occurs during *Corporales*, in Ecuador, where loaves of bread in the shape of babies are used to symbolize “the cosmological interdependence of people and the fruits of their labor” (Corr 2002:18). These babies, consumed by the living during rituals for the dead as mentioned above, are ritually buried during *Corporales* so that they may be consumed by the earth in an enactment of the “transformation of the physical body through death and the regeneration of the social body” (Corr 2002:15).

Additionally, many parallel references occur in the actions that take place during burial rites and agricultural work. For example, parallels are drawn between plowing and carrying a corpse or digging grave. In both Ecuador and Bolivia, men who take the corpse to the cemetery are called *toros*, or bulls, in reference to plowing (Harris 1982:52; Moya 1981:66). Similarly, methods of digging a grave parallel those used in potato plowing among the Qollahuaya of highland Bolivia (Bastien 1978). Human burial is also referenced in the sowing of seeds in Huaquirca, Peru (Gose 1994). Plants are considered to have souls similar to humans, as discussed below, which makes sowing a "collective, regenerative burial" and prayers said over seeds are like those said over graves on All Soul's Day (Gose 1994:114). Work periods that structure grave digging and washing the clothes of the dead during burial rites also parallel a work day in the fields; three periods of work are interspersed by two periods of drinking (Gose 1994).

Divinations with seeds take place at both sowing and wakes to determine the 'salvation' of the sowers from having to collect fertilizer in the first case and the fate of the soul in the second (Gose 1994:110,122). Seeds and other food parts are also used in games of chance played at funerals. The types of food objects that are tossed vary across Andean cultures from beans or maize (Gose 1994), corn cobs (Moya 1981), sheep knuckle bones (Harris 1982), or burro, ox, or llama bones, the latter once thought to attract the souls of the dead (Corr 2008). Despite this variation in food type, almost all such games involve a black and white theme, are played by males, and involve drinking, which may be referred to as "[having] some 'blood' (*yawar*)" (Corr 2008:10).

Additional uses of food as a symbol for a part of the body include the description of freeze-dried potatoes as mummies (Allen 1988), the burying of individually chewed coca in a communal heap like the bones of the cemetery and the communal ancestors (Allen 1988), and the description of bread as flesh and the use of potato slices as the body of Christ (Corr 2002). Some words themselves reference simultaneously agriculture and the dead, such as *wanu*, which means *guano*, or fertilizer, and comes from *wañuy* meaning death or to die (Gose 1994). As another example, the term *samakuy* can be used to refer to rest from work in the fields, seed divination practices, and/or the state of interment or burial (Gose 1994:113-114).

While the above examples reveal that much attention has been paid to the integration of food and death in ethnographic literature, the reasons for this integration are rarely discussed. It has been noted by ethnographers that bodies are "conduits" between the living and the dead (e.g., Allen 1988:172; Bastien 1985:597). In addition, researchers often cite ethnographic evidence that the dead must be fed, through one's own consumption or through libations to sacred earth shrines embodied by the ancestors, so that the dead will send rain and fertility to fields and herds and will not become angry and send sickness (e.g., Bastien 1978; Urioste 1981). However, in order to comprehend the relevance and meaning of these and the above practices for the lives of Andeans, it is first necessary to consider more closely how Andeans conceive of their bodies, their dead, and the foods both consume.

Conceptualizations of Body and Self in the Andes

Attempts to understand and explain American Indian perspectives of how the world operates often employ mutually exclusive, typically binary categories, such as nature and culture, the physical and metaphysical, or the body and soul/spirit, which gloss over central ideas in American Indian cosmology (Viveiros de Castro 1998). Even recent models, which attempt to explain the interconnectedness between such categories, such as animism and perspectivism in Amazonian ethnography (e.g., Århem 1996; Descola 1992; Viveiros de Castro 1998), continue to create distinctions that are dissonant with many South American Indian ideologies. Briefly, to illustrate, animism posits "metaphysical continuity... among beings of the cosmos" and thus continuity among humans and animals (Århem 1996; Descola 1992; Viveiros de Castro 1998:479). Perspectivism is the complement, positing physical discontinuity among beings, which leads to bodily expression of identity (Viveiros de Castro 1998). These perspectives, however, do not aptly describe the worldviews encountered among many Andean indigenous peoples. An examination of Andean concepts of the body demonstrates a complex interdependence of the metaphysical, physical, and social constituents of self and relations with other humans in the natural world. Therefore, continuity and discontinuity among beings cannot be easily rendered as either metaphysical or physical. Here, rather than attempting to construct a model for these perceptions, several ethnographic observations of body concepts observed among groups across the Andes are presented and important similarities among them are highlighted. Though the events that take place following death and relationships between the dead and the living are discussed in greater detail in the next section, ideas about death in relation to the body and self are also occasionally presented here.

The Canelos of Ecuador view the physical body and the soul and inner self, referred to as *el alma*, *la fuerza*, or *voluntad*, as "mutually constitutive elements" (Guzmán 1997:47).[1] A body, or *aicha*, that has lost its *aya*, the agentive life force translated as "alma" or soul, can weaken and die (Guzmán 1997:45). In addition, *samai*, which refers to breath, internal fortitude, and will, is also localized in the body (Guzmán 1997). This aspect of a person can be partially transferred to other people, for example, between a mother and infant or a shaman and sick person (Guzmán 1997). A connection exists between the individual, other individuals, and the environment: "the person is not perceived as a unit completely separate from other persons or from other beings" (Guzmán 1997:47).[2] For example, an elder can breathe *samai* into the breast milk of the mother of a child, which transmits part of his will and strength to the child, providing it with "spiritually nutritious qualities" (Guzmán 1997:47).[3]

Among the Quechua-speaking Qollahuaya of Kaata, Bolivia, the concept of *uqhuntin* includes the physiological body as well as the emotions, thoughts, and psyche of the inner self (Bastien 1978:43-47; 1985:598). Fluids--blood or *yawar*, air or *wayra*, and fat or *wira*--in a healthy body flow centripetally and centrifugally parallel to the environment, as well as between the environment and the body (Bastien 1978:45-46; 1985:599). Fluids and nutrients merge in the *sonco*, which is associated with circulation, breathing, digestion, thought, and emotion and is metaphorically associated with the union of ecologically distinct foods in ritual contexts (Bastien 1985:599). The communities and landscape of Mount Kaata are conceptualized to function like a body, also with both physiological and spiritual aspects (Bastien 1978, 1985). For example, the central lands are the stomach and heart, the highest hamlet the liver, and the fields at the edge of the community surround it like thick layers of fat (Bastien 1978, 1985). Indentations on the river of the lowest point of the landscape are referred to as legs or *chaqis* and toenails or *sillus* (Bastien 1985:597). All aspects of the landscape are "organically united" and remain integrated through marriage and exchange in ritual feasts

(Bastien 1978; 1985:597). Movement of fluids on the landscape can affect human fluids (Bastien 1978, 1985). For example, a landslide can replace a person's blood with water, weakening it (Bastien 1978). Physical fluids, such as blood and fat, are offered to the mountain to energize it so it will bring fertility to people and crops (Bastien 1978). The dead travel via underground waterways in a cyclical fashion up the levels of the mountain-body to the head where they can enter the land of living (Bastien 1978, 1985). The living originate from lakes, the mountain's eyes, and migrate down the mountain (Bastien 1978, 1985).

For the Aymara of the Bolivian altiplano, the term *chuyma* refers to the biological organ system, especially the integrated suite of the heart or *lloqo*, liver or *k'wicha*, and lungs, also termed *chuyma*, as well as the inner and social self or *ajayu* and soul or *alwa* (Orta 2000:872; 2004:157-158). The *ajayu* is constituted in part by *animu* and *kuraji*, comparable to, but different from, Western concepts of spirit and courage or passion, respectively, and associated with blood or *ch'ama*. Like the Qollahuaya concepts, blood or *ch'ama* and fat or *lik'i* are critical to physical well-being and personhood (Orta 2000:872; 2004:158). In addition, the *chuyma* extends beyond the body into the social world and across time and space. For example, speech produced by the *chuyma* can influence the taste or quality of a gift as it is experienced by another *chuyma* (Orta 2000, 2004). After death, the *chuyma* remains associated with the clothes of the deceased or particular spaces of the house for several years before joining the communal dead (Orta 2000, 2004).

For the people of Huaquirca in the Apurimac region of southern Peru, the *anímo* and *alma* are distinct, yet interdependent, soul-like concepts located within the body

(Gose 1994:113). The *alma* is more closely associated with the body and "moral character", while the *anímo* "maintains the life and health of the individual, and is responsible for vitality, animation, consciousness, courage, and sensory categories" (Gose 1994:115). The *anímo* can disassociate with the body through fright and in death is the aspect of self that is lost and is the focus of funerary ritual (Gose 1994). Such rituals serve to separate the cadaver or *aya* and the *alma*, as well as the *anímo* and the *alma,* the latter of which becomes further separated from the living through passage to an afterlife (Gose 1994:116).

For Sonqueños of the southern Peruvian highlands, the *alma* refers to the physical body of the dead, the "deindividualized spirit normally localized in the body", as well as the personality of an individual, which can exist independently of the body after death, but is never completely separable (Allen 1988:61). At death, flesh from bones merges with the earth, and the body enters into a new state of being (Allen 1988). Here, the separation of flesh from bone is critical. Lack of separation creates dangerous beings: *kukuchi*, rotting creatures who crave flesh, or *Machukuna*, sundried bones who want their flesh and blood back (Allen 1988:62-63). Properly separated dead eventually become *Machula Aulanchis*, who are communal ancestors that aid protection and fertilization of crops (Allen 1988:60,63).

While drawing generalizations can detract from the true meaning of concepts already transformed and simplified in translation, some basic similarities among perceptions of the self and body are readily apparent among the above ethnographic observations of concepts of body and self in the Andes. First, constituents of the individual considered distinct in medicalized, Western thought are not separate realms in

Andean perspective. Specifically, Western biomedicine considers the body as distinctly biological and physiological and separate from the psychological or emotional and cognitive self and mind (Morris 1994; Osherson and AmaraSingham 1981). Andean concepts concerning the physical human organism, in contrast, are inextricable from concepts of the inner self and soul (e.g., Allen 1988; Bastien 1985; Gose 1994; Guzmán 1997; Orta 2000, 2004). The body's organs and physiological mechanisms are perceived to exist and operate in sync with one's inner being and emotions (e.g., Bastien 1985; Guzmán 1997; Orta 2000, 2004).

Second, the simultaneously corporeal and spiritual individual body (and self) can both affect and be influenced by the bodies (and selves) of others. *Samai* is partially transferred among individuals, who are connected to both other individuals and their environment (Guzmán 1997). The *chuyma* transcends the body in time and space to influence the experiences of others (Orta 2000, 2004). No action by the individual self occurs in complete separation from other humans and/or the natural world.

Third, just as the body can influence and be affected by the bodies of others, it can also influence and be affected by the body of the landscape. Bodily fluids flow between and in parallel to the waterways of the environment (Bastien 1978, 1985). The communities and landscape of a single mountain or region are conceptualized to function like a body, also with both physiological and spiritual aspects (e.g., Bastien 1978; Kuznar 2003). Movement of fluids on the landscape affects human fluids and vice versa. The body of the landscape, itself, parallels the human body metaphorically, so that its parts and the people who live and work in them are both physiologically and spiritually interconnected (Bastien 1978, 1985; Classen 1993).

Andean Deathways

Building on the above discussion of Andean conceptualizations of body and self, this next section turns to Andean deathways, or beliefs about the events that take place following death and the relationships that the living maintain with the dead. An examination of afterlife concepts and characterizations of the dead reveals that the dead continue to possess many human-like qualities that influence the actions of living humans towards the dead.

First, in many Andean cultures, the dead continue to live in a way that is analogous to, but different from, the lives of the living (e.g., Allen 1988; Gose 1994; Harris 1982). For the *Runakuna* of Sonqo, Peru, the dead "do not cease to exist but exist in a less immediate state than the living--a parallel world from which they directly influence this one" (Allen 1988:63). This parallels *Runakuna* concepts of the past, in general, in that past periods of history do not disappear from existence, but continue to persist in a "less immediate", but influential manner (Allen 1988:64). These ideas are not unique to Soqueños. The Quechua term *pacha* refers simultaneously to both the earth and time as inseparable concepts (Skar 1981). For the peoples of Huaquirca, Peru (Gose 1994), as well as among the Laymi of Potosí, Bolivia (Harris 1982), the dead must cross a river before they can reach the afterlife. On the other side, their new life is characterized much like that of the world and time of the living. For example, they continue to work in fields, live in houses, and may remarry.

Many of the differences between the lives of the dead and the lives of the living are subtle: seasons or times of day may be reversed, crops important in the past may be grown, and/or sizes of people and objects may be reduced (e.g., Allen 1988; Gose 1994;

Harris 1982). However, crossing into the world is a feat that is irreversible (Ferraro 2008; Gose 1994; Harris 1982). For Pesillanos of the Northern Andes in Ecuador, the soul of the dead crosses a river in order to reach 'the world within' which is like a womb within a nearby woman volcano (Ferraro 2008:266). Desiccation is frequently associated with the process of transformation into the afterlife, with the expelled water returning to the world of the living where it sustains crops, and water prevents the reversal of the journey to the land of the dead and the return of souls (Ferraro 2008; Gose 1994). However, in other cultures, such as the Qollahuaya of Mount Kaata, the dead travel via waterways to their destination in the mountain and inhabit water and ice (Allen 1988:52; Bastien 1978).

Second, the dead continue to have human-like emotions, such as sorrow, love, and anger, which are influenced by actions of the living (Allen 1988; Bastien 1978). According to their sentiments, the dead influence the world of the living, such as by providing protection to crops and animals (e.g., Allen 1988; Steele and Allen 2004), by sending rains for fields or keeping rains away so that foods may be dried (e.g., Abercrombie 1998), by attacking the living (e.g., Allen 2002), or by inflicting sickness (e.g., Bastien 1978; Classen 1993; Urioste 1981). The dead, therefore, require special attention from living relatives and the broader community (Allen 1988; Bastien 1978). For example, land disputes or social disturbances can cause the dead to become angry and send sickness (Bastien 1978). Such sicknesses require help from a diviner to determine the dispute causing the sickness as well as the means necessary to rectify it, which often include making offerings at the grave of ancestors or another sacred site the ancestors embody (Bastien 1978). Additionally, the earth and the ancestors who inhabit many of its features become sad when people fight and act in other inappropriate ways.

Disgraces of previous generations are inherited by each new generation (Rösing 1994), so that the earth gradually increases in sadness over time as it ages (Swanson, personal communication, 2009; and see Allen 1988). Besides daily offerings and prayers, fertility rituals, including those discussed above, involve music, dancing, singing, eating and drinking large amounts of food to feed the dead, and making offerings of coca, maize beer or *chicha*, sacrificed animals, and fertility bundles usually filled with food products at special locations associated with ancestors, such as mountains or fields (e.g., Allen 1988; Bastien 1978; Gifford and Hoggarth 1976; Harris 1995).

Clearly, across Andean cultures, beliefs about the afterlife and the characterization of the dead are variable. However, all share a similar underlying concept in that the living and the dead are not completely dissimilar, distinct categories. Instead the living and the dead share many of the same actions and emotions, though they inhabit or embody different realms of space and time. These characteristics shared by the living and the dead require living humans to pay special attention to the needs of the dead because they must rely on the dead for their own livelihoods. The inseparability of individuals from one another, as discussed above, and from their dead and the environment, as discussed here and below, can be easily glossed over through the individualistic, compartmentalized Western view of the world. Yet, consideration of these similarities and connections is key to understanding pre-Columbian Andean processes of identification.

Characterizations of Plants and Animals Used as Food in the Andes

Andean conceptualizations of food are important for understanding the use of dietary practices in the construction of identity. The following section turns to ethnographic examples of Andean beliefs and practices associated with plants and animals used as food. Plants and animals used as food in the Andes are often described as having human qualities and/or are treated as if human. Alternatively or additionally, crops and domesticated animals are considered gifts from the ancestors or even as ancestors themselves, embodied as animals. Below, a description is presented of the way in which a number of crops, particularly Andean staples including maize (*Zea mays*), manioc (*Manihot esculenta*), and potatoes (*Solanum* sp.), are ascribed human characteristics. Next, multiple examples are reviewed in which economically-important animal species, such as llamas (*Llama glama*) and guinea pigs (*Cavia porcellus*), are similarly described or cared for as humans or ancestors.

Maize (*Zea mays*) is an important crop for many Andean populations living in coastal valleys, lower slopes of the cordillera (1800-3500 m), and the upper Amazonian forest (Bastien 1978; Brush 1982; Moya 1981; Troll 1968). Like manioc (*Manihot esculenta*), discussed below, maize is often used in the production of *chicha*, a ritually-important fermented beverage (e.g., Bastien 1978; Butler 2006; Moya 1981). Maize plants are often discussed as human beings, with corresponding body parts and spiritual aspects. In Gradas Chico, Bolívar, Ecuador, maize and other plants are considered to be humanlike: "the maize, like other plants, is a living humanized being" (Moya 1981:81).[4] Each part of the maize plant corresponds to a human body part: the leaves are the arms, feet are near the roots, and each has a head, neck, and heart (Moya 1981). Maize kernels are considered feminine while the non-productive parts and plants are masculine (Moya 1981). The maize plants waving in the field are compared to bodies and souls in a cemetery: "'The maize'...'moves its arms when the wind lightly blows. It looks like a crowd of people in a cemetery and resembles many souls sown in that space'" (Moya 1981:82).[5]

In Jauja, in the central Peruvian highlands, maize seeds take on human form when no one is watching (Tillman 1997). The night after maize is sown, the seeds dance down to the river to bathe, accompanied by other plants (Tillman 1997). When going to bathe, the maize takes on the body of a human: "a tall, thin white person" or, depending on the seeds, "people who are somewhat fat, or thin" (Tillman 1997:172).[6] When the seeds return to their places in the ground, they may mistake their original location in the dark of the night, leading to deviations in color from the seeds originally planted (Tillman 1997). Maize also has human-like emotions. Different colors of maize, *razas* or races, will fight if stored together and subsequently not produce a good harvest (Tillman 1997:180). Similarly, beans and peas *se odian*, or hate each other, when they are sown together (Tillman 1997:182). Maize becomes sad and cries when left alone, and thus must be stored in equal numbers so that all are in pairs (Tillman 1997).

In Huaquirca, in southern Peru, maize and other crops are considered to have souls complementary to humans' souls. The manner in which seeds are distributed in fields, such as the separation of maize by color or the intermixing of maize and beans in some areas but not others, is driven by the "spirit or power of agricultural products," characterized by *sawasira* and *pitusira*: "*sawasira* 'has affinity with' the human *anímo*, which provides energy, and … *pitusira* 'has affinity with' the human *alma*, which provides embodiment" (Gose 1994:109). The difference between these concepts parallels other differences such as between grain and cob, white and yellow maize, and maize and beans (Gose 1994). Twin peaks, *Sawasiray* and *Pitusiray*, of a nearby mountain, a guardian of maize, simultaneously embody these concepts (Gose 1994).

Elsewhere in the southern Peruvian highlands, charm bundles or *ch'uya unkhuña*, which "represent the seeking of blessing by the place-spirits on crops and domestic animals," contain numerous plant and animal parts (Gifford and Hoggarth 1976:Plate 11). Among these objects are several types of maize kernels, on and off the cob, "anointed" with animal fat (Gifford and Hoggarth 1976:Plate 11). Though not explicitly stated, it might be inferred that adding fat, a critical bodily fluid as described above, symbolizes a desire for the seeds to grow into healthy, human-like beings.

In other Andean regions, where manioc (*Manihot esculenta*), or yuca, is a staple crop, such as the Amazonian lowlands of Ecuador, it is similarly spoken of in human terms and treated as such. Parallel to the way maize is anointed with fat in the above example, manioc is symbolically anointed with blood by the Canelos in Ecuador (Guzmán 1997). Both manioc and the women sowers' faces are painted red with pigment made from achiote, or *manduru*, so that the manioc will drink the humans' blood, or *lumuga ñucanchic yahuarta upichun nisha*, and thus be able to grow well and provide thick tubers (Guzmán 1997:73).

In other cultures, manioc is spoken of and treated like a child. For example, Mundurucú women of the Brazilian Amazon wash themselves and their babies at the same time as they wash their manioc tubers (Mowat 1989). Ecuadorian Napo Runa place manioc tubers head down in baskets like babies in the womb (Swanson 2009). Tubers abandoned in fields will cry like babies (Swanson 2009). Gardeners avoid their gardens when in menstruation, to avoid causing the tubers to rot, and in pregnancy, to avoid causing the tubers to burst (Swanson 2009). Manioc gardens are "extensions of the woman's body and the manioc the substance of her children" (Uzendoski 2004:897). Both gardens and tubers are cleaned with extra care "like one keeps the body of a child" (Swanson 2009; Uzendoski 2004:897).

In the highland Andes, potatoes are similarly viewed as human-like beings. In Sonqo, "*Runakuna* treat potatoes as living, sentient beings--as female plants who give birth upon being planted" and "die" when freeze-dried into *ch'uño* (Allen 1988:172). In Pesillo, Ecuador, potatoes "mature like babies" (Ferraro 2008:266). Potato seeds planted by Aymara peoples of highland Bolivia "suckle from the earth", or *nutnt'asisitnani*, just as humans do when they consume the earth's products (Arnold 1987:333). The seed is a "girl-child", or *imill wawa*, which becomes married to her mother (Arnold 1987:335). Leaves cover the stem of the potato plant like a skirt, and energy, or *fuerzas*, flows through the stem (Arnold 1987:332). Similar to the maize and manioc examples above, llama fat, or *untu*, is offered at sowing and harvest to generate *parpa* or sap, which parallels the marrow of animals (Arnold 1987:332). Here, the earth, or *Mama Tirnira*, becomes pregnant, *tirnirtasxi*, and the potatoes and other products she produces at harvest are babies, or *wawas* (Arnold 1987:333). The earth menstruates when human women menstruate, and her blood "'grasps' the *wawa* as the seed is placed in the earth" (Arnold 1987:334).

Three common themes emerge from the above ethnographic examples of characterizations of staple crops in various Andean communities. First, plant parts, though clearly different in form, are analogous to human body parts or clothing. Plant parts may be discussed as heads, arms, legs, feet, or skirts (e.g., Arnold 1987; Moya

1981; Swanson 2009). Or they may take on a complete human form when humans are not watching (e.g., Tillman 1997). Second, crops are often also considered capable of human actions. Plants may move like a crowd of people (e.g., Moya 1981), seeds may dance and bathe (e.g., Tillman 1997), and tubers and seeds may drink or suckle and require washing and care as they grow like children (e.g., Arnold 1987; Guzmán 1997; Mowat 1989; Swanson 2009; Uzendoski 2004). Producing plants may also represent females who give birth and subsequently die (e.g., Allen 1988). Third, domesticated plants may also have human emotions. Seeds may have distinct souls, requiring special accommodations when sown and harvested to prevent fighting and hatred (e.g., Gose 1994; Tillman 1997). Manioc and maize may cry if abandoned in the fields or stored alone (e.g., Swanson 2009; Tillman 1997). In addition to intervening to prevent fights, providing companions, and cleansing and caring for crops, humans also administer energizing fluids of fat and blood and placate the earth on behalf of the plants so that it will nurture the plants (e.g., Arnold 1987; Gifford and Hoggarth 1976).

Domesticated animals are also ascribed human characteristics or treated as equals or ancestors. Guinea pigs (*Cavia porcellus*) can assume human characteristics that become a source of mockery of man (Morales 1995). Guinea pigs used in curing rituals mirror humans' ailments and can thus be examined to determine the cause of human sickness (Bastien 1978; Morales 1995). During Sonqueño rituals, llamas (*Llama glama*) and sheep (*Ovis aries*) are "dressed in human clothing to further emphasize the equation of humans and their herds" (Allen 2002:148). Humans and camelids have the same origin and social life and are "governed by the same supernatural forces" (Abercrombie 1998; Gow and Gow 1975:141)[7], such that camelids may be referred to as "our ancestors"

(Bolin 1998:56). During the Inca Inti Raymi ceremonies, llamas and humans were considered equal and could hold the same roles (see MacCormack 1991).

A recurring theme in these diverse examples from across the Andes is the attribution of human-like qualities to plants and animals that are important food staples. Like the conceptualizations of the human body discussed above, the human characteristics of plants and animals include both corporeal and spiritual aspects. Plant parts, though clearly different in form, are analogous to human body parts. Like humans, these plants move, dance, wear clothing, and feel emotions, such as sorrow and hatred. Because of these characteristics, they require special care from humans and/or the earth. They require humans to intervene to prevent fights, to provide them with companions, to gently cleanse and care for them, to administer energizing fluids of fat and blood, and to placate the earth on their behalf so that it will nurture their growth. Fewer examples exist for animals, but they too are ascribed human characteristics or treated as equals.

What becomes apparent through the above review of ethnographic examples is that, throughout the Andes, plants and animals used as food are often considered analogous to humans in physical structure, spirit/soul concepts, emotions, needs, and actions. In several ways, this is similar to the above discussion of the continued influence of the dead and the way their new lives continue to be the same in many aspects as they are in the world of the living. Like plants and animals, the dead are also ascribed emotions and needs and require attention from the living community. Importantly, the human characterization of plants and animals, or of the dead, should not be overemphasized. The above examples do not suggest in any way that these beings are considered completely identical to humans. Many of their actions and emotions are not visible or audible and thus require imagination and creativity in their ascription. Moreover, food is ultimately consumed by humans and thus obviously not entirely equivalent.

Food, Death, and the Socially Connected Andean Environment

The above reviews reveal that, in pre-Columbian Andean ideology, concepts of the body and self are inextricably intertwined in a way very distinct from medicalized, Western worldviews. Furthermore, the simultaneously corporeal and spiritual embodied self does not exist in complete separation from other social beings, but instead influences and is affected by similarly embodied others and the embodied landscape. The dead exhibit many human-like qualities, which are influential in the livelihoods of the living and thus require attention from the living community. Domesticated Andean food sources also share corporeal characteristics, actions, and emotions with humans and require special care from humans, the earth, and/or the ancestors. The inseparability of individuals from one another, their dead, and their environment can be easily glossed over in a Western, individualistic, compartmentalized perspective of the world. Consideration of these similarities and connections is key to understanding the significance of dietary practices and mortuary rituals in Andean social identification processes.

Chapter 3 Notes

[1] Original quotation: “elementos mutuamente constitutivos” (Guzmán 1997:47).

[2] Original quotation: “a la persona no se la concibe como a una unidad totalmente separada de otras personas o de otros seres” (Guzmán 1997:47).

[3] Original quotation: “cualidades espiritualmente nutritivas” (Guzmán 1997:47).

[4] Original quotation: “el maíz, como las otras plantas, es un ser viviente, humanizado” (Moya 1981:81).

[5] Original quotation: “‘El maíz’ . . . ‘mueve sus brazos cuando el viento sopla levemente. Parece una multitud de gente en un cementerio y se asemeja a muchas almas sembradas en ese espacio’” (Moya 1981:82).

[6] Original quotations: “una persona alta, delgada blanca”; “las personas medias gorditas, flaquitas” (Tillman 1997:172).

[7] Original quotation: “están gobernados por los mismos poderes sobrenaturales” (Gow and Gow 1975:141).

Chapter 4

YCHSMA COMMUNITIES

The Ychsma society of the central Peruvian coast serves as an important case study for an examination of community identity formation and internal community diversity. As described in detail below, the Ychsma people have been remarkably understudied, despite the significant and widespread influence of the Ychsma deity, Pachacamac, across the Andean region for over a millennium (Bueno 1982; Eeckhout 2003; Franco 1993; Rostworowski 2002b; Strong and Corbett 1943; Uhle 1991). The present study takes as its focus the Ychsma polity as defined by the archaeological cultural tradition distributed throughout the lower and middle aspects of the Rimac and Lurín Valleys, in the area now occupied by the central municipal districts of Metropolitan Lima. The Ychsma polity is additionally defined in time by the Late Intermediate Period, or the end of the influence of the Wari Empire in the area during approximately the 10th century AD and the beginning of the influence of the Inca Empire in the region towards the end of the 15th century AD (c. 1470 AD) with its adoption of Pachacamac (Rostworowski 2002b; Santillan 1968 [1563]).

Chapter 4 provides the necessary background to situate the current study within its regional and social context. The first section presents an overview of the natural and social settings that constituted the central Peruvian coastal region during the Late Intermediate Period. The natural environment of the region is characterized by extreme diversity produced by its geographical location between the Andean cordillera and the cold Humboldt Current of the Pacific Ocean (Brush 1982; Molina and Little 1981). The resulting diverse microclimates provide similarly diverse resources and opportunities for an assortment of subsistence practices (Pulgar Vidal 1985; Troll 1968). Limited studies of the sociopolitical complexity in the central Peruvian coastal region during the Late Intermediate Period reveal the presence of two contemporaneous cultural traditions, known as the Collique and Chancay to the north of the Ychsma polity (Eeckhout 2004a; Feltham 1984; Krzanowski 1991; Silva 1996). The highland regions adjacent to the central Peruvian coast, in contrast, were typically characterized by low-density settlements dispersed across ecozones (D'Altroy 1992; Parsons et al. 1997).

Following this overview of the natural and social environments of the central Peruvian coast during the Late Intermediate Period, the next section in Chapter 4 reviews in detail the ethnohistoric, archaeological, and bioarchaeological research previously used to understand Ychsma communities, focusing in particular on studies providing information about Ychsma dietary practices and mortuary rituals. Current understanding of Ychsma sociopolitical and economic organization is derived largely from ethnohistoric data (see Eeckhout 2004b), and as a result, Ychsma communities are portrayed as territorially bounded, internally homogenous, and isolated entities (e.g., Cornejo 2000; Cornejo 2004; Eeckhout 2004b; Paredes 2004). Ethnohistoric, archaeological, and bioarchaeological studies of the Ychsma indicate that both dietary practices and mortuary rituals were likely influential in Ychsma identification practices. A review of studies specific to the Surco and Ate *Señoríos* highlights the specific environmental and social contexts particular to the peoples buried at the sites of Armatambo and Rinconada Alta, the focus of the present project. Finally, the research questions of the present study, initially described in Chapter 1 are re-presented with greater detail specific to the Ychsma case study.

The Late Intermediate Period on the Central Peruvian Coast

The Natural Environment

Located in the center of the Central Andean Coast, the central Peruvian coast is defined as the region of coastal river valleys from the Fortaleza Valley south to the Cañete Valley (Figure 4.1; Lumbreras 1974:4). These river valleys run from the Western slopes of the Andean cordillera to Southern Pacific Ocean (Lumbreras 1974; Parsons 1970). The diverse ecological zones that characterize the region are produced by the combined effects of the steep Western Andean mountain slopes and the cold southern Humboldt, or Peruvian Current (Brush 1982; Molina and Little 1981). Over a span of less than 200 km, altitude levels rise abruptly from sea level to between 3500 to 6800 m (Contreras 2010; Molina and Little 1981). Across this drastic altitudinal change exist several distinct microclimates (Pulgar Vidal 1985; Tosi 1960; Troll 1968; Weberbauer 1936). The area of lowest altitudinal zone nearest the Pacific Coast (0 to 500 masl) is an extremely arid desert zone, or *chala* (Pulgar Vidal 1985).

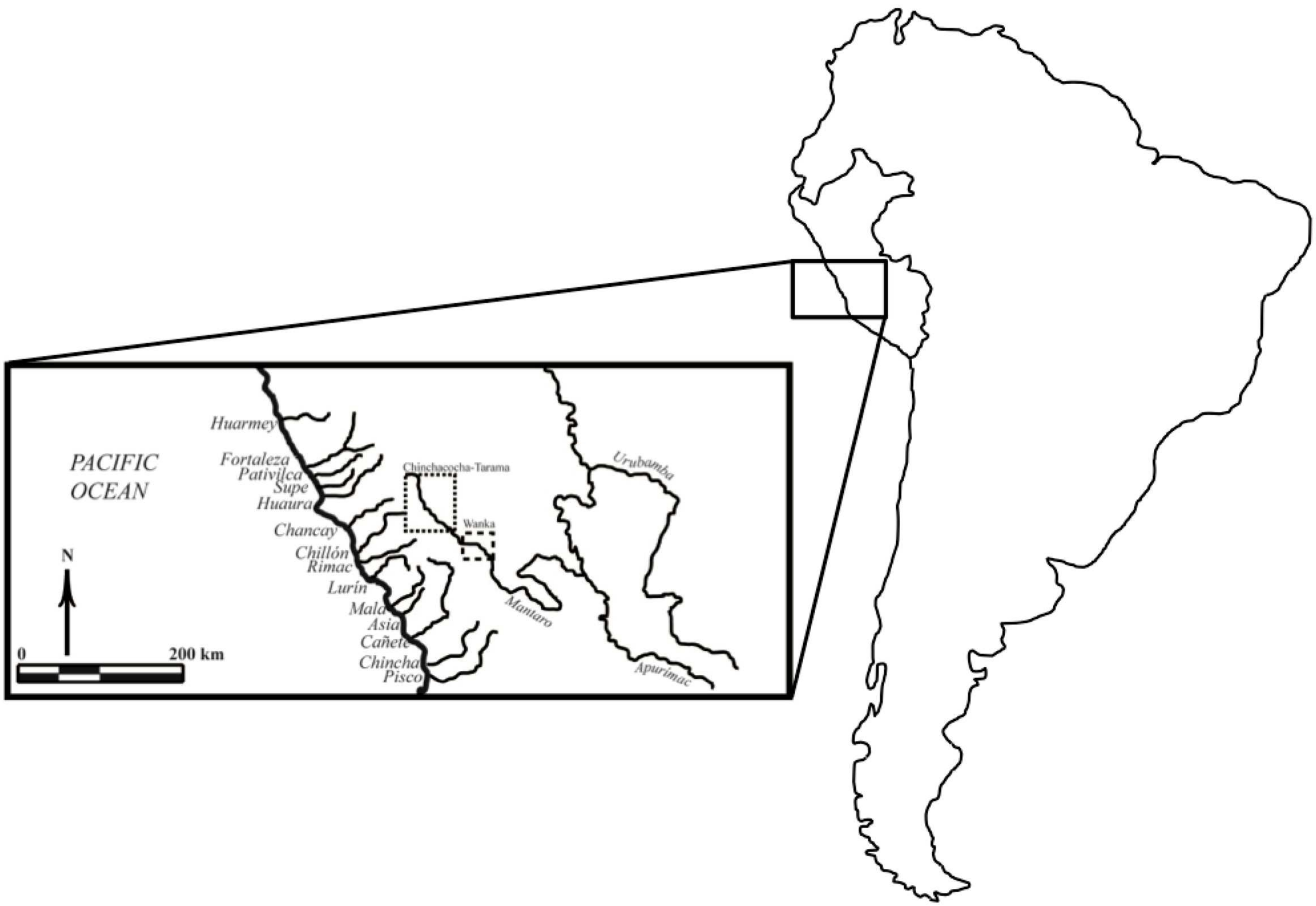
The aridity of this ecozone is maintained by both a rain-shadow effect of the Andean mountain ranges and the low oceanic water temperatures of the Humboldt Current (Hamburg 1932; Molina and Little 1981). Moisture from the southern Atlantic air mass is released at the eastern Andean slopes (Molina and Little 1981). The Humboldt Current brings cold waters horizontally from the south and vertically from the ocean depths produce cold water temperatures along the central Peruvian coast (Hamburg 1932; Molina and Little 1981). Pacific air masses are cooled as they move across the current resulting in stable air temperatures and an overall lack of precipitation (Brush 1982; Hamburg 1932; Molina and Little 1981; Rundel et al. 1991). The cold waters of the

Humboldt Current combined with the introduction of non-endemic marine species during El Niño events discussed below generate a diverse and extremely productive marine ecosystem off the shores of the central Peruvian coast (Marcus et al. 1999; Montecino and Lange 2009; Tarazona and Arntz 2001).

Due to the lack of precipitation in the region, much of the area of coastal desert ecozone has many areas void of vegetation. Areas with vegetation include coastal hills, irrigated river valleys, and freshwater marshes. First, the coastal hills or *lomas*, receive moisture from the frequent presence of ocean fog between 100 to 1000 masl (Oka and Ogawa 1984; Rundel et al. 1991). *Lomas* vegetation includes principally herbaceous, shrubby, and tillandsdia plants which serve as resources for human collection, for wild fauna such as cervids, and for the pasturing of livestock such as camelids (Brush 1982; Feltham 1983; Luteyn and Churchill 2000; Oka and Ogawa 1984). Second, the river systems that cut through the desert zone produce sufficient water for irrigation on alluvial soils enabling cultivation in the wide lower valleys. Rivers also provide freshwater crustaceans (Parsons 1970). Finally, underground drainage from Andean precipitation and glacier melt produces sporadic freshwater marshes, or *pantanos*, along the coastal desert. *Pantanos* vegetation includes important reed species used as animal feed and in the construction of materials, such as fishing boats and baskets (Pulgar Vidal 1985). Fauna associated with the *pantanos* include a variety of waterfowl and freshwater fish.

The mid-altitude ecozone (500 to 2300 masl) of the central Peruvian coast is known as the *yungas* and is characterized by a slightly greater amount of precipitation than the desert *chala* and a more temperate climate (Brush 1982; Pulgar Vidal 1985).

Figure 4.1. Map of central Peru. (Solid lines with italicized names indicate rivers. Dashed boxed indicate highland regions mentioned in the text.)



Areas of alluvial soils in this ecozone are well-suited for irrigation agriculture from the valley river systems (Brush 1982). Fruit trees, cacti, and succulents grow well in this zone (Pulgar Vidal 1985).

Above the *yungas* are high-altitude zones, referred to as the *quechua* (2300-3500 masl) and *suni* (3500-4000 masl) (Pulgar Vidal 1985). These higher ecozones contain the narrow high aspects of the river valley systems and experience greater amounts of precipitation and cooler temperatures. Crops, such as maize, cereals, and tubers, are also typically grown in these ecozones and domesticated guinea pigs are commonly raised in these areas (Pulgar Vidal 1985; Troll 1968).

The *puna*, the highest altitude zone, ranges from 3700 to 5300 masl and is characterized by cold temperatures and an intense rainy season (Pulgar Vidal 1985; Troll 1968). Grasslands provide abundant resources for wild and domesticated camelids (Pulgar Vidal 1985; Troll 1968). Tubers and grains may be grown seasonally and fish and frogs may be harvested from high altitude lakes in the region (Pulgar Vidal 1985).

Regular El Niño events, in which coastal water temperatures increase, bring climatic variation to the central Peruvian coast approximately every seven years (Rundel et al. 1991). Warming of coastal waters brings increased precipitation from Pacific air masses and significant changes to the marine ecosystem. In addition, the central Peruvian coast also lies parallel to the Peru Trench, the boundary between the continental South American tectonic plate and the oceanic Nazca tectonic plate and is a highly seismic region as a result (Dewey and Spence 1979; James 1971). Such activity has produced numerous large historical earthquakes and associated tsunamis (Dorbath et al. 1990).

The Social Environment

In contrast to the horizon periods of pan-Andean sociopolitical and ideological expansion, influence, and/or manipulation, the Late Intermediate Period (c. AD 1000-1470) in the Central Andes was characterized by the presence of numerous smaller polities of varying size and complexity (Covey 2008; Dulanto 2008). During this period, some areas underwent political fragmentation and instability, evident in settlement dispersals (e.g., D'Altroy 1992; Parsons et al. 1997), the construction of defensible structures and/or structures in defensible locations (e.g., Brown Vega 2009; Conlee 2003; D'Altroy 1992), and increased rates of violent trauma (e.g., Torres-Rouff et al. 2005). In other areas, especially along the coast, evidence of political centralization and increased hierarchy is visible in the aggregation of settlements (e.g., Conlee 2003; Herrera 2007) and the construction of monumental architecture (e.g., Eeckhout 2003; Krzanowski 1991; Topic 2003), including elite tomb structures (e.g., Conrad 1980; Eeckhout 2004c; Shimada et al. 2004b). The most extreme forms of complexity developed on the north coast of Peru. To the far north, the Lambayeque (c. AD 900-1400) confederation of polities in adjacent valleys are characterized by clusters of large pyramids, ceremonial in nature, often containing elaborate tombs (Conlee et al. 2004). South of the Lambayeque, lie the Kingdom of Chimor, or the Chimú (c. AD 900-1470), an expansionist empire at the time of Inca arrival (c. 1470), with the massive urban site of Chan Chan as its principal city (Moseley and Cordy-Collins 1990; Moseley and Day 1990). Intensive craft specialization and various forms of monumental architecture, including *ciudadelas* or enclosed high-walled palaces, surrounded by multiple *audencias* or U-shaped administrative structures, are among the characterizing features of the Chimú state (Conlee et al. 2004; Topic 2003).

Archaeological work on the central Peruvian coast and adjacent highlands has been limited, leaving archaeological evidence of Late Intermediate Period occupations in many regions largely unknown (Dulanto 2008). In the central Peruvian highlands, most archaeological work has focused on the Wanka, Tarama, and Chinchapoya areas (Dulanto 2008). Studies of the Wanka society of the Yanamarca and northern Upper Mantaro valleys near Xauxa reveal non-hierarchical, low-density settlements dispersed through various ecozones until the last phase of the Late Intermediate Period (c. AD 1350-1470) when population density increased and settlement became centralized into a smaller number of defensive sites (D'Altroy 1992; Hastorf 1990; Hastorf and Johannessen 1993). Slightly to the north, in the Tarama-Chinchaycocha Region of the northern central highlands, dispersed settlements of herder and cultivator specialists forming distinct moieties in adjacent ecozones were economically and ritually integrated through multi-community storage and mortuary practices (Parsons et al. 1997).

On the central Peruvian coast (Lumbreras 1974), most Late Intermediate Period archaeological research has focused on the valleys surrounding the capital city of Lima, Peru, while numerous archaeological sites in the valleys north of the Huaura Valley and south of the Lurín Valley have received much less attention (Angeles and Pozzi-Escot 2004; Dulanto 2008). The three most well-known coastal cultural traditions--the Chancay of the Huaura and Chancay Valleys, the Collique of the Chillón Valley, and the Ychsma of the Rimac and Lurín Valleys--exhibit increased population density and nucleation of settlements, which contain public monumental architecture and elite residential structures (Eeckhout 2003; Feltham 1984; Krzanowski 1991; Silva 1996). Distribution of ceramic technology and styles among the three regions of these polities suggests limited interaction among them (Silva 1996; Vallejo 2004). Ethnohistoric and archaeological data demonstrate clear evidence of interactions in the middle Chillón Valley between the coastal Collique *Señorío* and the Canta peoples of the adjacent highlands in the form of product exchange, water and land rights management, and warfare (Dillehay 1979; Rostworowski 2004b; Silva 1996). In the Rimac and Lurín Valleys, archaeological and ethnohistorical evidence suggests similar types of interactions may have occurred between the Ychsma of the coastal valleys and the Yauyos polity occupying the adjacent highlands in the Huarochirí province (Feltham 2005; Marcone 2004; Rostworowski 2002c, 2004b; Sánchez 2000).

Previous Research on Ychsma Communities

The Ychsma and Pachacamac

Ychsma[1] was recorded by early Spanish chroniclers as the term used by inhabitants of the Rimac and Lurín Valleys to refer variously to the Lurín Valley, a particular community within the valley, or certain family lineages (Rostworowski 2002b). Archaeologists use the term to refer to the Late Intermediate Period cultural tradition found in the lower and middle Rimac and Lurín Valleys characterized by a particular style of ceramics, public ceremonial structures, and burials, as reviewed below. Late Intermediate Period Ychsma occupation of this region is characterized by nucleated settlements near the coast or in the valleys on the floors of *quebradas*, ravines or gorges adjacent to agricultural lands along the banks of the river (Bonavía 1965; Bueno 1982; Díaz 2004a; Eeckhout 1999a; Feltham 1983, 1984).

Pachacamac, a large ceremonial center located in the lower Lurín Valley, 20 km south of Lima, is the largest Ychsma site and served as an important shrine for over a millennium. Continuous use and construction of monumental architecture at the site began in the Early Intermediate Period (c. 200 BC-AD 500) by the Lima culture, continued under the dominion of the Wari Empire during the Middle Horizon (c. AD 550-900), the Ychsma polity during the Late Intermediate (c. AD 900-1470), and finally the Inca Empire during the Late Horizon (c. AD 1470-1532) until its abandonment shortly after Spanish arrival in 1533 (Bueno 1978a; Eeckhout 2003; Franco 1993; Marcone 2000; Michczyński et al. 2003; Patterson 1985; Segura and Shimada 2010; Strong and Corbett 1943; Takigami et al. 2014; Tello 1940; Uhle 1991). Ethnohistoric and ethnographic legends describe the coastal deity for whom the site was constructed as the creator of the world, humans, and agriculture, god of earthquakes, and lord of the night (Jiménez 1985; Patterson 1985; Rostworowski 2002b). A double-faced wooden stela at the site decorated with plants and animals is interpreted to represent either Pachacamac and his brother, Vichama, the lord of the day (Jiménez 1985; Rostworowski 2002b), or male and female human figures created by the deities (Daggett 1988).

The occupation of the site of Pachacamac by the Ychsma culture during the Late Intermediate Period (c. AD 900-1470) has been the focus of most research on this polity (Bueno 1978a; Eeckhout 1998, 1999a, 1999c, 2003, 2004c, 2004d, 2004e; Franco 2004; Shimada 1991; Shimada et al. 2004a; Takigami et al. 2014). During this period, 15 pyramids with ramps, monumental platform structures joined to large adjacent patios via a ramp, were constructed (Eeckhout 2003; Paredes and Franco 1987; Shimada 1991). These structures have served as the foci of much of the archaeological investigation and debate concerning the Ychsma polity in general and the nature and development of its sociopolitical hierarchy in particular (e.g., Eeckhout 1995, 2000, 2003, 2004c; Franco 2004; Michczyński et al. 2003). Adjoining rooms on the platform of the pyramid commonly exhibit evidence of food consumption and elite domestic activities (Eeckhout 2000, 2003; Michczyński et al. 2003). Hearths and evidence of food processing and cooking are found in the patios adjacent to the pyramids (Eeckhout 2000, 2003). Frequently associated with these pyramidal complexes are high walls with platforms that seem to have been used to guard and restrict entrance (Eeckhout 2003). Adjacent storerooms containing remains of food, cotton, and the production of crafts, such as ceramics and textiles, are also present (Eeckhout 2003; Paredes and Franco 1987). Elite tombs associated with the abandonment of the structures have been found in three excavated pyramids (Eeckhout 2000, 2003). Some suggest that the pyramidal complexes served as religious embassies representing various groups within the Ychsma polity that worshiped Pachacamac (e.g., Bueno 1982; Jiménez 1985). Others propose that the pyramids were palaces of successive Ychsma lords and were constructed consecutively following the death of each leader (e.g., Eeckhout 2003; Michczyński et al. 2003). While both models agree that the pyramids served an economic function, the nature of leadership and regional interactions--religious versus political--is debated (Eeckhout 2004b). The possibility that economic, sociopolitical, and religious hegemony and organization need not have been mutually exclusive (Helms 1993), as other Andean contexts demonstrate (e.g., Earls and Silverblatt 1978; Isbell 1997; Parsons et al. 1997; Spalding 1984), has not yet been addressed.

Recently, researchers have begun to focus survey and excavation beyond the Ychsma monumental architecture of Pachacamac to its funerary contexts (e.g., Eeckhout 2010; Eeckhout and Owens 2008; Takigami et al. 2014) and residential areas (e.g., Shimada et al. 2004a), to secondary sites in other areas of the valleys where smaller versions of the pyramidal complexes are present (e.g., Bueno 1978b; Díaz 2004a; Díaz and Vallejo 2002; Eeckhout 1999a; López-Hurtado 2011; López-Hurtado et al. 2012; Marcone 2004; Marcone and Lopez-Hurtado 2002; Villacorta 2004), and to Ychsma cemeteries outside of Pachacamac (e.g., Díaz 2002, 2004b, 2004c, 2011; Díaz and Guerrero 1997, 1998; Díaz and Vallejo 2002, 2005; Pérez 1997; Ruiz and Guerrero 1996). Through such research, patterns in monumental architectural forms and functions have been established, a ceramic chronology has been proposed, potential trends in funerary rituals have been identified, and important hypotheses regarding Ychsma social organization have been postulated through the combined use of archaeological and ethnohistoric data and models. The subsequent section examines this current understanding of Ychsma social organization in detail. Then, in the next section, architectural, ceramic, and funerary observations are discussed further through an examination of dietary practices and mortuary rituals as potential mechanisms of social identification.

Señoríos *and* Curacazgos*: Portrayals of Ychsma Communities*

Ychsma social organization is currently understood through information and models derived from ethnohistoric documents and accounts recorded after the arrival of the Spanish (c. AD 1533). Through comparisons of ethnohistoric records with archaeological evidence, researchers have sketched an outline of potential sociopolitical relations in the Rimac and Lurín Valleys during the Late Intermediate Period (c. AD 900-1470). The current section reviews these ideas in detail below, highlighting observed gaps that the current study strives to address.

Through extensive research of legal documents, reports, and chronicles recorded on the central Peruvian coast during the sixteenth and seventeenth century Spanish colonial period, Rostworowski (1977, 2002b, 2005b) has developed a hypothetical socioeconomic model for pre-Inca coastal polities, which forms the basis of current understanding of Ychsma social organization. Multiple ethnohistoric records include descriptions of declarations from fisherfolk groups along the central coast, including the Rimac and Lurín Valleys, regarding their occupations. Specifically, the groups indicated that fishing was their sole occupation and stated that they did not own any agricultural lands nor know how to farm (Rostworowski 1977, 2005b). For instance, in the Chincha Valley, fisherfolk only fished for the *señorío* and salted and dried for trade with the highlands (Rostworowski 1977). On the north coast, when a leader of fisherfolk was asked by the *cacicque*, or polity leader, to farm maize to help the population meet the tribute demands of the Inca Empire, he stated that his group did not know how and instead paid tribute in the form of fish (Rostworowski 1977). Similarly, in a litigation in the Lurín Valley, fishers at San Pedro de Quilcay said that they did not own farming land, as their only occupation was fishing (Rostworowski 1977). Because of their lack of fields, the Quilcay fishers were not required to participate in the Spanish colonial rotating forced labor system, or *mita*, at the village of Pachacamac and did not help with agricultural work, instead contributing to a *mita pesquera*, a specialized fishing labor system (Rostworowski 1977, 2002b). Ethnohistoric documents suggest that not only were labor and tasks strictly divided, but that strict endogamy was also practiced. For example, the Quilcay fisherfolk who lived on the beach, not only did not help with agriculture in the valley, but also did not intermarry with agriculturalists (Rostworowski 2002b). Using these and additional examples, Rostworowski (2005b) proposes that central coastal polities, including the Ychsma, were organized into distinct economic specialist groups, structured around the diverse environmental zones of the coastal valleys, namely as fishers and farmers. In this way, the coastal polities are thought to have achieved economic self-sufficiency via product exchange among the specialist groups (Rostworowski 2005b; Sandweiss 1988).

Archaeologists working in the Rimac and Lurín Valleys have combined Rostworowski's model with additional ethnohistoric information specific to Ychsma leaders during the colonial period to draw inferences about Late Intermediate Period settlement patterns and monumental architecture (e.g., Bueno 1982; Cornejo 2000, 2004; Díaz 2004a; Eeckhout 2004b, 2008; Feltham 1983, 1984; Paredes 2004). During the sixteenth century, the larger Ychsma polity, or Ychsma *Señorío,* was comprised of seven smaller *señoríos*. Six *señoríos*--Ate, Surco, Guatca, Lima, Maranga, and La Legua--were present in the Rimac Valley at the time of Spanish arrival and one--also named Ychsma, sometimes called Pachacamac--was present in the Lurín Valley (Table 4.1; Cornejo 2000, 2004; Eeckhout 2004b). Each of the seven Ychsma *señoríos* was further comprised of several factions denominated *curacazgos*, also called *ayllus* or *parcialidades*[2] (e.g., Cornejo 2000; Paredes 2004; Rostworowski 2002b). Each *curacazgo* was associated with its own territory, ceremonial center, and leader, or *curaca*, and was specialized in economic production (Cornejo 2000). For example, within the lower Lurín Valley *señorío*, called Ychsma or Pachacamac, four *curacazgos* are thought to have formed a "sociopolitical mosaic…with defined productive vocations and economic specializations: fisherfolk, agriculturalists, and pastoralists during the Late Intermediate, Inca, and Early Colonial Period" (Cornejo 2000; Paredes 2004:740; Rostworowski 2002b).[3]

Modern toponyms are used to link ethnohistorically described *señoríos* and *curacazgos* with specific sites and districts (Table 4.1; Cornejo 2000, 2004; Eeckhout 2004b). In the Rimac Valley, each of the six *señoríos* is associated with a single capital *curacazgo,* based on the overall size and presence of monumental architecture at its principal associated archaeological site which shares the *curacazgo* name (Table 4.1; Cornejo 2004; Eeckhout 2004b). Smaller associated *curacazgos* are associated with most Rimac Valley *señoríos* and are comprised of one or multiple archaeological sites (e.g., Cornejo 2004). In the Lurín Valley, four principal *curacazgos*, also referred to as *ayllus*, of approximately the same scale as the Rimac Valley *señoríos*, are associated with a single *señorío*, the Ychsma *Señorío*, and the large ceremonial center Pachacamac, discussed above (Table 4.1; Cornejo 2000; Eeckhout 2004b). Each of the principal *curacazgos* of the Lurín Valley is associated with an archaeologically-recognized capital site (Table 4.1; Cornejo 2000; Eeckhout 2004b). Additional nearby sites are proposed to be associated with the capital *curacazgo* (Table 4.1; Cornejo 2000; Eeckhout 2004b).

Seven additional *curacazgos*--Anzapuquio, Lurigancho, Huachipa, Cajamarquilla, Caraponga, Ñaña, and Pueblo Viejo de Bellavista--located on the north bank of the lower and middle Rimac Valley and proposed to have been associated with Pachacamac and the Ychsma during the Late Intermediate Period and conquered by the highland Yauyos polity, the Chacalla, during the Late Horizon (Cornejo 1999, 2000), have been largely excluded from discussions of Ychsma sociopolitical organization (e.g., Cornejo 2004; Eeckhout 2004b). Similarly, ethnohistorically documented *señoríos* and *curacazgos* on the south middle Rimac Valley--and entire middle Lurín Valley also are not included in discussions of Ychsma sociopolitical organization (e.g., Cornejo 2004; Eeckhout 2004b), likely because these areas are thought to have been taken over by highland Yauyos polities, the Picoy and Yaucha, during the Late Horizon, thus making the projection of ethnohistoric data onto the Late Intermediate Period in these areas more complex (Cornejo 1999, 2000; Espinoza 1984; Rostworowski 2002a, 2002b; Salomon and Grosboll 2011; Salomon and Urioste 1991 [c. 1600]).

The above ethnohistoric models of Ychsma socioeconomic and sociopolitical organization provide important hypotheses that require further empirical archaeological and bioarchaeological investigation to understand the realities and complexities of Ychsma social interactions and relationships. In coastal valleys to the south, for instance, archaeological and bioarchaeological evidence of economic specialization and trade among fisher, agriculturalist, and/or pastoralist communities has been demonstrated (e.g., Marcus et al. 1999; Sandweiss 1988; Tomczak 2003). However, these studies reveal that ethnohistoric records present an idealized picture of the economic specialization and boundedness of these groups that does not correspond to actual practices. For example, economic specialist groups were not always reproductively isolated (e.g., Lozada 1998; Lozada and Buikstra 2005; Sutter 2005), and specialization did not restrict fisherfolk from planting some particular crops (e.g., Sandweiss 1988). Ethnohistoric models of social organization developed for contemporaneous communities in the adjacent Huarochirí highlands posit that each community obtained access to diverse resources via direct colonization rather than specialization and exchange of products (Murra 1972; Spalding 1984).

Much archaeological research on Ychsma sociopolitical and socioeconomic organization has focused on Ychsma elite strategies and the development of social hierarchy (e.g., Bueno 1978a; Bueno 1982; Eeckhout 2000, 2003, 2004c, 2008; Franco 2004; López-Hurtado 2011; Villacorta 2004). Comparative analyses of Ychsma monumental architectural forms and activities carried out in and around these structures provide important information about elite leadership strategies and practices (Eeckhout 1999a, 2000, 2003, 2004b, 2004c, 2004d, 2005, 2008; Eeckhout and Owens 2008; Farfán 2004; Franco 2004; López-Hurtado 2011; Villacorta 2004). An additionally popular line of research has focused on regional interactions during the Late Intermediate Period, particularly in the middle Lurín Valley between the Ychsma and the highland Yauyos. Analyses of settlement, architectural, and ceramic data in this area have led to an ongoing debate regarding the location and nature of these interactions (e.g., Cornejo 1995; Feltham 1984, 2005; Macneish et al. 1975; Marcone 2004; Marcone and Lopez-Hurtado 2002). Others work towards defining archaeologically the extent and nature of the Ychsma territory (Díaz 2008, 2011). The current study aims to complement these investigations through an examination of the social construction of Ychsma communities and the impact of the social diversity on these processes. The focus of the study is placed specifically on understanding the social lives of Ychsma common people and interactions within and between local Ychsma communities. This research investigates dietary practices and mortuary rituals as potential social mechanisms of identification based on previous archaeological evidence that suggests these practices were critical social and ideological aspects of Ychsma life as reviewed below.

Ychsma Dietary Practices and Mortuary Rituals as Social Mechanisms of Identification

Previous ethnohistoric and archaeological research suggests that dietary practices and mortuary rituals were likely salient social mechanisms of identification in the Ychsma polity. As with other Andean regions today described in Chapter 3, food and death are frequently integrated in Ychsma ethnohistory and archaeology. Thus, while this section first examines food and diet and then examines mortuary rituals, some overlap between these topics is unavoidable. Instead of drawing on ethnography as in Chapter 3, ethnohistoric and archaeological examples are the focus of this review due to their specific relevance to the Ychsma case study.

Table 4.1. Ychsma *señoríos* and *curacazgos (After Cornejo 2004; Eeckhout 2004b).*

Valley	***Señoríos***	**Capital *Curacazgo***	**Associated *curacazgos* or settlements**
Rimac Valley	Ate (Latí, Latim)	Puruchuco	Los Incas
	Guatca	Limatambo	Cacaguasi, Santa Cruz
	La Legua (Guala)	Paredones	
	Lima	Magdalena	Lima
	Maranga	Maranga	Mateo Salado
	Surco	Armatambo	Perales, La Calera
Lurín Valley	Ychsma	Ychsma (Pachacamac)	Puente Lurín, Las Palmas, Lomas Atocongo
		Manchay (Pampa de Flores)	Quebrada Golondrina, Tambo Inga
		Quilcay (Playas San Pedro-Mamaconas)	San Pedro de Quilcay, Mamaconas
		Caringa (Pueblo Viejo-Pucará)	Lomas Caringa, Pampa Pacta, Quebrada Malanche, Lomas de Lúcumo, Manzo

The diversity of resource zones in the Rimac and Lurín Valleys and the potential economic specialization of Ychsma communities or *curacazgos* predicted by the ethnohistoric models described above serve as primary evidence for the potential importance of food and eating in Ychsma social identity construction. Additional ethnohistoric examples further suggest the symbolic importance of food. For instance, according to multiple widespread ethnohistoric and ethnographic narratives, crops were created by Pachacamac, the coastal Ychsma deity, from the body parts of his human half-brother whom he killed out of jealousy (Rostworowski 2002b). Pachacamac sowed the child's body parts into the earth to prevent humans from complaining about the scarcity of food to the Sun. The teeth became maize, the ribs and bones became tubers, and the flesh became fruits (Rostworowski 2002b).

A second ethnohistoric example comes from the *Huarochirí Manuscript* narratives written by adjacent highland Yauyos peoples (Salomon and Urioste 1991 [c. 1600]). In the narratives, the coastal populations are referred to as *Yunca* (a general term for coast valley inhabitants), but direct references to sites in the lower and middle Rimac and Lurín Valleys connects them to the Ychsma. The highland narrators describe themselves as Yunca (Salomon and Urioste 1991 [c. 1600]). Although their ancestors came from the Yauyos province to the west, they became Yunca by defeating the previous Yunca (or Ychsma) inhabitants and incorporating their religious shrines (*huacas*) as their own (Salomon and Urioste 1991 [c. 1600]). "Yauyo" and "potato-eater" (*wak'cha*) are used in the manuscript as derogatory terms to refer to recent immigrants or poor highlanders suggesting a direct link between food and identity (Salomon 1991:7; Spalding 1984:53,57).

Archaeological contexts also provide evidence that food and eating were symbolically important. Analyses of the different functions of Ychsma architectural types reveal that feasting dominates public activities at ceremonial centers (Eeckhout 2003). Processing, preparing, and consuming food were among the major activities carried out at Ychsma pyramidal complexes (Eeckhout 2003; Franco 2004; López-Hurtado 2011).

Food species are additionally represented in many of limited instances of Ychsma iconography. Ychsma ceramic decorations are generally simple and include stamping, stippling, incising, and appliqué techniques, as well as cream, black and, less frequently, red or white paint (Feltham 1983; Feltham and Eeckhout 2004; Vallejo 2004). Sculptured vessels or vessels with small models or appliqués of anthropomorphic, zoomorphic or phytomorphic figures attached may include depictions of vegetables, fish, birds, snakes, and mammals (Bueno 1978a; Cornejo 2004; Feltham 1983; Feltham and Eeckhout 2004; Vallejo 2004). Non-ceramic decorations include painted, stamped, or woven designs of fish, birds, and felines on textiles, wooden plates shaped like fish or birds, and wall paintings of fish and maize plants (Díaz 2004a; Hyslop and Mujica 1993).

In addition, food products and subsistence-related objects are regular inclusions in Ychsma burials (Cornejo 1999; Díaz and Vallejo 2005; Fleming 1986). Examples of food products in Ychsma burials include corn, peanuts, beans, *pacae* and avocado leaves, fish, camelids, guinea pigs, and shellfish (Díaz 2002, 2004b, 2004c; Díaz and Vallejo 2005; Fleming 1986; Pérez 1997). Food production-related products in burials include fishing nets, weaving tools, and agricultural implements (Cornejo 2004; Díaz 2002, 2004b, 2004c; Díaz and Vallejo 2005; Fleming 1986).

Various aspects of Ychsma mortuary contexts suggest that mortuary rituals themselves also may have been used in identity formation. Ychsma burials reflect an elaborate process with many potentially visible stages and manipulable variables, including burial location, grave construction, body treatment, and types and numbers of grave goods. In general, Ychsma burials are described as containing either one or multiple individuals, each usually in a seated flexed position, inside a bundle constructed from textile wrappings and a plant material fill, sometimes completed with a false head made of wood or stuffed textiles and attached externally to the superior aspect of the bundle containing the skeleton (Díaz 2004a; Díaz and Vallejo 2002, 2005; Guerrero 2004). Bundles are placed into a simple, typically unlined cist tomb and artifacts, including ceramics, occupational tools, and food items, are situated to the front and sides of the individual (Corbacho 1971; Díaz and Vallejo 2005; Guerrero 2004; Machacuay and Aramburú 1998).

Variation in Ychsma funerary patterns has been proposed to correspond to the Ychsma ceramic chronological phases, but this hypothesis has not yet been empirically tested (Díaz and Vallejo 2005). Briefly, Ychsma ceramics are categorized into three chronological periods--Early, Middle, and Late Ychsma--each subsequently divided into two sub-phases--Phase A and Phase B (Díaz and Vallejo 2002, 2005; Feltham and Eeckhout 2004; Vallejo 2004). Early Ychsma ceramics represent a transition from those of the previous phase, Middle Horizon 4 (Guerrero 2004; Vallejo 2004). Decorations become less elaborate, colors more restricted, and finishing techniques simpler (Vallejo 2004). In the Middle Ychsma phase, vessel shapes also become simpler. Prior to Inca influence in vessel types, morphological details, painted designs, appliquéd figurines, and paste inclusions during Late Ychsma Phase B (Feltham and Eeckhout 2004; Vallejo 2004), the diversity of decoration and vessel types increase in Middle Ychsma Phase B and large changes in vessel materials and morphological details and in firing techniques occur in Late Ychsma Phase A (Díaz and Vallejo 2002; Feltham and Eeckhout 2004; Vallejo 2004). However, in all Late Intermediate Period Ychsma phases, undecorated forms are most abundant and decorations less elaborate than in the preceding and subsequent horizon periods (Feltham and Eeckhout 2004; Guerrero 2004; Vallejo 2004).

Díaz and Vallejo (2005) propose that, like Early Ychsma ceramics, Early Ychsma burial styles were somewhat similar to the last phases of the Middle Horizon during which time bodies were flexed and wrapped into bundles and placed into simple cists. Early Ychsma burials typically contain a single seated, flexed individual in a bundle formed from textile wrappings and vegetal fiber filling with a false head formed by a cloth filled with cotton or cattails and with detailed facial features. Burial structures, located in communal areas near buildings, consist of a simple circular cist in the natural earth sometimes with a wooden frame and basic roof. Inclusions were placed in a semicircle around the front of the bundle and include occupational tools (Díaz and Vallejo 2005). Middle Ychsma burial styles are suggested to be similar to Early Ychsma burials except that Middle Ychsma bundles were supported by cane frames and set on top of a circular gourd to catch fluids. Small metal objects are placed at various parts of the body including within the orbits, and faces are occasionally painted with cinnabar. Inclusions are proposed to have become more numerous, but with little evidence of social hierarchical differences present (Díaz and Vallejo 2005). Late Ychsma Phase A burials are proposed to be similar to those of earlier phases except for bundle construction. Late

Ychsma bundles are hypothesized to have been filled with unseeded cotton rather than vegetal fiber, and wrapped with more textiles and surrounded by a rope net, except for the area of the face. In addition, fewer inclusions are said to have been present (Díaz and Vallejo 2005).

Late Ychsma Phase B burials are those associated with Inca materials and influence. Burials in this phase were placed within earlier architectural features and built with reused construction materials in the form of adobe lined cists or multi-chambered structures. Bundles are more elaborately constructed with a greater amount of cotton and textile fill, more complex textile wrappings, and bodies more complexly processed and preserved. Inclusions include Inca artifacts, occupational tools, Spondylus, foreign style adornments, and *quipus*. Hierarchical differences in elaboration of tomb structure, bundle and body treatment, and inclusions are clear (Díaz and Vallejo 2005).

In addition to potential diachronic changes in funerary traditions, different forms of body treatment, grave goods, funerary litters, and burial structures and locations may also reflect use of the burial context to signify or manipulate social, religious, and/or occupational group membership. Rather than attempting to classify burials into types, the present study examines the potential use of mortuary rituals in social identification by investigating each aspect of the burial independently. To reduce the potential confounding factor of chronological differences, this study focuses on Middle and Late Ychsma A phase burials.

***The Surco and Ate* Señoríos**

To investigate the use of dietary practices and mortuary rituals in community and individual identity construction, the present study examines burials recovered from two

Ychsma sites in the Rimac Valley, Armatambo and Rinconada Alta. These sites are chosen for their locations in adjacent yet distinct ecozones associated with two different *señoríos*, Surco and Ate, each associated with different economic specializations.

Armatambo is situated less than one kilometer from the Pacific Ocean shore in the Chorrillos district of present-day Lima, Peru. During the eighteenth century, Chorrillos formed one of the two principal locations for indigenous fishing practices in the Lima area, the second being the opposite point of the Lima Bay at Maranga (Rostworowski 2004a). In sixteenth-century ethnohistoric documents, the Spanish refer to Armatambo inhabitants as fisherfolk who formed part of the Surco (or Sulco) *Señorío* (Cornejo 2004; Rostworowski 2005a). The area associated with Surco district spanned the length of the Surco Canal from the Rimac River to the Pacific Coast (Cornejo 1999). During colonial times, the Surco population was divided into multiple *parcialidades* or *barrios*, associated with particular aspects of the Surco canal system (Rostworowski 2002c). According to Cornejo (1999), during the Late Horizon, the Surco *Señorío* was comprised three *curacazgos*, or sub-districts--El Pino, La Calera, and Armatambo--each constituted by multiple sites. Armatambo, located nearest the ocean, was the principal *curacazgo* (Cornejo 1999, 2004; Eeckhout 2004b). Armatambo was home to *Sulcovilca*, a principal Ychsma *huaca*, or idol embodied in a large rock near the ocean (Cornejo 1999; Duviols 1967).

The archaeological site of Armatambo is located on the western slopes of the Morro Solar, a large bluff overlooking the Herradura and Chira beaches (Díaz 2004a). This location offered protection from ocean winds and fog and access to arable lands at the ends of the Surco canal system and to adjacent freshwater marshes to the south (Díaz

2004a). The site of Armatambo has witnessed a long history of destruction, beginning with looting during the early colonial period and continuing in recent years with the urban growth of Lima (Díaz 2004b, 2004c; Hyslop and Mujica 1993; Pérez 1997). Earliest recorded excavations at Armatambo were conducted in 1892 by Aldolph Bandelier of Switzerland (Hyslop and Mujica 1993). Bandelier estimated the site to cover an area of 124 acres comprised of one large and one small group of adobe structures, both including monumental and residential architecture, plazas, terraces, and tombs located behind the settlement along the slopes of the Morro Solar (Hyslop and Mujica 1993). Bandelier's excavations recovered several Ychsma-style burials and textile, feather, wooden, and ceramic artifacts with limited associated provenience information (Hyslop and Mujica 1993). Recent salvage excavations in response to threatened site destruction associated with rapid urban growth have rescued hundreds of additional Ychsma burials (Díaz 2004b, 2004c; Pérez 1997). Archaeological evidence indicates that Armatambo continued to serve an important site following the arrival of Inca imperial influence in the region. Tello (1999:30) identified Armatambo as an important *tampu* (Arma-tampu), or *tambo*, a place for travelers to rest along the Inca road system. Recent excavations confirm Inca occupation of the site (Díaz and Vallejo 2002; Hyslop and Mujica 1993).

Rinconada Alta, also referred to as La Rinconada, is located approximately 15 kilometers inland from Armatambo in the district of La Molina in present-day Lima. Ethnohistoric documents place Rinconada Alta in the Ate *Señorío*, also called Latí, Latim, or Late, which controlled adjacent lands to the east of the Surco *Señorío* during periods of Inca and Spanish control (Cornejo 1999; Díaz and Vallejo 2005). The Ate *Señorío* is ethnohistorically linked to the Ate or Latí Canal (Cornejo 1999:176;

Rostworowski 2002c:223-224). During the colonial period, the Ate Canal served as one of the principal canals in the lower Rimac Valley for the irrigation of adjacent agricultural fields (Díaz 2002; Rostworowski 2002c). Records from the early Spanish colonial period state that immigrants from the adjacent highlands sought agricultural lands in the Ate District, though it remains unknown whether such immigrants were present in the area during the Late Intermediate Period (Rostworowski 2004b).

Within the Ate *Señorío*, Cornejo (1999:178) identifies two sub-districts--Puruchuco and Los Inkas--based on distributions of architectural structures. Based on the presence of monumental architecture, the site of Puruchuco, located at Cerro Huaquerones, is proposed as the capital of the Puruchuco *Curacazgo*, and the site of Los Inkas, located to the southwest at the ends of the canal system is proposed as the capital of the Los Inkas *Curacazgo* (Cornejo 1999). Rinconada Alta is located within the latter Los Inkas *Curacazgo* (Cornejo 1999).

The site of Rinconada Alta is comprised of a large cemetery located on the southwestern slopes of Cerro Puruchuco. Rough estimates place the original number of burials at the location in the thousands (Guerrero n.d.). Like Armatambo, the archaeological site of Rinconada Alta has experienced a long history of destruction since the arrival of the Spanish due to its location within the city of Lima. During the colonial period, many burials were looted by the Spanish in search of gold or silver artifacts (Díaz 2002). Destruction has continued into modern times with the encroachment of urban development (Díaz 2002; Guerrero n.d.).

Rinconada Alta has also witnessed a long history of archaeological work, the majority of which has been lost due to misplacement of records and/or recovered materials (Díaz 2002; Marsteller, personal observation, 2012). In earliest recorded studies of the site, Tello (1999:51) associates Rinconada Alta and the Ate region with Armatambo and the Surco region, linking them together under the domain of his *Walla-marka* grouping. Multiple salvage excavations prior to urban development projects between the 1950s and 1970s reportedly recovered approximately 400 burials, the records and materials from which are currently misplaced (Casafranca 1959; Díaz 2002). Excavations in the 1990s by Guerrero and colleagues (Díaz and Guerrero 1997, 1998; Guerrero 1996-1998, n.d.; Guerrero et al. 1999; Ruiz and Guerrero 1996) recovered hundreds of burials, many of which are currently housed at the Museo Nacional de Antropología, Arqueología, e Historia del Perú in Lima. The majority of ceramic, textile, and metal artifacts recovered during these excavations belong to the local central coast tradition (Frame et al. 2004; Guerrero 1996-1998). However, the presence of some foreign materials, including Inca material remains, combined with the lack of an established Ychsma ceramic chronology at the time, led to hypotheses that the cemetery was associated primarily with the Late Horizon Period (AD 1470-1532) (Frame et al. 2004; Guerrero n.d.; Salter-Pedersen 2011; Vetter 2011). Recent excavations and re-examination of original field notes from the 1990s excavations indicate that the majority of burials contain Ychsma artifacts from pre-Inca periods (Díaz 2002; Guerrero 1996-1998). Suggestions that the site may have later functioned as a ceramic or silver production center during the Late Horizon remain unconfirmed (Frame et al. 2004; Guerrero n.d.; Salter-Pedersen 2011; Vetter 2011).

Research Questions

To empirically investigate how Ychsma communities were formed, the current project examines several important aspects of community identity construction through analyses of the dietary practices and mortuary treatments of individuals buried at Armatambo and Rinconada Alta, ethnohistorically linked with fishing and agricultural specialists, as discussed above. Research questions that address three specific features of community identity are investigated. First, do socially created community boundaries align with or transcend geographical boundaries? In other words, do patterns in Ychsma dietary practices and/or mortuary rituals correspond with burial location at each site? Second, were diverse and competing discourses present in the social construction of community identity? Specifically, do Ychsma dietary practices and/or mortuary treatments reflect different ways of symbolizing community identity that vary with individual characteristics such as sex, age at death, or geographic origins? Finally, were community boundaries penetrable, allowing outsiders to join Ychsma communities or allowing certain individuals to change group membership? Particularly, did some individuals change their dietary practices or geographic residence during their life course? Did such individuals receive different mortuary treatments? These research questions are discussed in further detail below.

First, the current research examines the correspondence between geographic space and social practices used to mark group affiliation. As discussed in Chapter 2, many archaeological studies of community construction emphasize the importance of place as the context for the social practices and interactions individuals use to create group identity (e.g., Hegmon 2002; Knapp 2003; Kolb and Snead 1997; Varien and Potter

2008b). Others note that frequent co-presence, not necessarily co-residence, is required for social interactions, and that community boundaries may consequently cross geographic ones (e.g., Goldstein 2000; Isbell 2000; Preucel 2000; Yaeger and Canuto 2000). As discussed in the previous sections of Chapter 4, current ethnohistoric models link Ychsma communities with archaeological sites and community boundaries with territorial boundaries associated with economic specialization and resource exchange (Cornejo 2000; Paredes 2004; Rostworowski 2002b). As mentioned above, ethnohistoric models of social organization developed for contemporaneous communities in the adjacent Huarochirí highlands, in contrast, posit that each community obtained access to diverse resources in noncontiguous lands via direct colonization (Murra 1972; Spalding 1984).

To assess whether Ychsma community boundaries corresponded to geographic boundaries, the present study considers the degree to which differences in dietary practices and mortuary rituals at Armatambo and Rinconada Alta correlate with or crosscut spatial boundaries. Specifically, large-scale trends in diet and mortuary treatment are analyzed in relation to burial location at each site. Interpretation of large-scale trends in dietary practices as mechanisms of social identification at Armatambo and Rinconada Alta requires consideration of potential constraints to dietary choices. Distance from or lack of rights to a particular production zone may have limited access to certain resources. Exchange of products would have been nutritionally beneficial, however, if communities specialized in marine or agricultural subsistence strategies (Reitz et al. 2010). Evidence for similar dietary practices across individuals buried at Armatambo and Rinconada Alta, specifically similar consumption of diverse marine and terrestrial plant and animal resources, may thus reflect access to both types of resources, attained either via direct control over multiple resource areas or via exchange among specialist communities. Similarly, evidence of different dietary practices according to burial location at each site may represent a lack of access to certain resource zones and minimal trade relationships between groups inhabiting each area. Different patterns of diet between the two sites may also represent the intentional use of dietary practices to communicate group differences through this embodied symbolic practice. Evidence of distinct dietary practices within each site may indicate a division of resource areas adjacent to the site and minimal resource exchange. Or, differences in diet within a site may reflect the intentional use of dietary practices to communicate group differentiation, either among intra-community subgroups of a single community at one site and its surrounding area or among multiple communities co-habiting a shared area.

Interpreting large-scale trends in mortuary treatments at Armatambo and Rinconada Alta requires consideration of the complex nature of mortuary rituals. Similarities in burial contexts across the two sites may reflect shared religious beliefs, such as those related to the Ychsma deity, Pachacamac. Such similarities in burial treatment may be indistinguishable from shared aspects of mortuary rituals employed to communicate stable social relationships or reinforce tenuous idealized relationships. Evidence of differential mortuary treatment according to burial location at each site may indicate the use of certain aspects of mortuary rituals to communicate differences among spatially separated groups. Importantly, different mortuary treatments between groups may relate to religious, occupational, and/or social differences. Evidence of distinct groups of mortuary treatments within each site may similarly reflect the use of mortuary rituals to communicate differences among groups within a shared space. Evidence of distinct burial treatments within Armatambo or within Rinconada Alta might reflect internal community subgroup differentiation or the presence of multiple communities at a single site.

The second question addressed in this project concerns the nature and influence of community diversity in the construction of communities. Scholars have long noted that community boundaries are differentially interpreted and enacted by the diverse individuals that comprise the community (Cohen 1985; Isbell 2000). Without evidence of social practices measureable at the level of the individual or subgroup, however, such intra-community heterogeneity in community construction is obscured in the archaeological record (e.g., Allison 2008). Ychsma studies, as described above, have previously emphasized data from ethnohistory and excavations of monumental architecture to understand Ychsma social organization, leading to a broad understanding of Ychsma community formation biased towards the elite (e.g., Eeckhout 2003, 2008).

To assess the internal diversity involved in the creation of Ychsma community boundaries, and especially the role of Ychsma commoners in community formation, the current study examines heterogeneity within large-scale trends in dietary practices and mortuary rituals. Specifically, variation in diet and mortuary treatment according to individual characteristics such as biological sex, age at death, and geographic origins is assessed. Patterns corresponding to individual characteristics that crosscut larger community trends are likely to represent age and gender identities within the larger Ychsma polity and are interpreted accordingly.

Finally, the third aspect of social community construction addressed in the present project is the potential incorporation of outsiders into Ychsma communities. Socially constructed community boundaries are not impenetrable to outsiders (Isbell 2000). Individuals may change their group membership by aligning their social practices with those used to define the community (e.g., Barth 1969; Belote and Belote 1984; Galaty 1986). Conversely, immigrant individuals or groups who maintain the social practices of their home community may not become full members of the community in which they newly reside (e.g., Belote and Belote 1984). As discussed above, the nature and extent of interactions among Ychsma communities and between the Ychsma and adjacent polities remain a topic of much discussion and debate (e.g., Cornejo 1995; Cornejo 2004; Díaz 2008; Eeckhout 2004b; Feltham 2005; Macneish et al. 1975; Marcone 2004; Paredes 2004; Sánchez 2000). Ethnohistoric evidence provides examples of exchange of individuals via intermarriage, adoption, or individual pursuits of increased economic positions (e.g., Spalding 1984).

To investigate the potential integration of outside individuals into Ychsma communities, the current study examines changes in dietary practices and residential location over the life course and compares observed patterns with mortuary treatments to assess how outsiders were treated in death. Changes in diet and residence are assessed using isotopic indicators of archaeological human tissues that form at different life stages: tooth enamel, bone, and hair. These data are used to infer whether some individuals changed their dietary practices in conjunction with changes in residence, or, alternatively, maintained dietary practices despite changed residence. Although changes in diet with changed residence may represent changes in access to food resources rather than changes in social affiliation, evidence of maintained dietary practices despite changed residence likely indicates maintenance of non-local social ties.

Chapter 4 Notes

[1] Alternative spellings include *Ychma, Isma, Yxma, Izma, Irma, Ichma, Ischma,* and *Ichimay* (Bueno 1978a; Cornejo 2000; Espinoza 1964; Rostworowski 2002b). The meaning of the word is associated with the color vermilion and the practice of painting the face. Late Intermediate Period Ychsma mummies frequently have red-painted faces (Díaz and Vallejo 2005).

[2] These terms are frequently used interchangeably with one another and a variety of other social organizational terms, including family, lineage, nation, clan, tribe (see Espinoza 1981 for a review of the usage of this term). Because *ayllu* is often used to refer to multi-scalar kinship groups (see Espinoza 1981; Isbell 1997; Spalding 1984), I refrain from using it in this particular context. The Spanish used the term *parcialidades* in reference to *ayllus* that were subdivisions of a larger polity (Espinoza 1981: 112). *Parcialidades* are frequently described as economically specialized ethnic groups associated with a particular territory (Rostworowski 2004a). *Curacazgo* is used in reference to the group and territory under the dominion of a *curaca* (Rostworowski 2002c; Spalding 1984). Since *curaca* (also spelled *kuraka*) and *curacazgo* derive from Quechua and are used most frequently by archaeologists studying the Ychsma (e.g., Cornejo 2000; Eeckhout 2004a), I employ these here as well.

[3] Original quotation: "mosaico sociopolítico...con definidas vocaciones productivas y especializaciones económicas: pescadores, agricultores y pastores durante el Período Intermedio Tardío, Inca y Colonial Temprano" (Paredes 2004:740).

Chapter 5

DEFINING THE STUDY SAMPLE

Osteological and Mortuary Contextual Data Sample

To define the total sample of archaeological human remains and associated mortuary contexts from Armatambo and Rinconada Alta for inclusion in the current study, all physical anthropological collections from the two sites were inventoried by the author and cross-referenced with final excavation reports on file at the Peruvian Ministerio de Cultura, formerly the Instituto Nacional de Cultura (Appendix A; Díaz 2002, 2004b, 2004c; Díaz and Guerrero 1997, 1998; Guerrero et al. 1999; Pérez 1997; Ruiz and Guerrero 1996). The physical anthropological collections observed are currently housed at the Museo Nacional de Antropología, Arqueología e Historia del Perú located in Pueblo Libre, Lima, Peru, and the associated Annex 1 storage facility located in La Victoria, Lima, Peru.[1]

Appendix A presents an inventory of approximately 900 skeletons, mummy bundles, or skeletal remains from commingled contexts observed as present in the collections at these two locations. Each individual is assigned a code corresponding to its provenience information, including cemetery site, excavation project, site sector, and burial context.[2] This inventory was created for the purposes of selecting an appropriate study sample of individuals from intact mortuary contexts with skeletal remains observable for osteological analysis and/or bone, tooth enamel or hair observable for biogeochemical analyses. For this reason, information collected focused on location within the physical anthropology collections and general observations regarding preservation status of observable remains. Intact mummy bundles (*fardos*) were recorded as present but were not examined as part of the present study. Detailed descriptions of the preservation status of mummy bundles previously conducted by museum personnel are on file at the Museo Nacional de Antropología, Arqueología e Historia del Perú.

From the complete inventory shown in Appendix A, 276 individuals, including 168 individuals from Armatambo and 108 individuals from Rinconada Alta, presented at least some skeletal elements observable for osteological analysis and/or biogeochemical sampling as well as associated archaeological data indicating recovery from an intact mortuary context. Given rough estimates placing the original number of burials at Rinconada Alta in the thousands (Guerrero n.d.), the study samples may represent only 5-10% of the total burial populations at each site. Unfortunately, due to the history of large-scale destruction witnessed by each site, more accurate estimates of the percentage of the total burial populations represented by these study samples are not possible. The final total sample of individuals presented in Appendix B served as the focus of the osteological and mortuary contextual analyses for the present study. A subsample of individuals was drawn from this total sample for biogeochemical analysis as described below.

Estimating Age at Death

Age at death estimates are given in Appendix B and were assigned by combining information from dental development and eruption, epiphyseal fusion, bone size, cranial suture closure, and degeneration of the pubic symphysis and auricular surfaces of the os coxae. To assess age at death for juveniles, dental development and eruption, epiphyseal fusion, and bone measurements were scored and compared (Baker et al. 2005; Bass 2005; Buikstra and Ubelaker 1994; Hillson 1996). For young juvenile skeletons that had not yet begun to fuse, dental development and eruption scores were relied upon in estimates of age at death (Buikstra and Ubelaker 1994; Hillson 1996; Moorees et al. 1963a, 1963b; Ubelaker 1989). In rare instances in which dentition was unobservable for young juveniles, femur length was used to estimate age at death (Bass 2005; Stewart 1968). Femur length measurements were compared to those from populations with known ages at death and to individuals within the study sample with estimates of age at death based on dental observations (Bass 2005; Stewart 1968). For older juveniles and adolescents, dental development and eruption and epiphyseal fusion scores were relied upon for age at death estimates (Baker et al. 2005; Buikstra and Ubelaker 1994; Moorees et al. 1963a, 1963b; Ubelaker 1989). Juveniles and adolescents were assigned one of the following standard osteological age categories: Fetal (*in utero*), Infant (birth to 3.9 years), Child (4-14 years), Adolescent (15-19 years) (Appendix B; Buikstra and Ubelaker 1994).

Adult age at death estimates were assessed using information from os coxal joint degeneration, cranial sutural closure, and epiphyseal fusion (Baker et al. 2005; Buikstra and Ubelaker 1994). Known age-related changes at the joints of the pelvis were scored at the pubic symphysis and the auricular surfaces of the os coxae using standardized procedures (Buikstra and Ubelaker 1994). Scores of degree of sutural closure throughout the cranium were also recorded where observable (Buikstra and Ubelaker 1994). Epiphyses and ossification centers that do not fuse until early adulthood, such as the medial clavicle and spheno-occipital synchondrosis, were scored for degree of fusion and taken into consideration in making age estimates (Baker et al. 2005; Buikstra and Ubelaker 1994).

Information from the os coxae was privileged in age at death estimates for adult skeletons (Buikstra and Ubelaker 1994). To estimate adult age at death using the os coxae, information from both the pubic symphysis and the auricular surface were combined. The pubic symphysis was scored using both the Todd and Suchey-Brooks scoring systems (Brooks and Suchey 1990; Buikstra and Ubelaker 1994; Todd 1921a, 1921b). The auricular surface was scored using the Lovejoy et al. scoring system (Buikstra and Ubelaker 1994; Lovejoy et al. 1985; Meindl and Lovejoy 1989). For individuals for whom the pubic symphysis scores and auricular surface scores produced different estimates of age at death, pubic symphysis scores were given preference because such estimates are considered more reliable (Buikstra and Ubelaker 1994).

In rare instances the os coxae were unobservable, so cranial sutural closure was used to assess age at death (Buikstra and Ubelaker 1994; Meindl and Lovejoy 1985). Because cranial sutural closures are less reliable estimates of age (Buikstra and Ubelaker 1994), refined estimates of adult age at death (i.e., beyond the general 'Adult' category described below), were only assigned to individuals exhibiting os coxal bones with intact pubic symphyses and/or auricular surfaces and/or crania with at least 10 observable sutural points (Buikstra and Ubelaker 1994). For, skeletal remains that did not meet these criteria, but were clearly adults based on completed epiphyseal fusion and overall size, estimates of age at death beyond "Adult" were considered not possible. For all other adult individuals, in accordance with standards (Buikstra and Ubelaker 1994), the following adult osteological age categories were established: Young Adult (20-34 years), Middle Adult (35-49 years), and Old Adult (50+ years).

Estimating Sex

Estimations of biological sex were conducted through osteological analyses of features of the adult os coxae and cranium that exhibit sexual dimorphism (Buikstra and Ubelaker 1994). Specifically, sex was estimated from observations of morphological characteristics of the os coxae and cranium following standardized procedures (Buikstra and Ubelaker 1994). For the os coxae, sexually dimorphic features of the subpubic region, greater sciatic notch, and preauricular sulcus were scored separately (Buikstra and Ubelaker 1994). Where possible, features of the more reliable subpubic region were used to make estimations of biological sex (Buikstra and Ubelaker 1994). For cases in which the subpubic region was ambiguous, damaged, or absent, the greater sciatic notch and preauricular sulcus were relied upon for the estimation.

Sexually dimorphic cranial features were also scored in the assignment of sex estimates. Features including the nuchal crest, mastoid process, supra-orbital margin, supra-orbital ridge or glabella, and the mental eminence were scored individually following standard procedures (Buikstra and Ubelaker 1994). Due to the lower overall reliability of cranial features in estimations of sex, the sexually-dimorphic characteristics of the pelvis described above were given preference in cases in which cranial and pelvic scores produced distinct sex estimates (Buikstra and Ubelaker 1994; Meindl and Lovejoy 1985). Because of the overall rugosity of cranial features in the study sample, scores developed from skeletal collections with more gracile features were frequently unreliable compared to sex estimates based on pelvic features (Acsádi and Nemeskéri 1970; Buikstra and Ubelaker 1994). Therefore, in the rare instances discussed below in which an individual lacked observable areas of the pelvic bone for estimating sex, estimates based on the cranial features alone were assigned to the ambiguous category. All adults and adolescents were assigned to one of the following standard osteological sex categories: Female, Probable Female, Male, Probable Male, Ambiguous, Undetermined (Appendix B; Buikstra and Ubelaker 1994). All juveniles were assigned to the Undetermined category as reliable sex estimates are not possible for pre-pubescent individuals lacking sexually dimorphic features (Appendix B; Baker et al. 2005).

Age at Death and Sex Distributions for the Entire Study Sample

All individual estimates of age at death and sex for individuals in the study sample are listed in Appendix B. The distribution of individuals across the estimated age at death categories is presented in Table 5.1. The Rinconada Alta distribution exhibits a higher overall proportion of juveniles (56.5%) than Armatambo (38.1%), with the highest proportion of juvenile individuals from Rinconada Alta in the infant category (42.6%). Juveniles from Armatambo are distributed more evenly between the infant (20.8%) and child (14.9%) categories, and both sites present low proportions of individuals *in utero* (Armatambo: 2.4%, Rinconada Alta: 6.5%). Armatambo has a higher proportion of adolescents and adults combined (61.9%) than Rinconada Alta (43.5%). The greatest proportion of adult individuals from Armatambo are in the Middle Adult category (29.8%) followed by the Young Adult category (17.3%), while at Rinconada Alta these two categories are similar in proportion (Middle Adult: 12.0%, Young Adult: 13.0%). Both sites have similar relatively low proportions of adolescents (Armatambo: 2.4%, Rinconada Alta: 1.9%) and older adults (Armatambo: 10.1%, Rinconada Alta: 7.4%).

Table 5.2 presents the distribution of biological sex estimations for both Armatambo and Rinconada Alta. Study samples from both sites present a moderately higher proportion of females versus males (Armatambo: females = 36.3%, males = 23.8%; Rinconada Alta: females = 21.3%, males = 16.7%). One individual from Rinconada Alta was assigned to the Ambiguous category. This individual (RINC-D02.IIA-CF83.1) lacks an observable pelvis and presents ambiguous features of the cranium. Individuals of undetermined sex from both sites include all juveniles and several incomplete adult individuals with insufficient skeletal areas observable for reliable estimations (Table 5.3).

Distributions of individuals by age within each sex category at each site are presented in Table 5.3. Within the adult age categories (Young Adults, Middle Adults, and Older Adults), distributions by sex are variable. At Armatambo, the numbers of males and females in the Young Adult category are nearly equal (females: $n = 14$, males: $n = 15$), while at Rinconada Alta a greater number of Young Adult males are present (females: $n = 3$, males: $n = 11$). A slightly greater number of females are present relative to males in the Middle Adult category at Armatambo (females: $n = 28$, males: $n = 22$), while the number of individuals in this category at Rinconada Alta is nearly equal (females: $n = 7$, males: $n = 6$). At both sites, the number of female individuals in the Old Adult category is much greater than the number of males (Armatambo: females: $n = 16$, males: $n = 1$; Rinconada Alta, females: $n = 8$, males: $n = 0$).

It is important to stress that the samples of observable individuals from intact burial contexts from both sites are not evenly distributed across all age at death and sex groups. This observation is critical to the structure and interpretation of subsequent analyses of osteological and mortuary data, since underlying trends associated with age

Table 5.1. Distribution of individuals by age category at Armatambo and Rinconada Alta

Age category:	**Number of Armatambo individuals**	**% Site Total**	**Number of Rinconada Alta individuals**	**% Site Total**	**Total number of individuals**	**% Total**
In utero	4	2.4%	7	6.5%	**11**	**4.0%**
Infant	35	20.8%	46	42.6%	**81**	**29.3%**
Child	25	14.9%	8	7.4%	**33**	**12.0%**
Juvenile subtotal	*64*	*38.1%*	*61*	*56.5%*	***125***	***45.3%***
Adolescent	4	2.4%	2	1.9%	**6**	**2.2%**
Young Adult	29	17.3%	14	13.0%	**43**	**15.6%**
Middle Adult	50	29.8%	13	12.0%	**63**	**22.8%**
Older Adult	17	10.1%	8	7.4%	**25**	**9.1%**
Unknown Adult	4	2.4%	10	9.3%	**14**	**5.1%**
Adolescent/Adult subtotal	*104*	*61.9%*	*47*	*43.5%*	***151***	***54.7%***
Total	**168**		**108**		**276**	

Table 5.2. Distribution of individuals by sex category at Armatambo and Rinconada Alta

Sex category:	**Number of Armatambo individuals**	**% Site Total**	**Number of Rinconada Alta individuals**	**% Site Total**	**Total number of individuals**	**% Total**
Female	57	33.9%	20	18.5%	**77**	**27.9%**
Probable Female	4	2.4%	3	2.8%	**7**	**2.5%**
Female subtotal	*61*	*36.3%*	*23*	*21.3%*	*84*	*30.4%*
Male	34	20.2%	16	14.8%	**50**	**18.1%**
Probable Male	6	3.6%	2	1.9%	**8**	**2.9%**
Male subtotal	*40*	*23.8%*	*18*	*16.7%*	*58*	*21.0%*
Ambiguous	0	0.0%	1	0.9%	**1**	**0.4%**
Undetermined	67	39.9%	66	61.1%	**133**	**48.2%**
Total	**168**		**108**		**276**	

Table 5.3. Distribution of individuals by age for combined sex categories at Armatambo and Rinconada Alta

	Armatambo:					**Rinconada Alta:**				
	F[a]	**M[b]**	**Amb[c]**	**Und[d]**	**Total**	**F[a]**	**M[b]**	**Amb[c]**	**Und[d]**	**Total**
Juveniles[e]	0	0	0	64	**64**	0	0	0	61	**61**
Adolescent	3	1	0	0	**4**	2	0	0	0	**2**
Young Adult	14	15	0	0	**29**	3	11	0	0	**14**
Middle Adult	28	22	0	0	**50**	7	6	0	0	**13**
Older Adult	16	1	0	0	**17**	8	0	0	0	**8**
Unknown Adult	0	1	0	3	**4**	3	1	1	5	**10**
Total	61	40	0	67	**168**	23	18	1	66	**108**

[a] Includes individuals estimated as 'Female' and 'Probable Female'.
[b] Includes individuals estimated as 'Male' and 'Probable Male'.
[c] Ambiguous
[d] Undetermined
[e] Includes individuals estimated as '*In utero*', 'Infant', and 'Child'.

or sex may produce artificial trends in large-scale comparisons. This issue is addressed in further detail in relevant subsequent sections. Similarly, the unequal age and sex distributions of individuals in the total study sample were taken into account when selecting a subsample of individuals for biogeochemical analyses to ensure a representative subsample was selected.

Biogeochemical Sample

Subsamples of approximately 40 percent of the individuals from the overall study sample for each site (Armatambo: *n*=67/168; Rinconada Alta: *n*=47/108), representative of age and sex distributions, were included in biogeochemical analyses. Individuals were chosen via stratified randomization, with preference given to individuals with tooth enamel, bone, and hair available for analysis. Appendix C lists the archaeological tissue specimens selected for biogeochemical analyses from a total of 114 individuals, or approximately 40% of the total study sample of 276 individuals. The distribution of individuals in the biogeochemical subsample across the age at death and sex categories at each site is presented in Table 5.4. Overall, the percentage of individuals in each category within the biogeochemical subsample is similar to the percentage of individuals in each category in the total study sample (Tables 5.1-5.2). Slight variation in some percentages is a result of the preference given to individuals with multiple tissue types preserved and available for analysis.

In all, 396 bone, tooth, and hair tissue specimens were sampled from the 114 individuals in the archaeological biogeochemical subsample (Appendix C). Bone specimens were sampled from all 114 individuals (100%). In addition, 193 tooth specimens including one to three teeth with different ages of formation were sampled from 103 of the total 114 individuals (90%) in the biogeochemical subsample. Hair specimens were sampled from 89 of the 114 individuals (78%) in the biogeochemical subsample.

Table 5.4. Distribution of individuals in biogeochemical sample by age for combined sex categories at Armatambo and Rinconada Alta

	Armatambo (n = 67)					**Rinconada Alta (n = 47)**				
Age category[a]	**F**[a]	**M**[b]	**A**[c]	**UD**[d]	**% Site Total**	**F**	**M**	**A**	**UD**	**% Site Total**
In utero	0	0	0	1	**1/67 (1%)**	0	0	0	3	**3/47 (6%)**
Infant	0	0	0	14	**14/67 (21%)**	0	0	0	18	**18/47 (38%)**
Child	0	0	0	10	**10/67 (15%)**	0	0	0	4	**4/47 (9%)**
Adol	1	1	0	0	**2/67 (3%)**	2	0	0	0	**2/47 (4%)**
YA	6	6	0	0	**12/67 (18%)**	2	6	0	0	**8/47 (17%)**
MA	11	8	0	0	**19/67 (28%)**	4	3	0	0	**7/47 (15%)**
OA	7	1	0	0	**8/67 (12%)**	4	0	0	0	**4/47 (9%)**
Adult	0	0	0	1	**1/67% (1%)**	1	0	0	0	**1/47 (2%)**
Total	**25**	**16**	**0**	**26**		**13**	**9**	**0**	**25**	
% Site Total	**25/67 (37%)**	**16/67 (24%)**	**0/67 (0%)**	**26/67 (39%)**	**% Site Total**	**13/47 (28%)**	**9/47 (19%)**	**0/47 (0%)**	**25/47 (53%)**	

[b] Adult age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult, Adult = Unknown Adult

[b] Includes individuals estimated as 'Female' and 'Probable Female'.

[c] Includes individuals estimated as 'Male' and 'Probable Male'.

[d] Ambiguous

[e] Undetermined

Chapter 5 Notes

[1] To the author's knowledge at the time of the study, physical anthropological materials from other excavations conducted at Armatambo and Rinconada Alta are not locatable. Materials reportedly recovered from Rinconada Alta during excavations by Max Uhle in 1908 (*n*=170 mortuary contexts), José Casafranca in 1959 (*n*=120 mortuary contexts), and Abelardo Sandoval in 1971 (*n*=235 mortuary contexts) may exist among collections at the Museo Nacional de Antropología, Arqueología e Historia del Perú that are currently in the process of being inventoried by museum personnel (Díaz 2002; Díaz and Vallejo 2005; Ravines 1988; L. Tepo, personal communication, 2012). Four burial contexts recovered from Armatambo during Aldolph Bandelier's 1892 excavation housed at the American Museum of Natural History in New York and approximately 40 mummy bundles recovered from Rinconada Alta by Arturo Jimenez Borja currently housed at the Museo de Sitio Arturo Jiménez Borja - Puruchuco were not included in the present study (Hyslop and Mujica 1993; C. Valladolid, personal communication, 2013).

[2] Individual codes were assigned as follows. The first aspect of the code refers to the cemetery site (ARMA = Armatambo, RINC = Rinconada Alta). The second aspect of the code refers to the excavation project (D02=Díaz 2002; D04=Díaz 2004b; 2004c; G9698=Guerrero et al. 1999; PER97=Pérez 1997). The excavation project code is followed by the site sector (I = Sector I; II = Sector II; IIA = Sector II - Ampliación; IIAE = Sector II - Ampliación Este; IV = Sector IV; V = Sector V; VI = Sector VI). Note that no sectors were assigned during the Perez (1997) excavation. The third aspect of the code refers to each excavator's specific mortuary context numbering system (ENT = burial (*entierro*) number; CF = funerary context (*contexto funerario*) number; no prefix = field code (*código del campo*) number. Note that multiple individuals present in the same mortuary contexts that were identified during excavation were distinguished by excavators with a letter or a Roman numeral (e.g., ENT24A, ENT24B; 0818-I, 0818-II). Occasionally, excavators used field codes instead of letters and Roman numerals to distinguish multiple individuals in the same contexts. In these instances, this code is added in parentheses to the end of the individual code (e.g., ARMA-D04.II-CF157 [#3528], ARMA-D04.II-CF157 [#3706]) With the exception of highly commingled or disturbed contexts, additional multiple individuals present in the same mortuary context observed by the author during osteological inventory and analysis are distinguished by an Arabic numeral following a period at the end of the individual code (e.g., ARMA-PER97-ENT24B.1, ARMA-PER97-ENT24B.2).

Chapter 6

RECONSTRUCTING RESIDENTIAL MOBILITY FROM RADIOGENIC STRONTIUM ($^{87}Sr/^{86}Sr$) AND STABLE OXYGEN ISOTOPES ($\delta^{18}O$)

Before presenting the reconstructions of dietary practices and mortuary rituals in Chapters 7 through 9, Chapter 6 focuses on the reconstruction of residential mobility using radiogenic strontium and stable oxygen isotopes to identify potential foreign immigrants at Armatambo and Rinconada Alta. In subsequent chapters, dietary practices and mortuary treatments of immigrants from outside the study region are compared to individuals with local isotopic values to assess for potential changes in community membership. Radiogenic strontium and stable oxygen isotopes are two of the most common archaeological biogeochemical tools used to infer residential mobility in the past. Chapter 6 first reviews the use of radiogenic strontium and stable oxygen isotopes in archaeological human bone and tooth enamel to reconstruct paleomobility. Following this review, collections methods used to obtain modern soils, faunal bone, and water samples for the creation of radiogenic strontium and stable oxygen isotope baselines for the study region are described. Then, laboratory methods used in the processing and analysis of all modern and archaeological samples for radiogenic strontium and stable oxygen isotopes are presented. Finally, radiogenic strontium and stable oxygen isotope results are presented.

Using Radiogenic Strontium ($^{87}Sr/^{86}Sr$) and Stable Oxygen Isotopes ($\delta^{18}O$) to Reconstruct Residential Mobility

Paleomobility can be reconstructed through analyses of radiogenic strontium and stable oxygen isotopes in archaeological human skeletal tissues (e.g., Balasse 2002; Bentley 2006; Budd et al. 2004; Buzon et al. 2011; Conlee et al. 2009; Haverkort et al. 2008; Knudson 2009; Knudson and Buikstra 2007; Knudson et al. 2012a; Knudson et al. 2008; Knudson et al. 2012b; Knudson et al. 2002, 2004; Knudson et al. 2005; Knudson and Tung 2007; Knudson et al. 2009; Müller et al. 2003; Perry et al. 2008; Price et al. 1994; Price et al. 2000; Turner et al. 2009; Turner et al. 2005; Turner et al. 2013; Webb et al. 2011; White et al. 1998; Wright et al. 2010). Briefly, radiogenic strontium and stable oxygen isotope ratios in bone and tooth enamel are derived from food and water resources consumed during the time of formation of the skeletal element (Ericson 1985; Longinelli 1984; Luz et al. 1984). In regions where food and water resources exhibit variable radiogenic strontium and stable oxygen isotope ratios due to environmental diversity, archaeological isotope chemistry of the skeleton may be used to infer mobility in the past (Ericson 1985; Knudson and Price 2007; Price et al. 1994; White et al. 2004b; White et al. 1998; White et al. 2004c). Immigrants are identified by non-local values of radiogenic strontium or stable oxygen isotope ratios in tooth enamel, which forms during childhood (Hillson 1996), or bone, which continually remodels and represents the last years of life (Price et al. 2002).

Strontium (Sr) exists in the natural ecosystem as four isotopes: ^{84}Sr, ^{86}Sr, ^{87}Sr, and ^{88}Sr. All strontium isotopes are stable and non-radiogenic except for ^{87}Sr, which is stable and radiogenic and forms from the decay of one of the isotopes of rubidium, ^{87}Rb, with a half-life of approximately 50 billion years (Bentley 2006; Dasch 1969; Elderfield 1986; Graustein 1989). The ratio of $^{87}Sr/^{86}Sr$ in a particular ecosystem is therefore related to the geological age of underlying bedrock. In general, older rocks exhibit higher $^{87}Sr/^{86}Sr$ values, while younger rocks exhibit lower $^{87}Sr/^{86}Sr$ values (Ericson 1985; Faure and Powell 1972). Erosion and soil transportation via wind and water systems combines $^{87}Sr/^{86}Sr$ values within different minerals of bedrock to form the $^{87}Sr/^{86}Sr$ available to plants and animals in an ecosystem (Bentley 2006). Oceans, as recipients of sediments from across continents, present homogenous $^{87}Sr/^{86}Sr$ signatures equal to 0.7092, representative of the worldwide average of weathered bedrock (Elderfield 1986; Veizer 1989). The local range of biologically available $^{87}Sr/^{86}Sr$ in an ecosystem is measured through analyses of $^{87}Sr/^{86}Sr$ in partially dissolved soil samples or non-migratory small mammals (Knudson et al. 2014; Price et al. 2002).

Because of structural similarities, elemental strontium substitutes for calcium in biological organisms, including calcium in hydroxyapatite, the mineral portion of bone and tooth enamel (Ericson 1985; Schroeder et al. 1972). Values of $^{87}Sr/^{86}Sr$ in uncontaminated archaeological human skeletal elements reflect the strontium isotope values of foods, particularly those rich in calcium, consumed during the formation of the particular element (Ericson 1985). Because the chemistry of archaeological human skeletal tissues may become contaminated by the local burial environment, particularly through the uptake of solutes from groundwater (Hedges 2002; Kohn et al. 1999), samples are processed carefully to exclude potentially diagenetic aspects of bone and tooth enamel from analysis. Samples analyzed for $^{87}Sr/^{86}Sr$ values are additionally assessed for major, minor, and trace elemental concentrations to verify that ratios of calcium to phosphorus (Ca/P) and concentrations of trace elements uranium (U) and

Neodymium (Nd) fall within normal biogenic ranges (Hedges 2002; Kohn et al. 1999; Price et al. 1994). Analysis of other isotopic systems, such as stable oxygen isotopes, are also used to support and refine conclusions about paleomobility drawn from radiogenic strontium isotope analyses (Bentley 2006; Eckhardt et al. 2009; Knudson and Price 2007).

Like radiogenic strontium, stable oxygen isotopes are commonly used to infer residential mobility in the past (Balasse 2002; Budd et al. 2004; Buzon et al. 2011; Eckhardt et al. 2009; Knudson 2009; Knudson et al. 2012a; Knudson et al. 2012b; Knudson and Price 2007; Knudson et al. 2009; Nado et al. 2012; e.g., Price et al. 1994; Turner et al. 2005; Webb et al. 2011; White et al. 1998; White et al. 2004c; Wright et al. 2010). Oxygen exists naturally as three stable isotopes: ^{16}O, ^{17}O, and ^{18}O. In drinking water sources, ratios of stable oxygen isotopes $^{18}O/^{16}O$, expressed as $\delta^{18}O$, vary with environmental factors including altitude, precipitation, and temperature (Craig 1961a, 1961b; Gat 1996).[1] Such variation in drinking water $\delta^{18}O$ values becomes incorporated into carbonate and phosphate of hydroxyapatite of tooth enamel and bone during the formation of the skeletal element (Longinelli 1984; Luz et al. 1984). Therefore, differences in $\delta^{18}O$ values in archaeological skeletal carbonate or phosphate samples are inferred to reflect differences in drinking water sources, and thus correspondingly, differences in residential origin (e.g., Knudson and Torres-Rouff 2009; Knudson and Tung 2007; Turner et al. 2009; White et al. 2004b; White et al. 1998; White et al. 2004c).

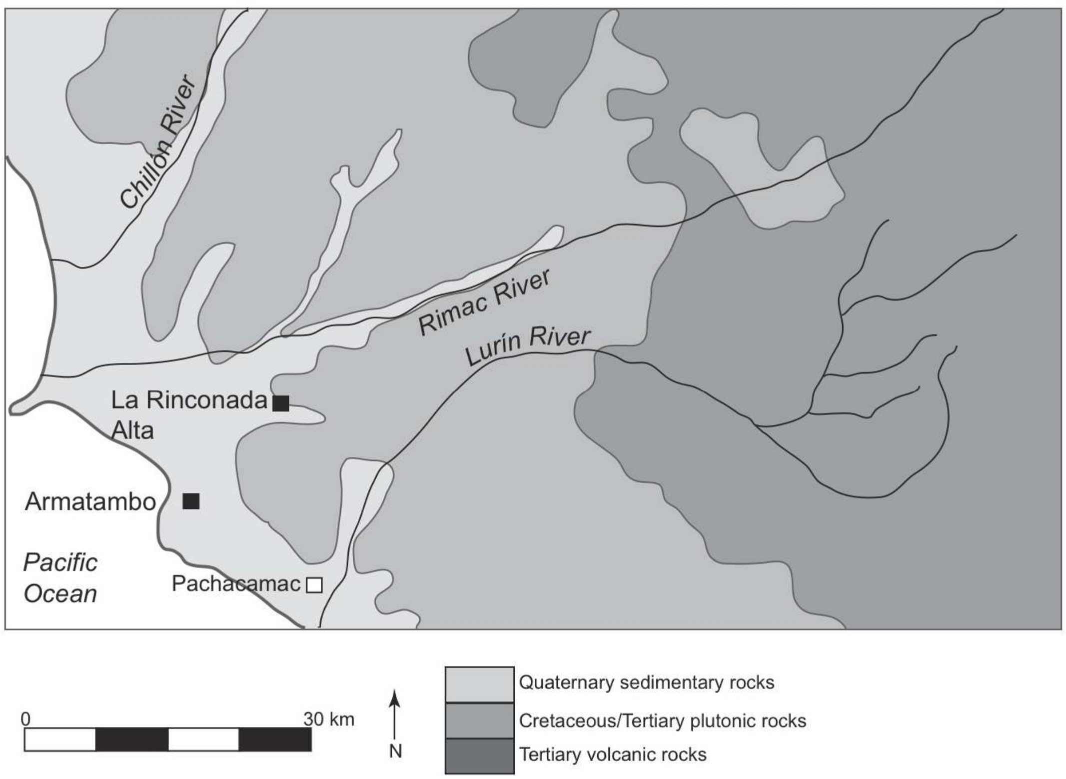
One complicating factor associated with the use of stable oxygen isotope analysis to infer mobility in the past is high local variability in drinking water $\delta^{18}O$ values. In regions with many diverse environmental zones within close proximity, such as the Andes, stable oxygen isotopes in local available water sources may be highly variable (Knudson 2009). Further complications in drinking water $\delta^{18}O$ values include potential seasonal variation and the mixing of multiple drinking water sources with different $\delta^{18}O$ values (Knudson 2009). One way to address whether observed intra-population variation is produced by local variability in drinking water $\delta^{18}O$ values versus differential residence patterns is through the construction of a local stable oxygen isotopic baseline (e.g., Buzon et al. 2011). Analysis of $\delta^{18}O$ values in multiple water sources within the study area likely to have been available in the past can be compared to observed $\delta^{18}O$ values archaeological human tissues to infer whether observed differences are due to local stable oxygen isotope variability versus paleomobility (e.g., Buzon et al. 2011; Chenery et al. 2010). Carbonate $\delta^{18}O$ values in archaeological human tooth enamel and bone are converted to drinking water $\delta^{18}O$ values for comparison to meteoric water sources (Coplen et al. 1983; Daux et al. 2008; Iacumin et al. 1996; Knudson 2009; Levinson et al. 1987; Longinelli 1984; Luz et al. 1984).

Interpretations of stable oxygen isotope ratios in archaeological human tissues that form during early childhood must take into consideration the isotopic enrichment of breast milk relative to local water sources (Roberts et al. 1988). Specifically, enrichment in $\delta^{18}O$ values observed in tooth enamel samples from early-forming teeth and bone samples from infants and young children is interpreted as evidence of breastfeeding (Dupras and Tocheri 2007; White et al. 2004a; e.g., Wright and Schwarcz 1999). In addition, $\delta^{18}O$ values in early-forming deciduous tooth enamel samples reflect $\delta^{18}O$ input from the both the uterine environment and breast milk, while fetal bone samples should reflect $\delta^{18}O$ values from of the uterine environment alone (Dupras and Tocheri 2007).

Collection Methods for Radiogenic Strontium ($^{87}Sr/^{86}Sr$) and Stable Oxygen ($\delta^{18}O$) Isotopic Baseline Samples

To construct a baseline of local biologically available radiogenic strontium and stable oxygen isotopes for the Rimac and Lurín Valleys and adjacent Huarochirí highlands, faunal, soil, and water samples were collected from throughout the study region. For the radiogenic strontium isotopic baseline, agricultural soils and small mammal bones were collected from multiple locations within each of the distinct geological zones in the area. Specifically, the Rimac and Lurín drainage systems cross three main types of bedrock. In the Huarochirí highlands, where the Lurín River originates, Tertiary volcanic rocks form the underlying bedrock. The middle Rimac and Lurín River Valleys are comprised of Cretaceous/Tertiary plutonic rocks, while the lower river valleys are comprised of Quaternary sedimentary rocks (Figure 6.1; INGEOMIN 1975). Because all of these rock types are likely mixed through erosion and river transport to form the biologically available $^{87}Sr/^{86}Sr$ (see Bentley 2006), agricultural soils and bones from small mammals (*Cavia porcellus*) that reportedly consumed only locally grown alfalfa were sampled from each of these geological regions (Appendix D). Soil samples were collected from agricultural fields farmed by traditional methods, although the possibility exists that these soils were treated with fertilizers that may influence $^{87}Sr/^{86}Sr$ values. *Cavia porcellus* bones were removed of soft tissues through scraping or boiling and were dried in a food dehydrator at 95°C for 24-48 hours prior to storage with silica gel in zip-top plastic bags for exportation. Due to the proximity of the study sites to the ocean, the effects of marine foods, seaspray, and marine fertilizers such marine bird feces (*guano*), must also be taken into consideration in the interpretation of archaeological $^{87}Sr/^{86}Sr$ values from human skeletal tissues. Such marine effects may bring the local values close to the ocean $^{87}Sr/^{86}Sr$ signature, which equals 0.7092 (Elderfield 1986; Veizer 1989).

Figure 6.1. Geological variation in the study region.



Meteoric water samples from throughout the study region were collected to construct a stable oxygen isotopic baseline. In an attempt to account for the widest range of stable oxygen isotope variation among locally available drinking water sources, samples were taken from as many types of water sources as possible, focusing on sources similar to those that would have been used in prehistory. Specifically, sources sampled include multiple sites along the Rimac and Lurín Rivers, multiple types of canals derived from the Lurín River currently used for agricultural purposes, naturally occurring springs, hand-dug wells, and freshwater marsh ponds (*pantanos*). Water samples were collected approximately 10 cm below surface water in areas with constant flow. Samples were stored in airtight plastic containers free of headspace, which were in turn stored in plastic zip-top bags for transport.

Laboratory Methods for Radiogenic Strontium ($^{87}Sr/^{86}Sr$) and Stable Oxygen ($\delta^{18}O$) Isotope Analysis

Analysis of Radiogenic Strontium Isotopes ($^{87}Sr/^{86}Sr$) in Modern Soils, Modern Faunal Bone Apatite, and Archaeological Bone Apatite and Tooth Enamel

All modern soil samples, modern faunal bone samples, and archaeological human bone and tooth enamel samples were processed for radiogenic strontium isotope analysis in the Arizona State University Archaeological Chemistry Laboratory under the direction of K.J. Knudson. Modern soil samples were dried at 120˚C for 48 hours, and then ground with a Coors porcelain mortar and pestle to increase the surface area of particles present. The ground sample was ashed at 800˚C for approximately 10 hours to eliminate organic particles. Approximately 4.0 g of the ashed sample were partially dissolved in 10 mL of 1 M ammonium acetate (CH_3COONH_4) at room temperature for 24 hours. Non-dissolved particulates were filtered from the soil solution and discarded, and the resulting extract was prepared for strontium isotope analysis in the W.M. Keck Laboratory Foundation for Environmental Biogeochemistry Trace Metal Clean Laboratory as described below.

Modern faunal and archaeological human bone samples for radiogenic strontium analysis were mechanically cleaned using a Dremel MultiPro or MiniMite equipped with a carbide burr to remove dirt, soft tissues, trabecular bone and external layers prone to diagenesis. Cleaned cortical bone sections spanning the entire width and thickness of the rib or tibia fragment were cut from the larger bone specimens with a Dremel MultiPro equipped with a circular diamond saw. The cleaned bone sections were ashed at 800˚C for approximately 10 hours to remove organic matter. Ashed samples were ground to a fine powder with an agate mortar, and approximately 10-15 mg of bone ash powder were dissolved in 0.5 mL of 5 M nitric acid (HNO_3) and prepared for strontium isotope analysis in the W.M. Keck Laboratory Foundation for Environmental Biogeochemistry Trace Metal Clean Laboratory.

Archaeological human tooth enamel for radiogenic strontium analysis was cleaned of visible dirt and discolored external layers of enamel subject to contamination using a Dremel MultiPro equipped with a diamond burr. Enamel powder was removed from the cleaned section with a clean diamond burr, taking care to include the entire extent of the crown height. Approximately 10-15 mg of tooth enamel powder were dissolved in 0.5 mL of 5 M nitric acid (HNO_3) for preparation for strontium isotope analysis in the W.M. Keck Laboratory Foundation for Environmental Biogeochemistry Trace Metal Clean Laboratory.

All modern soil sample extracts and dissolved modern and archaeological bone ash and archaeological tooth enamel powder were prepared for strontium isotope analysis in the W.M. Keck Laboratory Foundation for Environmental Biogeochemistry Trace

Metal Clean Laboratory under the supervision of K.J. Knudson and G. Gordon. Samples in the 5 M nitric acid (HNO_3) solutions described above were evaporated at 50-100˚C until dry and re-dissolved in 0.25 mL 5 M nitric acid (HNO_3). Strontium was separated from the sample matrix using EiChrom SrSpec resin (50-100 µL diameter) loaded onto fretted glass columns. Columns were first rinsed twice with 1.0 mL distilled and deionized water (18.2 MΩ). Approximately 0.1-0.2 mL of pre-cleaned EiChrom Sr was loaded and subsequently rinsed twice with 1.0 mL distilled and deionized water (18.2 MΩ). Resin was equilibrated with 0.75 mL of 5 M nitric acid (HNO_3) prior to loading the sample dissolved in 0.25 mL 5 M nitric acid (HNO_3) onto the column. The sample was washed three times with 0.25 mL 5 M nitric acid (HNO_3) before collecting the strontium via three elutions of 0.5 mL distilled and deionized water (18.2 MΩ). One blank and one sample of NIST SRM 1400 bone ash standard were prepared simultaneously with each batch of 15-25 samples using identical column chemistry procedures.

The eluted strontium samples were evaporated until dry at 50-100˚C. The precipitate was dissolved in 0.64 mL 5 M nitric acid (HNO_3) and subsequently diluted with 9.36 mL of distilled and deionized water (18.2 MΩ) to a final concentration of 0.32 M nitric acid (HNO_3) for analysis. Diluted samples were analyzed for radiogenic strontium isotope ratios ($^{87}Sr/^{86}Sr$) at the Arizona State University W.M. Keck Laboratory Foundation for Environmental Biogeochemistry on a Thermo Finnigan Neptune Multi-Collector Inductively-Coupled Plasma Mass Spectrometer (MC-ICP-MS) under the direction of G. Gordon and K.J. Knudson. Analyses of strontium carbonate standard SRM-987 for radiogenic strontium isotopes produce mean

$^{87}Sr/^{86}Sr$=0.71025±0.000002 (*n*=190, 2σ). Analyses of bone ash standard NIST-1400 produce mean $^{87}Sr/^{86}Sr$=0.71312±0.00005 (*n*=34, 2σ).

All archaeological human bone samples and all tooth enamel samples with sufficient tooth enamel present were analyzed for elemental concentrations of calcium, phosphorus, neodymium, and uranium to identify any potential diagenetic contamination. Samples were prepared for analysis in the Arizona State University Archaeological Chemistry Laboratory by the author under the direction of K.J. Knudson. Approximately 3.0 mg of the bone ash and tooth enamel powder samples, prepared as described above for radiogenic strontium isotope analysis, were dissolved in 0.96 mL of 5 M nitric acid (HNO_3) and then diluted with 14.04 mL distilled and deionized water (18.2 MΩ) to a final concentration of 0.32 M nitric acid (HNO_3). A 0.20 mL aliquot of the final solution was removed and further diluted with 14.80 mL 0.32 M nitric acid (HNO_3) for analysis. Samples were analyzed for elemental concentrations at the Arizona State University W.M. Keck Laboratory Foundation for Environmental Biogeochemistry on a Quadrupole Inductively-Coupled Plasma Mass Spectrometer (Q-ICP-MS) under the direction of G. Gordon and K.J. Knudson. Average Ca/P=2.07±0.18 (*n*=306, 2σ), with minimum Ca/P=1.91 and maximum Ca/P=2.42, comparable to measurements of Ca/P in modern bone and tooth enamel (e.g., Hancock et al. 1993; Kohn et al. 1999; Sillen 1989). All measured U concentrations were below detection or quantification limits, except for one sample, ACL-4640 RIMAC-ARMA.M213, which exhibits a very low concentration of U equal to 6 ppm, which is within normal variation of biogenic human bone (Hancock et al. 1993). The majority of Nd concentrations were also below detection or quantification limits. Values within quantification limits range from 0.01 ppm to 0.21 ppm with an average Nd=0.10ppm±0.0.12ppm (n=121, 2σ). Such values are well within reported Nd levels for biogenic human bone (Hancock et al. 1993).

Analysis of Stable Oxygen Isotopes ($\delta^{18}O_{mw[V\text{-}SMOW]}$) in Meteoric Water Samples

In the Arizona State University Archaeological Chemistry Laboratory, under the direction of K.J. Knudson, the author prepared all meteoric water samples for analysis of stable oxygen isotopes. Approximately 15 mL of each sample were transferred to a clean 15 mL centrifuge tube, taking care to immediately cap and leave no headspace in the tube to reduce exposure to air and potential stable oxygen isotope exchange. Samples with solid particles present were filtered through a plastic funnel lined with filter paper during the transfer to the 15 mL tube. All meteoric water samples were analyzed for stable oxygen ($\delta^{18}O_{mw}$) isotope analysis by B. Moan of the Colorado Plateau Stable Isotope Laboratory at Northern Arizona University under the direction of B. Hungate. Analyses were performed on a Delta V Advantage IRMS coupled with a Gas Bench II. Replicates of internal standards produce standard deviations ranging from ±0.01-0.15‰ (1σ) for $\delta^{18}O$.

Analysis of Stable Oxygen Isotopes in Carbonates ($\delta^{18}O_{ap[VPDB]}$) of Archaeological Bone and Tooth Enamel Samples

Sample preparation of archaeological bone and tooth enamel for analysis of stable oxygen isotopes in carbonates was performed by the author at the Archaeological Chemistry Laboratory in the School of Human Evolution and Social Change at Arizona State University under the direction of K.J. Knudson. A section of each bone sample was cleaned with a Dremel MultiPro or MiniMite equipped with a carbide burr to remove visible dirt, soft tissue, trabecular bone, and discolored external layers of cortical bone subject to contamination. The cleaned bone section was subsequently removed from the larger bone sample using a Dremel MultiPro equipped with a circular diamond saw. The cleaned bone sample was powdered using a mortar and pestle or was taken using a Dremel MultiPro or MiniMite equipped with a carbide burr. Powdered samples were taken across the entire width of each bone section to ensure a bulk sample representative of the entire formation and remodeling period of the bone. For tooth enamel samples, a small section of the side of the tooth crown was cleaned to remove visible dirt and discolored external layers of enamel subject to contamination using a Dremel MultiPro equipped with a diamond burr. Enamel powder was subsequently taken from the cleaned area of the tooth crown with a clean diamond burr. Care was taken to include enamel powder from the entire extent of the crown height from the occlusal surface to the cemento-enamel junction to obtain a bulk sample representative of the entire formation period of the tooth.

As shown in Appendix E, 35 deciduous tooth enamel samples, two anterior permanent tooth enamel samples, and one bone sample did not present sufficient sample for stable oxygen isotope analysis and were necessarily excluded from the study. For all other samples, approximately 15-20 mg of bone powder or tooth enamel powder were chemically treated to remove any organics or diagenetic carbonate present. Following previously established procedures (Koch et al 1997), samples were first treated with 2% NaOCl (sodium hypochlorite) for 24 hours to remove any organics present, and subsequently treated with 0.1 M CH_3COOH (acetic acid) for 24 hours to remove diagenetic carbonate. For each treatment, 0.04 mL of solution were used per milligram of sample. Between each treatment, samples were rinsed three times with 0.50 mL of deionized water, vortexing for one minute during each rinse. Following the final rinse of the second treatment, samples were dried at 50˚C for 24 hours.

Approximately 3-4 mg of the chemically treated bone or enamel powder sample were analyzed for stable oxygen isotopes in carbonate ($\delta^{18}O_{ap}$) by B. Moan of the Colorado Plateau Stable Isotope Laboratory at Northern Arizona University under the direction of B. Hungate. Analyses were performed on a Delta V Advantage IRMS coupled with a Gas Bench II. Replicates of international isotope standards NBS-18, NBS-19, and LSVEC yield a reproducibility of ±0.12-0.16‰ (1σ) for $\delta^{18}O$. Stable oxygen isotope ratios in carbonates ($\delta^{18}O_{ap[VPDB]}$) are used in statistical analyses and in comparisons with other carbonate values and are converted to drinking water $\delta^{18}O_{dw(V\text{-}SMOW)}$ values for comparison to stable oxygen isotope ratios in meteoric water samples ($\delta^{18}O_{mw[V\text{-}SMOW]}$) using the following equations:

(1) $\delta^{18}O_{VSMOW} = (1.03091 \times \delta^{18}O_{VPDB}) + 30.91$	(Coplen et al. 1983)
(2) $\delta^{18}O_{VPDB} = (0.97002 \times \delta^{18}O_{VSMOW}) - 29.98$	(Coplen et al. 1983)
(3) $\delta^{18}O_{cVSMOW} = (8.5 + \delta^{18}O_{pVSMOW})/0.98$ or, $\delta^{18}O_{pVSMOW} = (\delta^{18}O_{cVSMOW} \times 0.98) - 8.5$	(Iacumin et al. 1996)
(4) $\delta^{18}O_{dwVSMOW} = 1.54(\pm0.09) \times \delta^{18}O_{pVSMOW} - 33.72(\pm1.51)$	(Daux et al. 2008; Levinson et al. 1987; Longinelli 1984; Luz et al. 1984)

Radiogenic Strontium ($^{87}Sr/^{86}Sr$) and Stable Oxygen Isotope ($\delta^{18}O$) Results

Radiogenic Strontium Isotopes ($^{87}Sr/^{86}Sr$) in Modern Soils and Faunal Bone Apatite

Results of analyses of radiogenic strontium isotope ratios ($^{87}Sr/^{86}Sr$) in the partially dissolved agricultural soils and in *Cavia porcellus* bone apatite are shown in Appendix D. As shown in Table 6.1, average $^{87}Sr/^{86}Sr$ in agricultural soils for the entire study region equals 0.70652±0.00091 (n=24, 1σ). Average $^{87}Sr/^{86}Sr$ in bone apatite from *Cavia porcellus* reportedly raised on local crops equals 0.70608±0.00069 (n=15, 1σ) (Table 6.2). Within each geographic area in the study region, $^{87}Sr/^{86}Sr$ averages and overall ranges of $^{87}Sr/^{86}Sr$ values are largely similar for both agricultural soils and *Cavia porcellus* bone apatite. Across the study region, the lowest $^{87}Sr/^{86}Sr$ values in both agricultural soils and *Cavia porcellus* bone apatite are from locations in the Huarochirí highlands (Appendix D). Highest $^{87}Sr/^{86}Sr$ values in the region come from agricultural fields located adjacent to the Pacific Ocean littoral in the lower Lurín Valley (Appendix D). These values, unsurprisingly, are close to the value of ocean water, which is $^{87}Sr/^{86}Sr$=0.07092, and are likely influenced by the effect of seaspray (Bentley 2006; Elderfield 1986; Veizer 1989).

These values are comparable to $^{87}Sr/^{86}Sr$ values previously reported by other researchers analyzing agricultural soils and *Cavia porcellus* bone apatite from the region. Previously reported soil sample average $^{87}Sr/^{86}Sr$ values are slightly higher than those reported here. Knudson and colleagues (2014) report average $^{87}Sr/^{86}Sr$ equal to 0.70722±0.00036 (n=12, 1σ) for soils collected from modern agricultural fields near Lima, Peru, with the total $^{87}Sr/^{86}Sr$ range from 0.706554 to 0.70772. Slovak and colleagues (2009) found average $^{87}Sr/^{86}Sr$ in soils from archaeological burials at Ancón equal to 0.70774±0.00018 (*n*=2, 1σ), with the total $^{87}Sr/^{86}Sr$ range from 0.70761 to 0.70786. Modern rodent bone samples from Pachacamac, Peru, in the lower Lurín Valley show an average $^{87}Sr/^{86}Sr$ equal to 0.70684±0.00016 (*n*=9, 1σ) (Knudson et al. 2014). Slovak and colleagues (2009) found average $^{87}Sr/^{86}Sr$ in bone apatite from modern and archaeological *Cavia porcellus* from Ancón equal to 0.70654±0.00012 (*n*=5, 1σ) (Slovak et al. 2009). The broader range of $^{87}Sr/^{86}Sr$ values observed in the current study may reflect the wider range of locations sampled within the study region. Similarities between highland and lower coastal valley signatures may be due to erosion, mixing, and transportation of geological sediments onto the alluvial floodplains of the middle and lower river valleys (Bentley 2006). Following Price et al. (2002), the local biologically-available $^{87}Sr/^{86}Sr$ range is defined here as the mean of the small mammal $^{87}Sr/^{86}Sr$ values, plus and minus two standard deviations, or 0.70470-0.70746.

Table 6.1. Radiogenic strontium isotope ($^{87}Sr/^{86}Sr$) values for agricultural soils in the study region

Geographic Area	***n***	**Average $^{87}Sr/^{86}Sr$**	**1σ**	**Minimum $^{87}Sr/^{86}Sr$**	**Maximum $^{87}Sr/^{86}Sr$**
Rimac Valley	8	0.70697	0.00013	0.70676	0.70712
Lurín Valley	12	0.70664	0.00098	0.70519	0.70805
Huarochirí highlands	4	0.70527	0.00039	0.70479	0.70576
Entire region	**24**	**0.70652**	**0.00091**	**0.70479**	**0.70805**

Table 6.2. Radiogenic strontium isotope ($^{87}Sr/^{86}Sr$) values in bone apatite from *Cavia porcellus* reportedly raised on crops local to the study region

Geographic Area	***n***	**Average $^{87}Sr/^{86}Sr$**	**1σ**	**Minimum $^{87}Sr/^{86}Sr$**	**Maximum $^{87}Sr/^{86}Sr$**
Rimac Valley	5	0.70662	0.00004	0.70658	0.70667
Lurín Valley	6	0.70585	0.00057	0.70516	0.70649
Huarochirí highlands	4	0.70560	0.00092	0.70481	0.70653
Entire region	**15**	**0.70608**	**0.00069**	**0.70481**	**0.70667**

Radiogenic Strontium Isotopes ($^{87}Sr/^{86}Sr$) in Archaeological Bone Apatite and Tooth Enamel

Results of analyses of radiogenic strontium isotopes in archaeological human bone apatite and tooth enamel are presented in Appendix E. Values of $^{87}Sr/^{86}Sr$ are overall very homogenous across the entire sample with the average $^{87}Sr/^{86}Sr$ for the entire sample equal to 0.70750±0.00046 (n=275, 1σ). The overall range for the entire sample is $^{87}Sr/^{86}Sr$=0.70643 to $^{87}Sr/^{86}Sr$=0.71314. For bone samples, average $^{87}Sr/^{86}Sr$ equals 0.70755±0.00028 (n=110, 1σ), with the minimum $^{87}Sr/^{86}Sr$=0.70691 and the maximum $^{87}Sr/^{86}Sr$=0.70820 (Appendix E; Figure 6.2). Although this range of bone $^{87}Sr/^{86}Sr$ values is largely increased relative to the range of biologically available $^{87}Sr/^{86}Sr$ calculated from the *Cavia porcellus* bone apatite, the overall homogeneity of $^{87}Sr/^{86}Sr$ values suggests that the values are indicative of local $^{87}Sr/^{86}Sr$ (Figure 6.2). The increase in archaeological human bone $^{87}Sr/^{86}Sr$ relative to local fauna may be caused by consumption of marine foods as discussed in Chapter 7.

Overall, archaeological human tooth enamel samples are similarly homogenous (Figure 6.3). Average tooth enamel $^{87}Sr/^{86}Sr$ equals 0.70747±0.00054 (n=166, 1σ), with the minimum $^{87}Sr/^{86}Sr$=0.70643 and the maximum $^{87}Sr/^{86}Sr$=0.71314 (Appendix E). One distinct outlier presents a third molar $^{87}Sr/^{86}Sr$ value equal to 0.71314. This tooth sample belongs to individual RINC-G9698.II-0567-ENT116. This same individual presents a first permanent molar $^{87}Sr/^{86}Sr$ equal to 0.70727 and a bone $^{87}Sr/^{86}Sr$ equal to 0.70728, both of which are within the local biologically available $^{87}Sr/^{86}Sr$ range (Appendix E). The possibility that the third molar outlier $^{87}Sr/^{86}Sr$ value is due to diagenesis is unlikely given the elemental data described above. Specifically, for this sample, the calcium to phosphorus ratio is quite normal (Ca/P=2.01), the uranium concentration is below detection limits, and the neodymium concentration is also quite low and within the biogenic value range (Nd=0.10ppm). Therefore, the high $^{87}Sr/^{86}Sr$ value in this adult female's third molar likely indicates that she consumed resources from a different region during the formation of her third molar between ages 7-18 years (Hillson 1996). These results suggest that this female migrated to an outside region during late childhood and adolescence and may have subsequently returned to the Rimac Valley region during adulthood.

Figure 6.2. $^{87}Sr/^{86}Sr$ values in archaeological human bone samples from Armatambo and Rinconada Alta. Mean $^{87}Sr/^{86}Sr$ for regional faunal bone apatite (solid line) and one (dashed lines) and two (dotted lines) standard deviations are indicated.

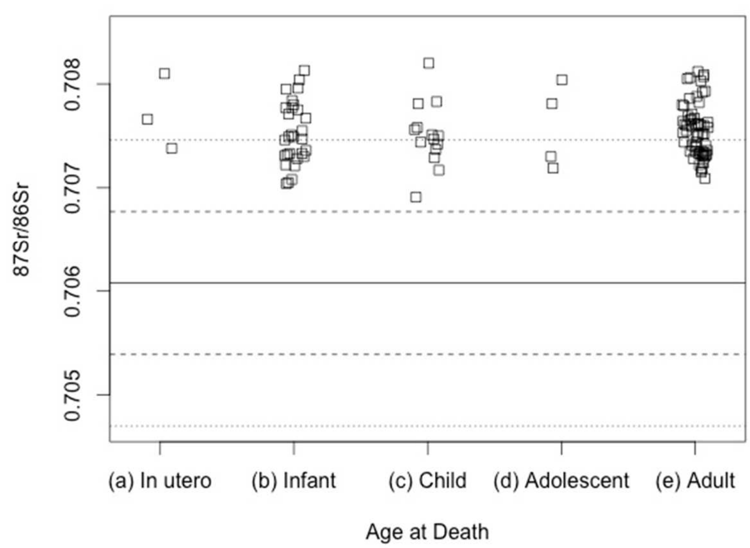
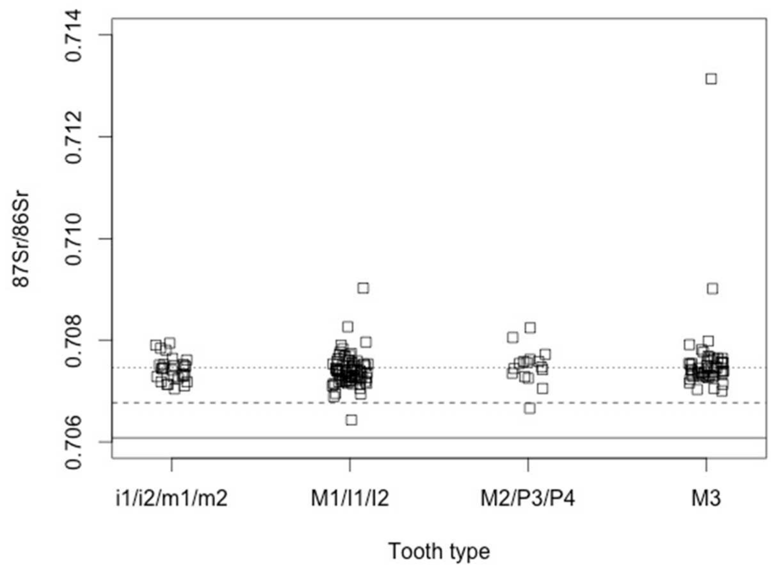


Figure 6.3. $^{87}Sr/^{86}Sr$ values in archaeological human tooth enamel samples from Armatambo and Rinconada Alta. Mean $^{87}Sr/^{86}Sr$ for regional faunal bone apatite (solid line) and one (dashed lines) and two (dotted lines) standard deviations are indicated.



Stable Oxygen Isotopes in Meteoric Water ($\delta^{18}O_{mw[V\text{-}SMOW]}$)

The results of the analyses of stable oxygen isotope ratios ($\delta^{18}O_{mw[V\text{-}SMOW]}$) in baseline meteoric water sources from throughout the study region are presented in Appendix F. As shown in Table 6.3, average $\delta^{18}O_{mw}$ for the region equals -12.4‰ ±1.0‰ (n=22, 1σ), with the minimum $\delta^{18}O_{mw}$=-14.6‰ and the maximum $\delta^{18}O_{mw}$ = -10.6‰. Average $\delta^{18}O_{mw}$ for geographic areas within the study region are similar to that of the region as a whole (Table 6.3). The local $\delta^{18}O_{mw}$ range for the study region is defined here as the mean $\delta^{18}O_{mw}$ for the entire region, plus and minus two standard deviations, or $\delta^{18}O_{mw}$= -14.4‰ to -10.4‰.

Table 6.3. Stable oxygen isotope ($\delta^{18}O_{mw[V\text{-}SMOW]}$) values for water sources in the study region

Geographic Area	***n***	**Average $\delta^{18}O_{mw(V\text{-}SMOW)}$ ‰**	**1σ**	**Minimum $\delta^{18}O_{mw(V\text{-}SMOW)}$ ‰**	**Maximum $\delta^{18}O_{mw(V\text{-}SMOW)}$ ‰**
Rimac Valley	7	-13.3	1.1	-14.6	-12.0
Lurín Valley	12	-11.9	0.7	-13.3	-10.6
Huarochirí highlands	3	-12.2	0.7	-13.0	-11.7
Entire region	**22**	**-12.4**	**1.0**	**-14.6**	**-10.6**

Stable Oxygen Isotopes in Carbonates ($\delta^{18}O_{ap[VPDB]}$) of Archaeological Bone and Tooth Enamel

Stable oxygen isotope values in carbonates ($\delta^{18}O_{ap[VPDB]}$) of archaeological human bone and tooth enamel samples are in Appendix E. Results of the conversion of the values to the $\delta^{18}O_{dw(V\text{-}SMOW)}$ standard format for comparison to observed $\delta^{18}O_{mw(V\text{-}SMOW)}$ values in baseline water samples from the study region are also shown in Appendix E. Because of the error introduced when converting carbonate stable oxygen isotope values ($\delta^{18}O_{ap[VPDB]}$) to drinking water stable oxygen isotope values $\delta^{18}O_{dw(V\text{-}SMOW)}$ (Daux et al. 2008), converted values are used here only in direct comparisons to baseline water sample stable oxygen isotope values ($\delta^{18}O_{mw[V\text{-}SMOW)]}$).

For all bone samples combined, stable oxygen isotopes in carbonates ($\delta^{18}O_{ap[VPDB]}$) range from $\delta^{18}O_{c(VPDB)}$ equals -10.9‰ to -4.5‰ with mean bone $\delta^{18}O_{ap(VPDB)}$ equal to -8.2‰±1.4‰ (n=114, 1σ). Converted to $\delta^{18}O_{dw(V\text{-}SMOW)}$, values range from $\delta^{18}O_{dw(V\text{-}SMOW)}$ equals -17.1‰ to -7.1‰ with mean bone $\delta^{18}O_{dw(V\text{-}SMOW)}$ equal to -13.0‰±2.2‰ (n=114, 1σ). As a whole, the range of bone values is much greater than the $\delta^{18}O_{mw(V\text{-}SMOW)}$ range determined for regional water sources above (Table 6.3). Because the total sample includes bone specimens from multiple young juvenile individuals, however, it is necessary to account for the enrichment effect on $\delta^{18}O_{dw(V\text{-}SMOW)}$ associated with breastfeeding before potential non-local values can be assessed (White et al. 2004a; Wright and Schwarcz 1999). Observing $\delta^{18}O_{dw(V\text{-}SMOW)}$ in bone samples by age indicates that bone samples from infants and children are enriched overall in $\delta^{18}O_{dw(V\text{-}SMOW)}$ relative to samples from fetal, adolescent, and adult samples, with many values exceeding the upper end of the $\delta^{18}O_{mw(V\text{-}SMOW)}$ range (Figure 6.4).

Figure 6.4. Values of $\delta^{18}O_{dw(V\text{-}SMOW)}$ in archaeological human bone samples by age at death. Mean $\delta^{18}O_{mw(V\text{-}SMOW)}$ for regional water sources (solid line) and one (dashed lines) and two (dotted lines) standard deviations are indicated.

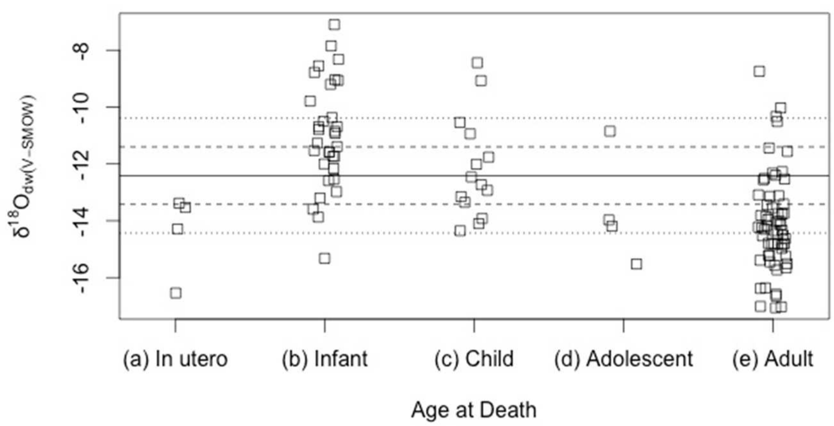


Table 6.4. Mean bone $\delta^{18}O_{ap(VPDB)}$ by age group

Age group	n^a	$\bar{x}^b$	s^c	**SE**^{d}
In utero	4	-9.2	0.9	0.5
Infant	32	-7.0	1.2	0.2
Child	14	-7.7	1.2	0.3
Adolescent	4	-8.7	1.3	0.6
Adult	60	-9.0	1.1	0.1

$^a n$ = sample size
$^b \bar{x}$ = sample mean
$^c s$ = standard deviation
^{d}SE = standard error

To test whether mean $\delta^{18}O_{ap(VPDB)}$ is significantly different among the age groups (Table 6.4), a one-factor analysis of variance (ANOVA) was performed. The variances of the residuals across the five age groups are not significantly different (Levene's test: $W_{4,109}$=0.23, P=0.92), and the residuals are normally distributed (Shapiro-Wilk test: W=0.98, P=0.07), indicating that the assumptions for an ANOVA test are met (Zar 2010). The results of the ANOVA indicate that the means are not the same for all age groups ($F_{4,109}$=17.46, P=0.00). A Tukey-Kramer test of all pairs of means indicates that mean infant and mean child $\delta^{18}O_{ap(VPDB)}$ are significantly different from mean adult $\delta^{18}O_{ap(VPDB)}$ (Table 6.5, Figure 6.5). Mean child $\delta^{18}O_{ap(VPDB)}$, however, is not significantly different from mean *in utero* and mean adolescent $\delta^{18}O_{ap(VPDB)}$. The latter two group means are also not significantly from the mean adult $\delta^{18}O_{ap(VPDB)}$. Because fetal bone $\delta^{18}O_{ap(VPDB)}$ values should reflect drinking water sources of the mother, the similarity of mean fetal bone $\delta^{18}O_{ap(VPDB)}$ to mean $\delta^{18}O_{ap(VPDB)}$ of adolescents and adults is not unexpected.

Figure 6.5. Error bar plot of mean $\delta^{18}O_{ap(VPDB)}$ in archaeological human bone samples in each age group

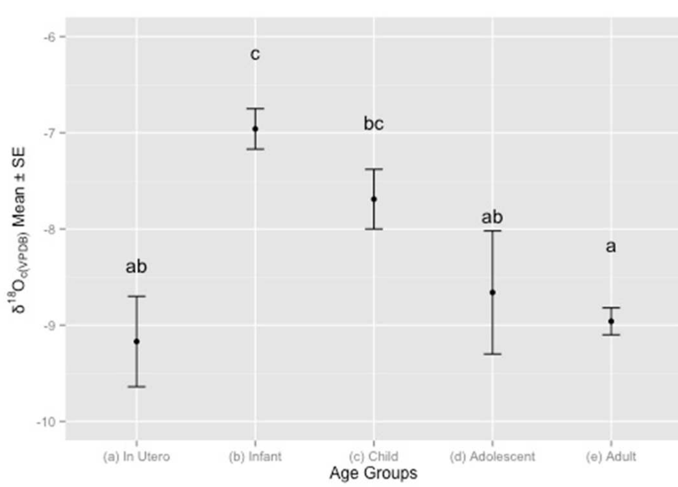


Table 6.5. Results of Tukey-Kramer test of comparisons of mean bone $\delta^{18}O_{ap(VPDB)}$ among age groups

Comparison	**Difference in means**	**P**
In utero vs. Infant	-2.2	***0.00***
In utero vs. Child	-1.5	0.16
In utero vs. Adolescent	-0.5	0.97
In utero vs. Adult	-0.2	1.00
Infant vs. Child	0.7	0.28
Infant vs. Adolescent	1.7	0.05
Infant vs. Adult	2.0	***0.00***
Child vs. Adolescent	1.0	0.57
Child vs. Adult	1.3	***0.00***
Adolescent vs. Adult	0.3	0.99

For all tooth enamel samples, $\delta^{18}O_{ap(VPDB)}$ values range from -11.6‰ to -4.9‰ with average tooth enamel $\delta^{18}O_{ap(VPDB\ B)}$ equal to -9.3‰±0.9‰ (n=156, 1σ). Converted to $\delta^{18}O_{dw(V\text{-}SMOW)}$, values range from -18.1‰ to -7.7‰ with average tooth enamel $\delta^{18}O_{dw(V\text{-}SMOW)}$ equal to -14.6‰±1.4‰ (n=156, 1σ). The range of tooth enamel sample $\delta^{18}O_{dw(V\text{-}SMOW)}$ by tooth types, grouped according to age of crown formation is shown in Figure 6.6. Two distinct outliers, one permanent first molar and one permanent third molar, both from the same individual (RINC-G9698.IIAE-1115-1) are evident. Removing the two outliers shows the apparent enrichment in $\delta^{18}O_{dw(V\text{-}SMOW)}$ values for the groups of tooth types that form during the potential period of weaning, specifically deciduous incisors and molars (formation time: *in utero* to 2-11 months), permanent first molars (formation time: 0-4 years), and permanent first and second incisors (formation time: 3 months to 5 years), relative to later forming teeth, specifically permanent second molars (formation time: 3-5 years) and permanent third molars (formation time: 7-18 years) and relative to local $\delta^{18}O_{mw(V\text{-}SMOW)}$ values (Figure 6.7; Hillson 1996).

Figure 6.6. Values of $\delta^{18}O_{dw(V\text{-}SMOW)}$ in archaeological human tooth samples by tooth types grouped by time of formation.

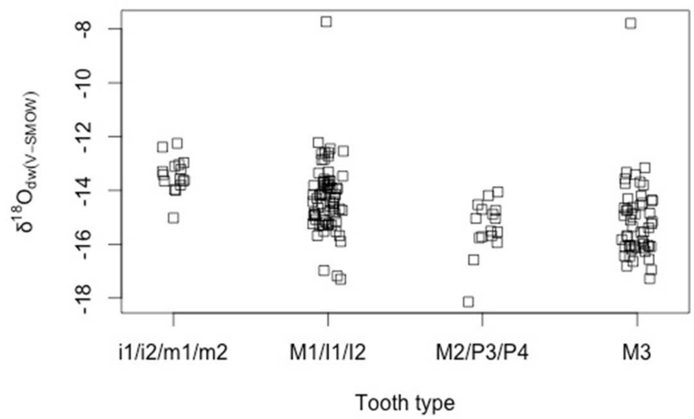
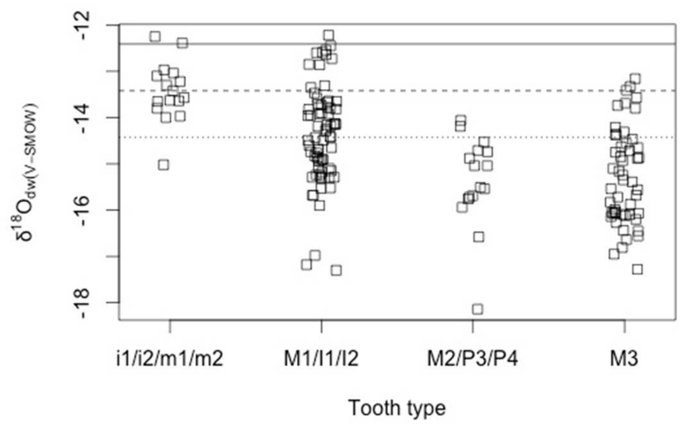


Figure 6.7. Values of $\delta^{18}O_{dw(V\text{-}SMOW)}$ in archaeological human tooth samples by tooth types grouped by time of formation with outliers removed. Mean $\delta^{18}O_{mw(V\text{-}SMOW)}$ for regional water sources (solid line) and one (dashed lines) and two (dotted line) standard deviations are indicated.



Mean $\delta^{18}O_{ap(VPDB)}$ for the two early forming tooth type groups are greater than the mean $\delta^{18}O_{ap(VPDB)}$ in the permanent second and third molar groups (Table 6.6). To test the significance of differences in mean $\delta^{18}O_{ap(VPDB)}$ among the early-forming versus later-forming tooth type groups, a one-factor ANOVA was performed on the total tooth enamel sample excluding the two outliers mentioned above. A test of the variances of the residuals across the four tooth type groups shows that they are not significantly different (Levene's test: $W_{3,150}$=1.89, P=0.13). The residuals are also normally distributed (Shapiro-Wilk test: W=0.98, P=0.07), and thus the assumptions for an ANOVA test are met (Zar 2010). The results of the ANOVA show that the means are not the same for all age groups ($F_{3,150}$=19.00, P=0.00).

Table 6.6. Mean tooth enamel $\delta^{18}O_{ap(VPDB)}$ by tooth types grouped by formation time.

Tooth type	n^a	$\bar{x}^b$	s^c	SE^d
i1/m1/m2^e	16	-8.5	0.4	0.1
M1/I1/I2^f	71	-9.1	0.7	0.1
M2^g	16	-9.8	0.6	0.2
M3^h	51	-9.7	0.7	0.1

$^a n$ = sample size

$^b \bar{x}$ = sample mean

$^c s$ = standard deviation

^{d}SE = standard error

^{e}Includes deciduous first incisors (n=1), deciduous first molars (n=2), and deciduous second molars (n=13).

^{f}Includes permanent first molars (n=68), permanent first incisors (n=1), and permanent second incisors (n=2). Excludes one M1 outlier from individual RINC-G9698.IIAE-1115-1.

^{g}Includes only permanent second molars.

^{h}Includes only permanent third molars. Excludes one outlier from individual RINC-G9698.IIAE-1115-1.

A Tukey-Kramer test of all pairs of means shows that both the mean $\delta^{18}O_{c(VPDB)}$ for the deciduous tooth group and the mean $\delta^{18}O_{c(VPDB)}$ for the permanent first molar and first and second incisors group are significantly different from one another and from the means of the permanent second molar group and permanent third molar group (Table 6.7; Figure 6.8). The latter two groups are not significantly different from one another (Table 6.7; Figure 6.8). Significantly increased mean $\delta^{18}O_{c(VPDB)}$ in deciduous incisor and molar tooth enamel relative to all later-forming tooth types most likely reflects the influence of breastfeeding during the first year of life (Dupras and Tocheri 2007; Roberts et al. 1988;

White et al. 2004a; Wright and Schwarcz 1999). The mean $\delta^{18}O_{c(VPDB)}$ of the permanent first molars and incisors group is significantly less than the deciduous tooth group mean and significantly greater than the permanent second and third molars group means. This intermediate position likely reflects the period of weaning from breast milk to solid foods that generally occurs during the first five years of life when the permanent first molars and first and second incisors are formed (Hillson 1996). The lack of significant difference in mean $\delta^{18}O_{c(VPDB)}$ between the permanent second and permanent third molars, which form during ages 3-5 years and 7-18 years, respectively (Hillson 1996), suggests that young children imbibed water from sources similar to those of older children and teenagers.

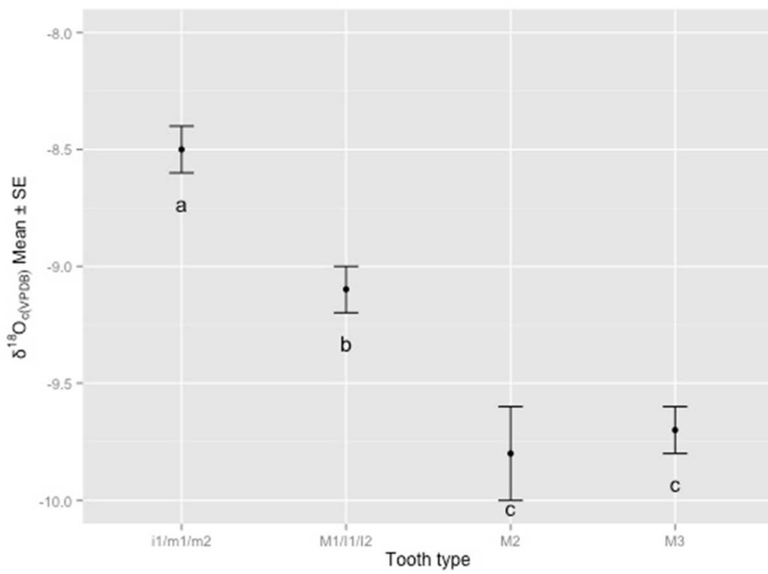
Table 6.7. Results of Tukey-Kramer test of comparisons of mean $\delta^{18}O_{ap(VPDB)}$ among age groups

Comparison	Difference in means	P
i1/m1/m2 vs M1/I1/I2	0.6	***0.00***
i1/m1/m2 vs M2	1.3	***0.00***
i1/m1/m2 vs M3	1.2	***0.00***
M1/I1/I2 vs. M2	0.6	***0.00***
M1/I1/I2 vs. M3	0.6	***0.00***
M2 vs M3	-0.1	0.99

Taking into account the overall enrichment of $\delta^{18}O_{c(VPDB)}$ values in skeletal tissues formed during childhood, potential non-local individuals and extra-regional residential mobility can be identified. Changes in $\delta^{18}O_{dw(VPDB)}$ values over the life course inferred from changes among skeletal tissues from the same individual that form at different periods of life are compared to the local $\delta^{18}O_{mw(V\text{-}SMOW)}$ range in Figures 6.9 and 6.10. Due to inter-laboratory variability in $\delta^{18}O$ measurements, Pestle and colleagues (2014) calculate 3.1‰ as the Minimum Meaningful Difference (MMD) for $\delta^{18}O$

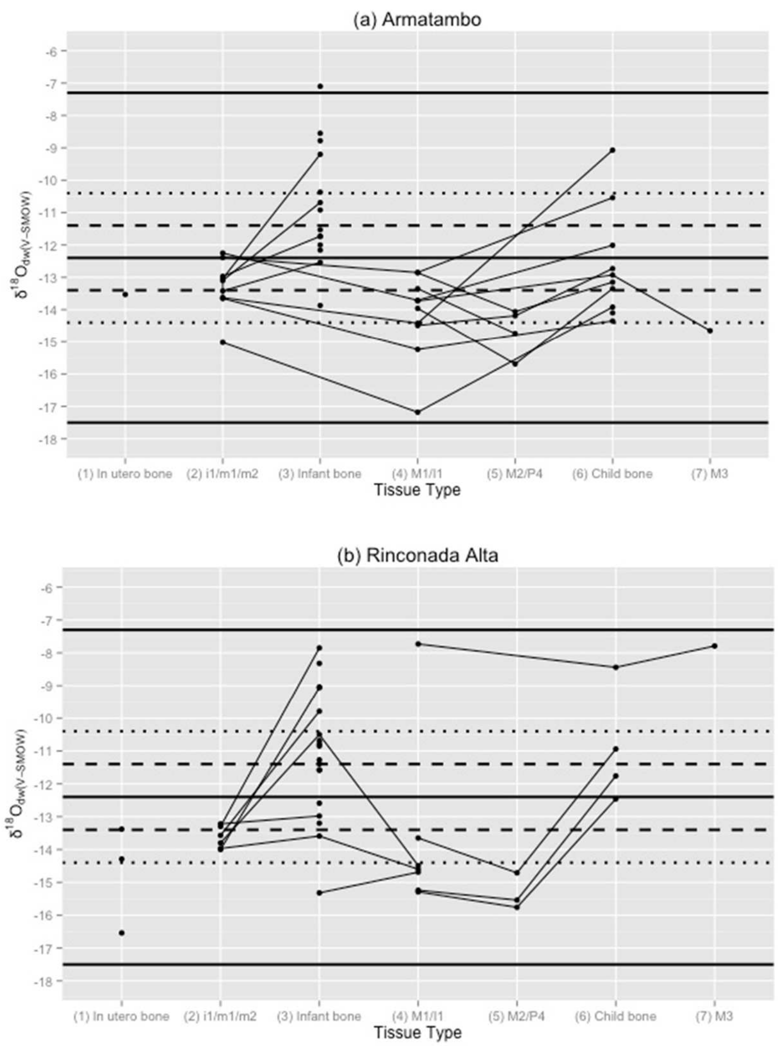
comparisons. In other words, only differences in $\delta^{18}O$ greater than 3.1‰ should be considered to reflect *bona fide* differences associated with environmental differences used to infer residential mobility (Pestle et al. 2014). Thus, only archaeological bone and tooth enamel $\delta^{18}O_{dw(VPDB)}$ values at least 3.1‰ outside of the local $\delta^{18}O_{mw(V\text{-}SMOW)}$ range determined above are considered here to be non-local values as described below.

Figure 6.8. Error bar plot of mean $\delta^{18}O_{ap(VPDB)}$ in archaeological human tooth enamel samples for each tooth type group. The two outliers in Figure 6.1 are not included.



All changes in juvenile $\delta^{18}O_{dw(V\text{-}SMOW)}$ values over the life course are shown in Figure 6.9 in relation to all juvenile $\delta^{18}O_{dw(V\text{-}SMOW)}$ values and the range of $\delta^{18}O_{mw(V\text{-}SMOW)}$ in local water samples. Only one Armatambo infant bone sample exhibits a $\delta^{18}O_{dw(V\text{-}SMOW)}$ value outside of the local $\delta^{18}O_{mw(V\text{-}SMOW)}$ range when the MMD is taken into consideration (Figure 6.9a). Because infant bone specimens overall are significantly enriched in $\delta^{18}O_{c(VPDB)}$ as shown above, this high value can be accounted for by enrichment due to breastfeeding and is unlikely to represent a non-local individual.

Figure 6.9. All juvenile $\delta^{18}O_{dw(V\text{-}SMOW)}$ values from all skeletal samples at (a) Armatambo and (b) Rinconada Alta. Samples from the same individual are connected with a line. Mean $\delta^{18}O_{mw(V\text{-}SMOW)}$ for regional water sources (center solid line) and one (dashed lines) and two (dotted line) standard deviations are indicated. Outer solid lines mark the 3.1‰ MMD on either side of this $\delta^{18}O_{mw(V\text{-}SMOW)}$ regional range.

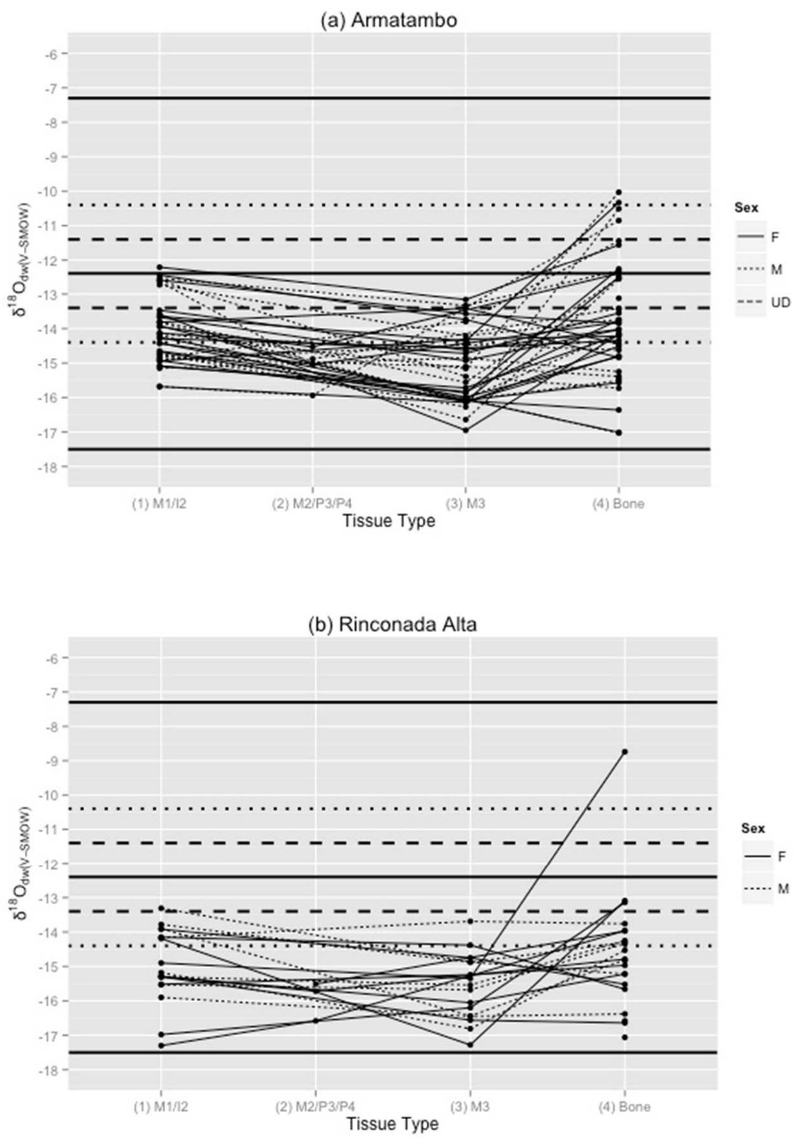


Of note, the outlier mentioned above, an eight- to nine-year-old juvenile buried at Rinconada Alta (RINC-G9698.IIAE-1115-1), exhibits $\delta^{18}O_{dw(V\text{-}SMOW)}$ values for all tissues analyzed that fall outside the 2σ range of $\delta^{18}O_{mw(V\text{-}SMOW)}$ for regional water samples. Specifically, this juvenile's first molar and third molar $\delta^{18}O_{dw(V\text{-}SMOW)}$ values are much greater than first and third molars from any other individual analyzed from either site (Figures 6.9-6.10). In addition, the bone $\delta^{18}O_{dw(V\text{-}SMOW)}$ for this juvenile falls near the highest $\delta^{18}O_{dw(V\text{-}SMOW)}$ values of the infant bone samples, despite the juvenile's advanced post-weaning age (Figure 6.9). However, because these values are not greater than 3.1‰ beyond the 2σ range of $\delta^{18}O_{mw(V\text{-}SMOW)}$ for regional water samples, these values fall within the range of inter-laboratory variability for $\delta^{18}O$ and thus cannot be considered to reflect non-local residential mobility. This individual's $^{87}Sr/^{86}Sr$ values fall within the local bioavailable $^{87}Sr/^{86}Sr$ range discussed above. Interestingly, one adult female from Rinconada Alta, Individual RINC-G9698.II-0567-ENT116, the individual with the high outlier $^{87}Sr/^{86}Sr$ value above, presents a high bone $\delta^{18}O_{dw(V\text{-}SMOW)}$ value close to that of Individual RINC-G9698.IIAE-1115-1 and is examined in greater detail below (Figure 6.10b).

Figure 6.10 shows changes in adult and adolescent $\delta^{18}O_{dw(V\text{-}SMOW)}$ values over the life course in relation to the range of $\delta^{18}O_{mw(V\text{-}SMOW)}$ in local water samples. All adult and adolescent $\delta^{18}O_{dw(V\text{-}SMOW)}$ values fall within the local $\delta^{18}O_{mw(V\text{-}SMOW)}$ range when the MMD is taken into consideration (Figure 6.10). The adult female from Rinconada Alta who exhibits the high outlier third molar $^{87}Sr/^{86}Sr$ value, Individual RINC-G9698.II-0567-ENT116, presents the highest bone $\delta^{18}O_{dw(V\text{-}SMOW)}$ value (-8.31‰). Notably, Individual RINC-G9698.II-0567-ENT116's bone $^{87}Sr/^{86}Sr$ value falls within the local bioavailable $^{87}Sr/^{86}Sr$ range as described above and suggests that the high bone $\delta^{18}O_{dw(V\text{-}SMOW)}$ measurement is likely the result of inter-laboratory variability and not a reflection non-local residence during the last years of life. Intriguingly, this value is very near to the enriched bone $\delta^{18}O_{dw(V\text{-}SMOW)}$ value (-8.06) of the Rinconada Alta juvenile Individual

RINC-G9698.IIAE-1115-1 described above and suggests that these two individuals may have consumed water from sources with similarly high $\delta^{18}O_{mw(V\text{-}SMOW)}$ values during their last years of life.

Figure 6.10. All adult $\delta^{18}O_{dw(V\text{-}SMOW)}$ values from all skeletal samples at (a) Armatambo and (b) Rinconada Alta. Adult $\delta^{18}O_{dw(V\text{-}SMOW)}$ values from individuals with one or more values outside the local $\delta^{18}O_{mw(V\text{-}SMOW)}$ range. Samples from the same individual are connected with a line. Mean $\delta^{18}O_{mw(V\text{-}SMOW)}$ for regional water sources (solid line) and one (dashed lines) and two (dotted line) standard deviations are indicated. Outer solid lines mark the 3.1‰ MMD on either side of this $\delta^{18}O_{mw(V\text{-}SMOW)}$ regional range.



Summary of Results

To summarize the results, baseline radiogenic strontium values from modern soils and *Cavia porcellus* bone apatite were found to be similar to previously published values for the study region and nearby valleys, but with a broader overall range likely due to the wider range of locations sampled. Values of radiogenic strontium isotopes in archaeological human bone apatite and tooth enamel are homogenous overall with an increased range relative to local faunal values likely a result of the consumption of marine foods. One adult female from Rinconada Alta, RINC-G9698.II-0567-ENT116, presents a third permanent molar radiogenic strontium value well outside the regional radiogenic strontium isotope range. This individual thus likely consumed resources from outside the region during the formation of this tooth between ages 7-18 years. Her first permanent molar and bone radiogenic strontium values, which reflect early childhood and her last years of adult life, respectively, lie within the local regional range.

A local range of stable oxygen isotope ratios in baseline meteoric water sources was defined for the region including the Rimac and Lurín Valleys and adjacent Huarochirí highlands. Stable oxygen isotope values in carbonates of archaeological human bone and tooth enamel, converted to drinking water stable oxygen isotope values, exhibit a range much greater than the locally defined range. The influence of breastfeeding is detected in significantly increased mean infant and mean child bone stable oxygen isotope values relative to adult bone values, as well as significantly increased mean stable oxygen isotope values for early-forming deciduous teeth and for early-forming permanent incisors and first molars relative to later-forming permanent second and third molars. Taking into account both this enrichment in skeletal tissues formed during childhood and inter-laboratory variability in stable oxygen isotope measurements, no further evidence of non-local residential origins or mobility is present among the sample of individuals analyzed.

Chapter 6 Notes

[1] Stable isotope ratios are expressed in δ notation relative to an international standard in parts per thousand (‰), or $\delta^{H}X = [(R_{SAMPLE}/R_{STANDARD}) - 1) \times 1000$ per mil. (X represents the element, H represents the heavy isotope, and R represents the ratio of the heavy isotope to the light isotope.)

Chapter 7

RECONSTRUCTING DIET FROM STABLE CARBON ($\delta^{13}C$) AND NITROGEN ($\delta^{15}N$) ISOTOPES

To examine dietary practices as potential mechanisms of social identification at Armatambo and Rinconada Alta, diet is reconstructed using stable carbon and nitrogen isotopes and dental wear and pathology in Chapters 7 and 8. Chapter 7 focuses on stable carbon and nitrogen isotope analysis of archaeological human tissues as a means of direct assessment of individual paleodiet. Here, the background of this technique is presented, along with the methods used in the current study, and the results obtained. The first section reviews the use of stable carbon and nitrogen isotopes in archaeological human tissues to reconstruct certain aspects about diets in the past. Next, collection methods used to obtain modern botanical and faunal samples used to construct a stable carbon and nitrogen isotopic baseline local to the study region are described, followed by a description of laboratory methods used to process and analyze all modern and archaeological samples for stable carbon and nitrogen isotopes. Finally, the results of these analyses are presented.

Using Stable Carbon ($\delta^{13}C$) and Nitrogen ($\delta^{15}N$) Isotopes to Reconstruct Diet

Over the last several decades, the analysis of stable carbon and nitrogen isotope ratios in archaeological human remains has become a well-established method for reconstructing paleodiet (Ambrose 1993; Ambrose and DeNiro 1986; Katzenberg 2000; Schwarcz and Schoeninger 1991; Schwarcz and Schoeninger 2011; Tykot 2004; van der Merwe and Vogel 1978; Vogel and van der Merwe 1977). Inferences about paleodiet are possible due to the transfer of variation in stable carbon and nitrogen isotope ratios in dietary resources to consumers' body tissues (Ambrose and Norr 1993; Chisholm et al. 1982; DeNiro and Epstein 1978, 1981; Schoeninger and DeNiro 1984; Schoeninger et al. 1983). Stable carbon and nitrogen isotope ratios in archaeological human bone collagen, tooth dentin, and, where preserved, hair and nail keratin, muscle, and skin are used to reconstruct dietary protein sources (e.g., Bocherens 1997; Chisholm et al. 1982; Dupras and Tocheri 2007; Fernández 1999; Finucane et al. 2006; Finucane 2007; Hastorf 1985; Hu et al. 2006; Keegan and DeNiro 1988; Knudson et al. 2007; Macko et al. 1999a; Macko et al. 1999b; McCullagh et al. 2005; O'Connell and Hedges 1999; Richards and Hedges 1999; Scherer et al. 2007; Slovak and Paytan 2009; Tomczak 2003; van der Merwe and Vogel 1978; Vogel and van der Merwe 1977; Webb et al. 2013; White 1993; Williams and Katzenberg 2012; Wright and Schwarcz 1999). Stable carbon isotope ratios in hydroxyapatite carbonates of archaeological human bone and tooth enamel in contrast reflect the whole diet and are used in conjunction with stable carbon and stable nitrogen isotope ratios in bone collagen to assess relative differences in sources of dietary protein and energy (e.g., Ambrose 1993; Ambrose and Norr 1993; Froehle et al. 2012; Hu et al. 2006; Kellner and Schoeninger 2007; Krueger and Sullivan 1984; Lee-Thorp et al. 1989; Slovak and Paytan 2009).

The use of stable carbon and nitrogen isotopic analysis for reconstructing paleodiet is possible due to isotopic differences within and between ecosystems. Carbon and nitrogen each exhibit two stable isotopes, ^{13}C and ^{12}C and ^{15}N and ^{14}N, respectively (Hoefs 2004; Nier 1950). Certain plant and animal groups exhibit variation in ratios of stable carbon isotopes, $^{13}C/^{12}C$, expressed as $\delta^{13}C$, and in ratios of stable nitrogen isotopes, $^{15}N/^{14}N$, expressed as $\delta^{15}N$ (Hedges and Reynard 2007; Kelly 2000; Tieszen and Chapman 1992; Virginia and Delwiche 1982; Wada et al. 1975). Isotopic variation among plants is transferred to consumers' tissues and up the food chain. On average, an organism's tissues exhibit stable carbon isotope values ($\delta^{13}C$) increased by approximately 1‰ (per mil) relative to the diet, while stable nitrogen isotope values ($\delta^{15}N$) are increased by approximately 3-4‰ (DeNiro and Epstein 1978, 1981; Minagawa and Wada 1984). Analysis of stable carbon and nitrogen isotope values in archaeological human tissues, therefore, can be used to reconstruct relative differences in the consumption of certain groups of plants and animals, specifically those that vary in stable carbon and nitrogen isotope ratios (Chisholm et al. 1982; DeNiro and Epstein 1978, 1981; Schoeninger and DeNiro 1984; Schoeninger et al. 1983).

Stable carbon and nitrogen isotope analysis is generally used to reconstruct four particular aspects of past human diets: (1) relative consumption of marine versus terrestrial foods, (2) relative consumption of C_4- and CAM-photosynthetic plant foods versus C_3-photosynthetic plant foods, (3) trophic level, or the relative consumption of carnivorous animal foods versus herbivorous animal foods versus plant foods, and (4) relative differences in sources of dietary protein and in sources of dietary energy from carbohydrates and lipids. First, variation in stable carbon and nitrogen isotopes between marine and terrestrial ecosystems makes it possible to reconstruct relative differences in consumption of marine versus terrestrial resources in past human populations (Chisholm et al. 1982; Schoeninger and DeNiro 1984; Schoeninger et al. 1983). On average, marine organisms exhibit increased $\delta^{13}C$ and $\delta^{15}N$ values relative to terrestrial organisms (Ambrose 1993; Deines 1980; Kelly 2000; Schoeninger and DeNiro 1984). Early tests of each element separately within select populations known to have distinct diets demonstrated the usefulness of stable carbon and nitrogen isotope analysis for differentiating marine and terrestrial consumers (e.g., Chisholm et al. 1982; Schoeninger et al. 1983). Subsequent work has examined stable carbon and nitrogen isotope ratios in conjunction to effectively demonstrate differences in relative consumption of marine versus terrestrial foods consumed in groups around the world (e.g., Ambrose et al. 1997; Keegan and DeNiro 1988; Richards and Hedges 1999; Walker and DeNiro 1986), including the Andean coast (e.g., Knudson et al. 2007; Slovak and Paytan 2009; Tomczak 2003).

Importantly, however, some overlap in the overall ranges of $\delta^{13}C$ and $\delta^{15}N$ values of marine and terrestrial organisms requires careful consideration of $\delta^{13}C$ and $\delta^{15}N$ values in locally available resources when drawing interpretations about past human diets (Ambrose 1993; Kelly 2000; Schoeninger and DeNiro 1984; Sealy et al. 1987; Szpak et al. 2013). For example, increases in $\delta^{15}N$ due to marine food consumption may overlap with increases in $\delta^{15}N$ associated with increased trophic level as discussed in further detail below (Ambrose 1993; DeNiro and Epstein 1981; Minagawa and Wada 1984). In addition, terrestrial plants with certain photosynthetic pathways may be similarly enriched in $\delta^{13}C$ as discussed below (Bender 1968; Bender et al. 1973; Deines 1980; Johnson and Hatch 1968; Smith and Epstein 1971).

In addition to distinguishing marine and terrestrial resources, stable carbon and nitrogen isotopes also can be used to assess differences in consumption of certain plant types that exhibit variation in $\delta^{13}C$ or $\delta^{15}N$ associated with differences in physiological mechanisms. For example, plants that utilize a dicarboxylic acid, or C_4, photosynthetic pathway exhibit increased $\delta^{13}C$ relative to plants that utilize the more common C_3-photosynthetic pathway (Bender 1968; Deines 1980; Smith and Epstein 1971). C_4-photosynthetic plants of significance to human diets include tropical grasses, such as *Zea mays* (corn), *Saccharum* (sugar cane), and *Sorghum* (sorghum), as well as a few dicots, such as some species of *Amaranthus* (amaranth) and *Atriplex* (saltbush) (Bender 1968; Johnson and Hatch 1968; Smith and Epstein 1971). Similarly, some plants that utilize a Crassulacean acid metabolism, or CAM, photosynthetic pathway are also enriched in $\delta^{13}C$ on average relative to C_3-photosynthetic plants, although the overall range of CAM-photosynthetic plants overlaps with that of C_3-photosynthetic plants (Bender et al. 1973; Deines 1980). CAM-photosynthesis is utilized by succulents and cacti (Bender et al. 1973; O'Leary 1988), which may serve as dietary resources for human groups in desert and tropical regions (Ambrose 1993; Mizrahi et al. 1997; Reinhard 1992). Because $\delta^{13}C$ values in plants are further influenced by environmental effects such as canopy cover, light intensity, water availability, and soil salinity, the construction of a local isotopic baseline to infer diet from archaeological human isotope data is necessary (Szpak et al. 2013).

Evidence of consumption of C_4- and CAM-photosynthetic plants among past human groups can be identified by increased $\delta^{13}C$ values in archaeological human remains (e.g., Ambrose and DeNiro 1986; Blake et al. 1992; Chisholm and Matson 1994; Decker and Tieszen 1989; Farnsworth et al. 1985; Vogel and van der Merwe 1977; White 1993). Because C_3-photosynthetic plants are much more common than C_4- and CAM-photosynthetic plants, differences in $\delta^{13}C$ values among human remains are often used to infer relative differences in the consumption of one or two particular plant species in areas where only one or two types of C_4- or CAM-photosynthetic plants are known to have been available or used as staple crops (Decker and Tieszen 1989; Finucane 2007; Lynott et al. 1986; Vogel and van der Merwe 1977; White 1993). In the Andes, differences in $\delta^{13}C$ values in archaeological human remains have often been used to assess the relative degree of consumption of *Zea mays* (maize), a C_4-photosynthetic plant (Burger and van der Merwe 1990; Finucane et al. 2006; Finucane 2007, 2009; Kellner and Schoeninger 2008; Lambert et al. 2012; Slovak and Paytan 2009; Tykot and Staller 2002; Ubelaker et al. 1995). Such studies rely on the assumption that increased $\delta^{13}C$ values (without a corresponding increase in $\delta^{15}N$ indicative of marine consumption) are indicative of maize consumption. Importantly, this assumption has recently been called into question by recent surveys of stable carbon isotope values in wild and domesticated Andean plants that reveals approximately one-third of plants in the Andean region also exhibit $\delta^{13}C$ values associated with C_4- or CAM-photosynthesis, including *Amaranthus caudatus* (amaranth, or *kiwicha*), an important grain domesticate in the region (Cadwallader et al. 2012; Szpak et al. 2013; Turner et al. 2010).

Similar to photosynthesis, differences in physiological mechanisms used by plants to obtain nitrogen cause variation in stable nitrogen isotopes. Specifically, plants that utilize nitrogen fixation to incorporate atmospheric nitrogen into their tissues, exhibit decreased $\delta^{15}N$ values relative to other plants that do not fix atmospheric nitrogen (Ambrose 1993; Virginia and Delwiche 1982). Nitrogen-fixing plants of importance in human diets are the legumes, which include species such as *Arachis hypogaea* (peanut), *Phaseolus* sp. (bean), *Vicia faba* (broad bean), *Glycine max* (soybean), *Pisum sativum* (pea), *Lens culinaris* (lentil), and *Medicago* (alfalfa) (Stewart 1977). Numerous complications arise, however, in identifying legume consumption in paleodietary reconstructions using stable nitrogen isotopes. Specifically, $\delta^{15}N$ differences between nitrogen-fixing and non-nitrogen-fixing plants may vary with location and season (see DeNiro and Epstein 1981). In addition, low $\delta^{15}N$ values in nitrogen-fixing plants may be offset by the use of fertilizers, which increase $\delta^{15}N$ (e.g., Szpak et al. 2014). Plant $\delta^{15}N$ values are also influenced by environmental factors such as temperature and water availability (Szpak et al. 2013).

Stable nitrogen isotopes may also be used to reconstruct trophic level. Animal tissues are enriched in $\delta^{15}N$ by approximately +3‰ relative to the diet (DeNiro and Epstein 1981; Minagawa and Wada 1984). Due to this consistent enrichment in $\delta^{15}N$ over the diet, $\delta^{15}N$ values may be useful for assessing an organism's trophic level, or the relative consumption of carnivorous animal foods versus herbivorous animal foods versus plant foods (Hedges and Reynard 2007; Schoeninger and DeNiro 1984). Children who are breastfeeding similarly exhibit a trophic level shift with $\delta^{15}N$ values +2.4‰ higher than their mothers' $\delta^{15}N$ values (Fogel et al. 1989). For this reason, $\delta^{15}N$ values of early-forming juvenile skeletal elements can be used to estimate dietary changes associated with birth and weaning (e.g., Dupras and Tocheri 2007; Wright and Schwarcz 1999). Additional potential confounding effects influencing δ^{15}N values in human tissues include inter-individual variation associated with physiological changes due to pregnancy, growth, fasting, and starvation (see Finucane 2007; Hedges and Reynard 2007). Finally, in arid environments, differences between δ^{15}N values in human and animal tissues and δ^{15}N values in the diet in general are largely increased as a result of physiological adaptations to water stress (Ambrose 1993; Sealy et al. 1987).

Importantly, δ^{13}C and δ^{15}N values in human and animal tissues represent the diet only during the period of formation of the tissue. For this reason, comparison of δ^{13}C and δ^{15}N values in tissues that form at different times can be used to assess relative changes in diet over the life course (e.g., Knudson et al. 2012b; Sealy et al. 1995). For example, tooth enamel and dentin are formed during childhood and remain unchanged throughout the life course (Hillson 1996). Values of δ^{13}C and δ^{15}N in enamel and dentin from teeth that form at different times can be compared with one another to assess dietary changes during childhood, such as weaning (e.g., Dupras and Tocheri 2007; Wright and Schwarcz 1999). In adults, values of δ^{13}C and δ^{15}N from teeth can also be compared with δ^{13}C and δ^{15}N values in bone to assess relative changes between childhood and adult diets (e.g., Sealy et al. 1995). Bones begin forming *in utero*, are continuously remodeled as they grow over the course of childhood, and continue to remodel throughout adulthood exhibiting complete turnover every several years (Baker et al. 2005; Ortner 2003; Price et al. 2002). Finally, hair grows from the base of the scalp at a rate of approximately 0.44-0.45 mm per day per month (Randall and Ebling 1991; Saitoh et al. 1969). Values of δ^{13}C and δ^{5}N in bulk or sectioned hair samples can thus be used to reconstruct an individual's diet during the last months or years of life (e.g., Knudson et al. 2007; Macko et al. 1999a; O'Connell and Hedges 1999; Roy et al. 2005; Webb et al. 2013; Williams and Katzenberg 2012).

Because archaeological human tissues used in stable carbon and nitrogen isotope analyses are generally exposed to a burial environment, they are subject to diagenetic contamination and must be assessed. Mechanical and chemical cleaning procedures prior to isotopic analysis serve to remove external tissue layers more prone to contamination. In addition, examination of the chemical composition of tissues in conjunction with analyses for stable carbon and nitrogen isotopes allows for assessment of contamination. Uncontaminated high-quality collagen samples present adequate collagen yields, greater than 2.0 wt%, elemental carbon to nitrogen ratios (C:N) within an acceptable range of 3.1-3.6, and a normal crystallinity index (Ambrose 1990; Hedges 2002; van Klinken 1999). Hair is formed by hydrophobic proteins that are not sensitive to degradation making diagenetic contamination less likely (Lubec et al. 1987). Preservation of hair keratin, however, may be assessed through analysis of amino acid types and abundances (Macko et al. 1999a).

Stable Carbon (δ^{13}C) and Nitrogen (δ^{15}N) Isotopic Baseline Sample Collection

To account for local environmental variation in δ^{13}C and δ^{15}N in food resources (Ambrose 1991, 1993; Heaton 1999; Keegan and DeNiro 1988), a stable carbon and nitrogen isotopic baseline was generated for the interpretation of δ^{13}C and δ^{15}N values in archaeological human tissues used to reconstruct diet in the Rimac Valley. An attempt was made to collect the widest possible variety of modern botanical and faunal species from throughout the study region for stable carbon and isotope analysis. Collection focused on modern botanical and faunal samples known to have been cultivated or available during pre-Columbian periods. The majority of such resources were identified from published archaeological sources that report species or genus level identifications of a wide variety of exceptionally preserved macro-faunal or macro-botanical remains recovered from the region (e.g., Cohen 1978; Feltham 1983; Marcus et al. 1999). Other collections included additional edible marine species and additional crops domesticated in the Andes. Archaeological samples were not used due to known isotopic changes in uncarbonized archaeological plants (DeNiro and Hastorf 1985), as well as the lack of previously studied and identified archaeological faunal remains in the Armatambo and Rinconada Alta collections (MNAAHP personnel, personal communication 2012). All modern botanical and faunal samples were collected by the author and exported to the Arizona State University Archaeological Chemistry Laboratory under United States Department of Agriculture regulations (Veterinary Permits 117748 and 121146, Plant Permit PDEP-11-00050).

Where possible, samples were collected by hand from Lurín Valley beaches or purchased from local farmers and fishermen in the Rimac and Lurín Valleys and Huarochirí highlands. Additional samples were purchased from local markets, specifically the Lurín town market and the Villa Maria del Triunfo fish market (Terminal Pesquero Villa Maria del Triunfo) located in south Lima between the Lurín and Rimac Valleys. A few plants that could not be obtained from local sources were purchased as products cultivated in outside regions, specifically from Cuzco purchased at Wong supermarkets, and from Ica purchased from the owners of Samaca Organic products (Appendix G). It is important to note that the stable carbon and nitrogen isotope data from such samples may vary slightly compared to those of the same species previously cultivated in the Rimac Valley and are used here only as a general estimate. In addition, for high trophic level marine fauna for which samples could not be obtained locally for the present study, published $\delta^{13}C$ and $\delta^{15}N$ values for specimens collected from animals at Western Pacific locales presented in Appendix H were used.

Laboratory Methods for Stable Carbon ($\delta^{13}C$) and Nitrogen ($\delta^{15}N$) Isotope Analysis

Analysis of Stable Carbon and Nitrogen Isotopes in Modern Plants ($\delta^{13}C_{[VPDB]}$ and $\delta^{15}N_{[AIR]}$), Modern and Archaeological Bone Collagen ($\delta^{13}C_{col[VPDB]}$ and $\delta^{15}N_{col[AIR]}$), and Archaeological Hair Keratin ($\delta^{13}C_{ker[VPDB]}$ and $\delta^{15}N_{ker[AIR]}$)

Modern plant and faunal soft tissue and bone samples collected for baseline stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope data were gently cleaned and dried in the field by the author prior to exportation. Bone samples were defleshed mechanically by hand and dried at approximately 35˚C in a food dehydrator for 12-24 hours. Plant and faunal soft tissue samples were rinsed with water to remove any dirt or adhering matter. Leaf samples were air dried at room temperature. Fruits and faunal soft tissues were cut into thin slices and dried separately in a food dehydrator at approximately 35˚C for 12-48 hours. Dried samples were stored in plastic bags with silica during exportation to prevent the growth of fungi and bacteria.

At the Archaeological Chemistry Laboratory in the School of Human Evolution and Social Change at Arizona State University all modern botanical and faunal samples and all archaeological human bone and hair samples were prepared for analysis of stable carbon and nitrogen isotopes by the author under the direction of K.J. Knudson. Approximately 2.0 g of each modern plant sample were cleaned ultrasonically in distilled and deionized water and dried for 48 hours at 60˚C. Using a ball mill, the dried samples were ground to a fine powder for analysis.

External layers of the previously dried modern faunal soft tissue samples were mechanically removed with a Dremel MultiPro or MiniMite equipped with a carbide burr. A 0.2-1.0 g section of cleaned tissue was chopped into small fragments for collagen extraction using a clean razor blade and an agate surface cleaned with methanol and distilled and deionized water. For modern faunal and archaeological human bone samples, a Dremel MultiPro or MiniMite equipped with a carbide burr was used to remove soft tissue, trabecular bone, visible dirt, and discolored external layers of cortical bone subject to contamination. Cleaned bone sections were subsequently removed from larger bone samples using a Dremel MultiPro equipped with a circular diamond saw. Where possible, 1.0-2.0 g cleaned bone sections were processed for collagen extraction. For smaller bone specimens, a 0.1-0.9 g section was processed.

Following mechanical cleaning, all soft tissue and bone samples were cleaned ultrasonically in a series of five washes in the following order: two washes with distilled and deionized water, one wash with 95% ethanol, one wash with 100% ethanol, and one wash with 100% acetone. Samples were rinsed with distilled and deionized water between each five-minute ultrasonication. Collagen was extracted using a modified version of Longin's method (DeNiro and Epstein 1978, 1981; Longin 1971; Wright and Schwarcz 1999). Using course (40-60 μm) glass fritted extraction thimbles, soft tissue and bone samples were demineralized in 0.25 M HCl (hydrochloric acid) changing solution every 48 hours for 5-20 days until demineralization was complete as indicated by the softness and translucence of the sample and the cessation of the release of carbon dioxide. Modern soft tissue and bone samples were treated with a chloroform-methanol solution (1:2:0.8 [v/v] ratio of chloroform-methanol-distilled and deionized water) to remove lipids. All samples were rinsed to neutrality with distilled and deionized water and then treated with 0.125 M NaOH (sodium hydroxide) for 24 hours to prevent contamination by any humic acids present (DeNiro and Epstein 1981; Håkansson 1972). Following the sodium hydroxide treatment, the samples were rinsed to neutrality with distilled and deionized water, and the collagen was solubilized by heating at 70-90˚C in 10^{-3} M HCl (hydrochloric acid) for 24 hours. This solubilization method was repeated an additional two times. The filtrates were evaporated, re-dissolved in 3.0 mL 10^{-3} M HCl (hydrochloric acid), frozen at -20˚C overnight, and then lysophilized overnight at -50˚C.

Bulk hair samples of 0.1-0.2 g were selected from archaeological hair specimens by choosing hairs of variable lengths and sources. For a few small hair specimens, 0.02-0.09 g were used. Samples were mechanically cleaned of soil and debris, soaked in 100% ethanol for 24 hours to remove any adhering soil, dried at room temperature overnight, and mechanically cleaned a second time. Samples were cleaned ultrasonically through a series of five washes in the following order: 20 mL distilled and deionized water, 10 mL distilled and deionized water, twice with 10 mL of a chloroform-methanol solution (1:2:0.8 [v/v] ratio of chloroform-methanol-distilled and deionized water) to remove lipids, and finally with 10 mL distilled and deionized water. Samples were ultrasonicated for five minutes in each solution and were rinsed with 20 mL of distilled and deionized water between each wash. After the final wash, samples were dried at 70-90˚C overnight until all visible moisture was evaporated. Dried samples were chopped with razor blades and hair shears sterilized with methanol and distilled and deionized water on an agate surface and ground into 0.5 mm segments with an agate mortar and pestle.

Analysis of mass fractions (wt%) of carbon and nitrogen and the stable carbon (δ^{13}C) and nitrogen (δ^{15}N) isotopes was conducted in the W. M. Keck Foundation Laboratory for Environmental Biogeochemistry at Arizona State University by N. Zolotova and the author under the direction of K.J. Knudson. Samples were weighed (5-7 mg) into tin capsules and analyzed using a Delta Plus Advantage Isotope Ratio Mass Spectrometer (IRMS) equipped with a Costech Elemental Analyzer. Ten percent of all samples were analyzed in triplicate. Long-term precision for the Keck Laboratory Delta Plus Advantage IRMS is 0.2‰ for both δ^{13}C and δ^{15}N. Archaeological bone collagen and hair keratin samples were assessed for preservation through examination of bone collagen yields, mass fractions of carbon (wt% C) and nitrogen (wt% N), and molar C:N ratios (Appendices H-I).

Analysis of Stable Carbon Isotopes in Archaeological Bone Apatite ($\delta^{13}C_{ap[VPDB]}$)

Stable carbon isotopes in carbonates ($\delta^{13}C_{ap}$) of archaeological human bone apatite samples were analyzed in conjunction with stable oxygen isotopes in carbonates

($\delta^{18}O_{ap}$) of the same sample. Procedures for the preparation and analysis of these samples are described above in Chapter 6. Analyses were performed on a Delta V Advantage IRMS coupled with a Gas Bench II by B. Moan of the Colorado Plateau Stable Isotope Laboratory at Northern Arizona University under the direction of B. Hungate. Replicates of international isotope standards NBS-18, NBS-19, and LSVEC yield a reproducibility of ±0.04-0.05‰ (1σ) for $\delta^{13}C$.

Stable Carbon ($\delta^{13}C$) and Nitrogen ($\delta^{15}N$) Isotope Results

Stable Carbon ($\delta^{13}C$) and Nitrogen ($\delta^{15}N$) Isotopic Baseline

Results of analyses of stable carbon and nitrogen isotopes in modern botanical and faunal samples are given in Appendix G. These values are used to generate a local isotopic baseline for the study region for the interpretation of archaeological human tissue isotopic values from Armatambo and Rinconada Alta. To account for the known decrease in $\delta^{13}C$ in atmospheric CO_2 associated with the burning of fossil fuels and biomass since the Industrial Revolution, a correction factor of +1.5‰ was added to all modern plant and faunal samples (Keeling 1979; Marino and McElroy 1991; Schwarcz and Schoeninger 2011). Following Keegan and DeNiro (1988), $\delta^{13}C$ and $\delta^{15}N$ values for terrestrial faunal bone samples (*Cavia porcellus*) were additionally corrected by -3.7‰ for $\delta^{13}C$ and +1.7‰ for $\delta^{15}N$ to reflect values of consumable flesh. For fish bone samples, $\delta^{13}C$ and $\delta^{15}N$ values were not corrected because muscle samples were also analyzed for all but one species (*Sciaena gilberti* A) and fish bones are potentially edible (e.g., Xia and Abbott 1987; Appendix G).

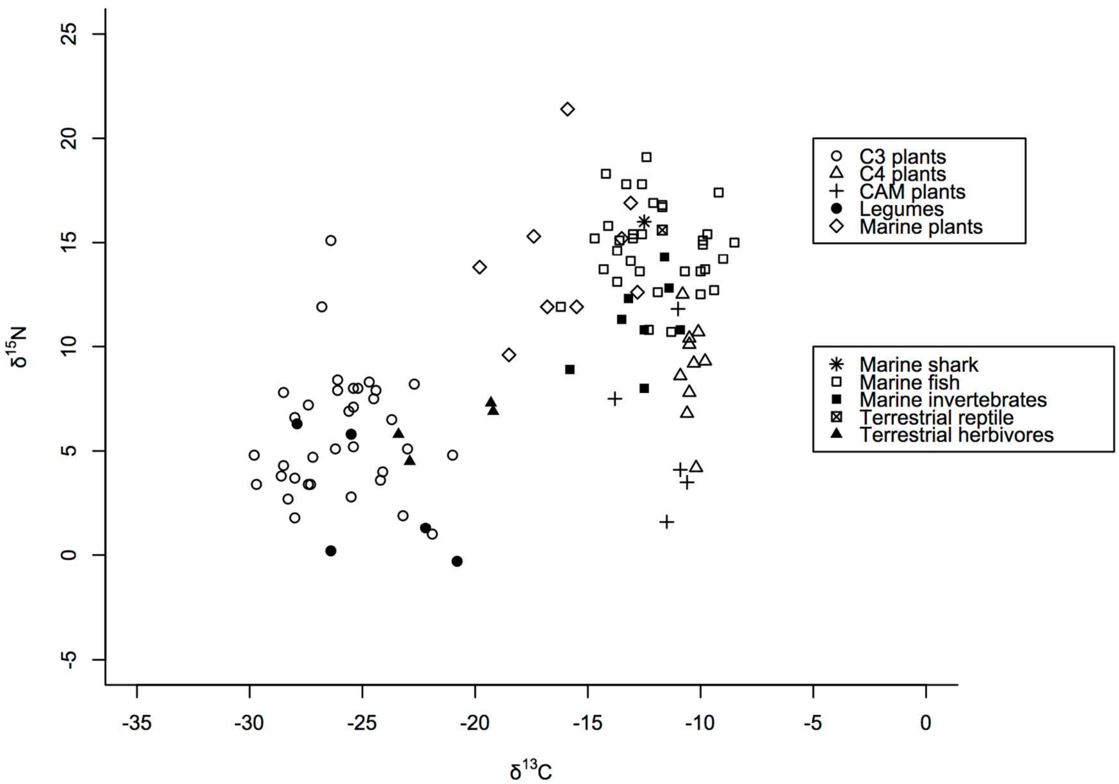
Observed values in the local botanical and faunal samples follow expected patterns based on groupings of foods by types known to be isotopically distinct (Figure 7.1; Table 7.1). Specifically, among the plant samples, plants that utilize the C_4-photosynthetic pathway are enriched in $\delta^{13}C$ relative to all other plant types (Figure 7.1; Table 7.1). CAM-photosynthetic plants are also enriched in $\delta^{13}C$ relative to all plant groups except C_4-photosynthetic plants (Figure 7.1; Table 7.1). Also as expected, nitrogen-fixing leguminous plants are depleted in $\delta^{15}N$ relative to the other plant groups, while marine plants are enriched in $\delta^{15}N$ (Figure 7.1; Table 7.1).

Overall, observed faunal samples also follow expectations. All marine animal specimens exhibit enriched $\delta^{13}C$ and $\delta^{15}N$ relative to the terrestrial small-mammal herbivores (Figure 7.1; Table 7.1). Within the marine animals, $\delta^{15}N$ increases up the food chain. Marine invertebrates exhibit lower $\delta^{15}N$ values on average compared to marine fish (Figure 7.1; Table 7.1). The single marine shark specimen presents a $\delta^{15}N$ value greater than the range of $\delta^{15}N$ values for the marine invertebrates and falls within the range of $\delta^{15}N$ values for the marine fish (Figure 7.1; Table 7.1). The sole reptile specimen, a small lizard, presents unexpectedly high $\delta^{13}C$ and $\delta^{15}N$ for a terrestrial animal, but this may be due to the extremely close proximity of its habitat to the littoral zone implying its diet likely includes marine resources (Figure 7.1; Table 7.1).

Stable Carbon and Nitrogen Isotopes in Bone Collagen ($\delta^{13}C_{col[VPDB]}$ and $\delta^{15}N_{col[AIR]}$)

Carbon and nitrogen data from archaeological bone collagen samples are presented in Appendix I. Measurements of bone collagen yields (wt%), mass fractions of carbon (wt% C) and nitrogen (wt% N), and molar C:N ratios demonstrate excellent

Figure 7.1. Stable carbon ($\delta^{13}C$) and nitrogen isotope ($\delta^{15}N$) values of local modern botanical and faunal samples analyzed in the current study



overall preservation of collagen samples. Collagen yields, calculated as the weight percent of the whole bone, are high overall with average of 13.0wt%±4.0wt% (*n*=114, 1σ). Yields for four samples (ACL-4430, ACL-4730, ACL-4761, ACL-4794) fall near or below 2.0wt%, the point at which changes in composition have been demonstrated to occur (Ambrose 1990; van Klinken 1999), indicating that these four samples may be poorly preserved. One of these samples, ACL-4730, yielded an amount of collagen insufficient for the weight required to produce valid carbon and nitrogen data.

Mass fractions of carbon (wt% C) and nitrogen (wt% N) also indicate that the collagen samples as a whole are well preserved (Appendix I). Intact collagen exhibits

Table 7.1. Stable carbon ($\delta^{13}C_{[VPDB]}$) and nitrogen ($\delta^{15}N_{[AIR]}$) isotope values for plant and animal foods in the study region analyzed in the current study

Food category	***n***	**Average $\delta^{13}C$ (‰)**	**1σ**	**Minimum $\delta^{13}C$ (‰)**	**Maximum $\delta^{13}C$ (‰)**	**Average $\delta^{15}N$ (‰)**	**1σ**	**Minimum $\delta^{15}N$ (‰)**	**Maximum $\delta^{15}N$ (‰)**
C_3 plants	35	-25.9	2.2	-29.8	-21.0	5.8	2.9	1.0	15.1
C_4 plants	10	-10.4	0.3	-10.9	-9.8	9.0	2.3	4.2	12.5
CAM plants	5	-11.6	1.3	-13.8	-10.6	5.7	4.0	1.6	11.8
Leguminous plants	5	-24.6	3.0	-27.9	-20.8	2.7	3.2	-0.3	6.3
Marine plants	9	-15.9	2.5	-19.8	-12.8	14.3	3.5	9.6	21.4
Marine shark	1	-14.0	-	-	-	16.0	-	-	-
Marine fish	33	-11.9	1.9	-16.2	-8.5	14.8	2.1	10.7	19.1
Marine invertebrates	8	-12.7	1.5	-15.8	-10.9	11.2	2.0	8.0	14.3
Terrestrial reptile	1	-13.2	-	-	-	15.6	-	-	-
Terrestrial herbivores	4	-21.2	2.3	-23.4	-19.2	6.1	1.3	4.5	7.3

mass fractions ranging from 26.0-43.6% for carbon and 11-16% for nitrogen (Ambrose 1990; van Klinken 1999). Two samples analyzed here present mass fractions of carbon only slightly higher than the range for intact collagen (Appendix I; ACL-4499: wt% C=44.3%, ACL-4779: wt% C=44.9%). These same two samples, along with several others, exhibit mass fractions of nitrogen around 17%, which is also slightly higher than the range expected for intact collagen (Appendix I). Although higher mass fractions of carbon may indicate the presence of organic substances, low mass fractions are of most concern as indicators of poor preservation and are usually associated with low collagen yields and abnormal C:N ratios (van Klinken 1999). All ratios of C:N fall within the range of 2.8-3.6, as found in intact collagen (Appendix I; DeNiro 1985; Van Klinken 1999; Ambrose 1990). Taken together, the collagen yields, mass fractions of carbon and nitrogen, and ratios of C:N, indicate that archaeological human bone collagen samples from Armatambo and Rinconada Alta are very well preserved as is expected given the extremely low rates of precipitation along the central Peruvian coast (Molina and Little 1981; Rundel et al. 1991).

Results of analyses of stable carbon and nitrogen isotopes in archaeological human bone collagen are shown in Appendix I. Overall, bone collagen $\delta^{13}C_{VPDB}$ values range from -15.2‰ to -7.2‰ with average bone collagen $\delta^{13}C_{VPDB}$ equal to -10.4‰±1.4‰ (n=113, 1σ). Bone collagen $\delta^{15}N_{VPDB}$ values range from 9.3‰ to 21.3‰ with mean bone collagen $\delta^{15}N_{VPDB}$ equal to 15.1‰±2.4‰ (n=113, 1σ). In Figures 7.2-7.3, archaeological human bone collagen $\delta^{13}C$ and $\delta^{15}N$ results are compared to isotopic baseline data ranges. Human bone collagen $\delta^{13}C$ and $\delta^{15}N$ values fall within or very near ranges of $\delta^{13}C$ and $\delta^{15}N$ values for marine fish and invertebrates and C_4- and CAM-photosynthetic plants, indicating that individuals from both sites likely obtained dietary protein from these resources and/or terrestrial animals that consumed such resources. Overall, bone collagen $\delta^{15}N$ values are increased in adults, adolescents, and juveniles buried at Armatambo relative to $\delta^{15}N$ values from Rinconada Alta individuals. The significance of these trends is discussed in greater detail below. Notably, one Armatambo rib fragment from an adult of undetermined age and sex (ARMA-D04.II-CF038) shows a bone collagen $\delta^{15}N$ value approximately 3‰ higher than the next highest $\delta^{15}N$ values, suggesting this adult likely obtained her or his dietary protein from high tropic level marine carnivores, such as marine mammals, sharks, high-trophic level fish, or high-trophic level birds, such as pelicans. Diet is reconstructed in further detail below.

Among the different age groups in the combined study sample, infants have an overall increased mean bone collagen $\delta^{13}C_{VPDB}$ and an increased mean bone collagen $\delta^{15}N_{VPDB}$ relative to all other age groups (Table 7.2; Figure 7.4). Unfortunately, a statistical test of the apparent difference in mean bone collagen $\delta^{13}C_{VPDB}$ by age group is not possible because the variances of the groups are not equal as indicated by tests of the residuals (Levene's test: $W_{4,108}$=3.70, P=0.01), and therefore the assumptions required of the analysis of variance (ANOVA), and its non-parametric equivalent, the Kruskal-Wallis test, are not met (Zar 2010). In contrast, the assumptions of equal variances and normal distributions required for the ANOVA are met for mean bone collagen $\delta^{15}N_{VPDB}$ (Levene's test: $W_{4,108}$=1.94, P=0.39; Shapiro-Wilk test: W=0.99, n=113, P=0.72). The ANOVA test on the overall sample reveals that mean bone collagen $\delta^{15}N_{VPDB}$ is not significantly different among the fetal, infant, child, adolescent, and adult bone collagen samples ANOVA: $F_{4,108}$=2.13, P=0.08).

Figure 7.2. Archaeological human bone collagen δ^{13}C and δ ^{15}N from adults and adolescents compared to modern baseline flora and fauna δ^{13}C and δ^{15}N values. A correction factor of -3‰ is applied to human bone collagen δ^{15}N for direct comparability between samples. Boxes represent total ranges for baseline values and are labeled as follows: C3 = C_3-photosynthetic plants; C4 = C_4-photosynthetic plants; CAM = CAM-photosynthetic plants; LG = Leguminous plants; MP = marine plants; HLMC = high trophic level marine carnivores, including marine shark sample and published values in Appendix H; MF = marine fish; MI = marine invertebrates; TH = terrestrial herbivores.

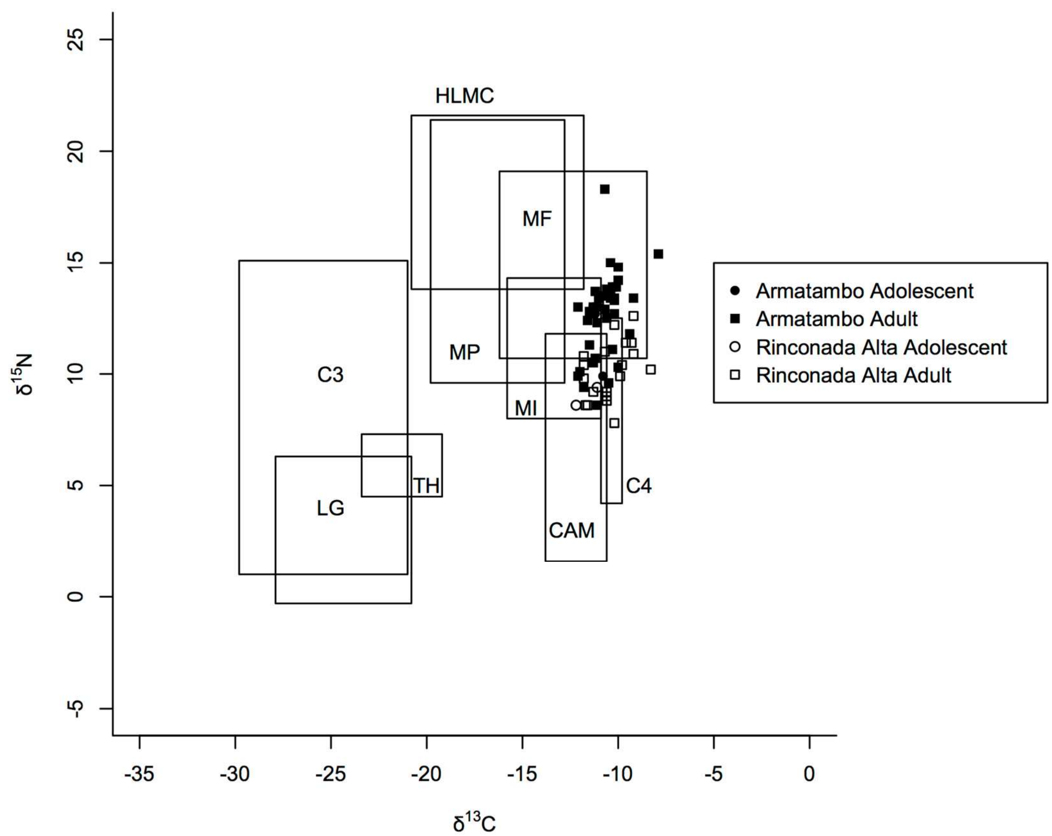


Figure 7.3. Archaeological human bone collagen $\delta^{13}C$ and $\delta^{15}N$ from juveniles compared to modern baseline flora and fauna $\delta^{13}C$ and $\delta^{15}N$ values. A correction factor of -3‰ is applied to human bone collagen $\delta^{15}N$ for direct comparability between samples. Boxes represent total ranges for baseline values and are labeled as follows: C3 = C_3-photosynthetic plants; C4 = C_4-photosynthetic plants; CAM = CAM-photosynthetic plants; LG = Leguminous plants; MP = marine plants; HLMC = high trophic level marine carnivores, including marine shark sample and published values in Appendix H; MF = marine fish; MI = marine invertebrates; TH = terrestrial herbivores.

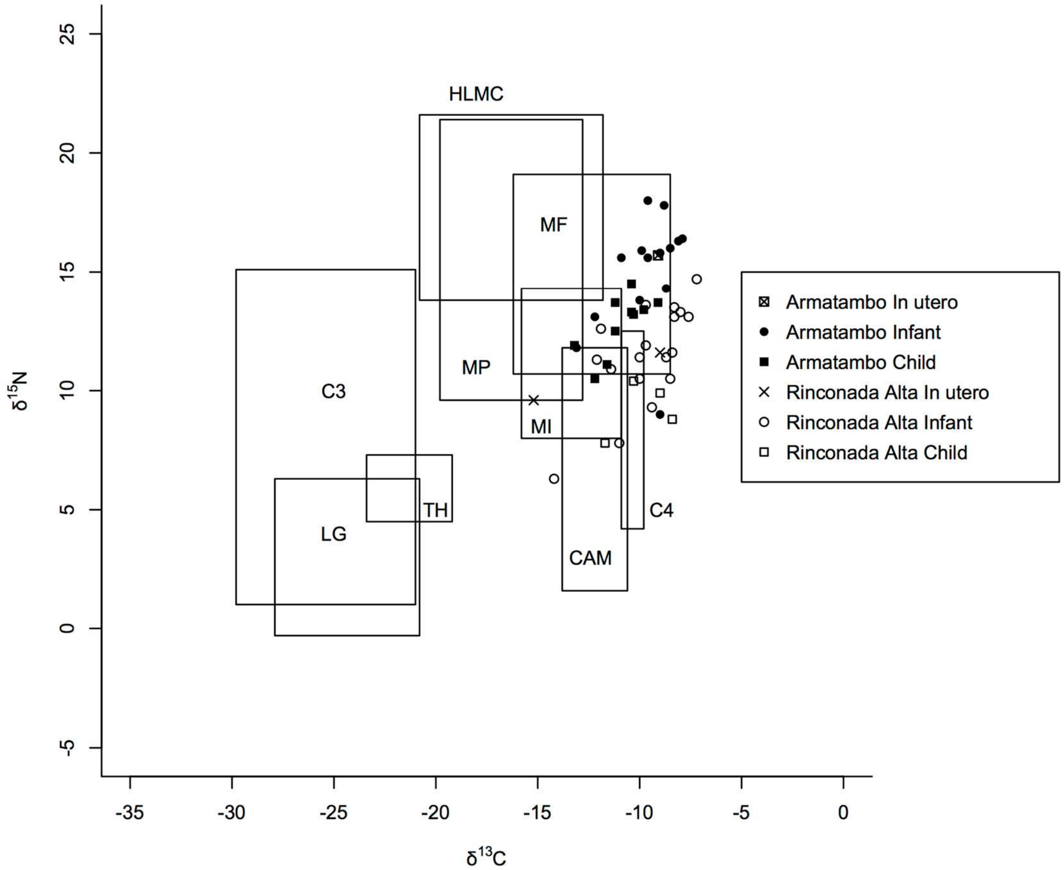
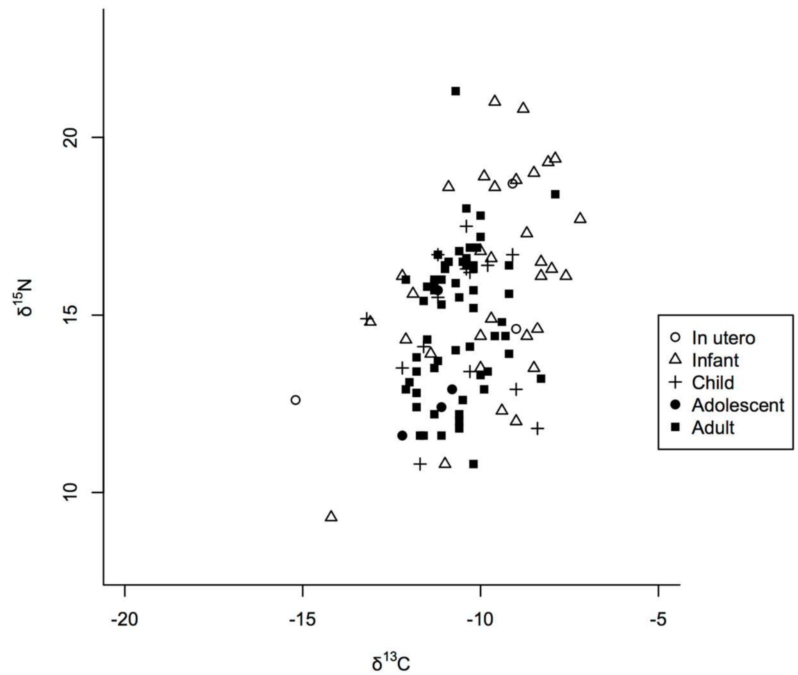


Table 7.2. Mean $\delta^{13}C_{col(VPDB)}$ and by $\delta^{15}N_{col[AIR]}$ in bone collagen by age group

		$\delta^{13}C_{col(VPDB)}$			$\delta^{15}N_{col(AIR)}$		
Age group	n^a	$\bar{x}^b$	s^c	**SE**^{d}	$\bar{x}^b$	s^c	**SE**^{d}
In utero	3	-11.1	3.6	2.1	15.3	3.1	1.8
Infant	32	-9.7	1.7	0.3	16.0	2.8	0.5
Child	14	-10.6	1.3	0.4	14.8	2.0	0.6
Adolescent	3	-11.3	0.6	0.3	13.2	1.8	0.9
Adult	60	-10.6	0.9	0.1	14.9	2.1	0.3

[a]n = sample size
[b]$\bar{x}$ = sample mean
[c]s = standard deviation
[d]SE = standard error

Figure 7.4. $\delta^{13}C_{col[VPDB]}$ and by $\delta^{15}N_{col[AIR]}$ in bone collagen by age group for total study sample



Within the Armatambo sample, mean bone collagen $\delta^{13}C$ is not the same among the age groups (ANOVA: $F_{4,62}$=3.55, P=0.01; Levene's test: $W_{4,62}$=1.90, P=0.12; Shapiro-Wilk test: W=0.97, n=66, P=0.08). Specifically, mean bone collagen $\delta^{13}C$ is significantly different between infants and adults (Tukey-Kramer test: mean difference, $\delta^{13}C$=1.0‰, P=0.02) and between infants and children (Tukey-Kramer test: mean difference, $\delta^{13}C$=1.3‰, P=0.04), but not between any other age groups in pairwise comparisons. Mean bone collagen $\delta^{15}N$ within the Armatambo sample is not the same among the age groups (ANOVA: $F_{4,62}$=4.72, P=0.00). The assumption of equal variances for this ANOVA test is met (Levene's test: $W_{4,62}$=0.59, P=0.67), but the assumption of normality is not met (Shapiro-Wilk test: W=0.95, *n*=67, P=0.01). Mean bone collagen $\delta^{15}N$ is significantly different between infants and adults (Tukey-Kramer test: mean difference, δ^{15}N=2.3‰, P=0.00), but not between any other age groups in pairwise comparisons.

Comparisons of mean bone collagen δ^{13}C and mean bone collagen δ^{15}N among the age groups buried at Rinconada Alta are not significant ($ANOVA_{\delta 13C}$: $F_{4,41}$=1.79, P=0.15; $ANOVA_{\delta 15N}$: $F_{4,41}$=2.43, P=0.06). For the ANOVA on mean bone collagen δ^{13}C, the variances among the age groups are not equal (Levene's test: $W_{4,41}$=4.18, P=0.00), but the assumption of normality is met (Shapiro-Wilk test: W=0.98, *n*=46, P=0.58). For the ANOVA test on mean bone δ^{15}N among the age groups, both the assumptions of equal variances and normality are met (Levene's test: $W_{4,41}$=0.84, P=0.51; Shapiro-Wilk test: W=0.97, n=46, P=0.33).

No significant differences in mean bone collagen δ^{13}C and mean bone collagen δ^{15}N are observed between males and females within the total sample, the Armatambo sample, or the Rinconada Alta sample (Figure 7.5; Table 7.3). In the comparison in mean bone collagen δ^{15}N between males and females in the total sample and between males and females in the Armatambo sample, the assumption of normality required for the *t*-test is not met for the female group in the total sample test or for the female group in the Armatambo sample test (Table 7.3). Closer examination of the distribution of bone collagen δ^{15}N values reveals a bimodal distribution for females in the Armatambo sample (Figure 7.6).

Comparisons of mean bone collagen δ^{13}C between groups buried at Armatambo and groups buried at Rinconada Alta show no significant difference for the total sample, any of the age groups, or either sex (Table 7.4). The assumption of equal variance

Figure 7.5. $\delta^{13}C_{col[VPDB]}$ and by $\delta^{15}N_{col[AIR]}$ in adult and adolescent bone collagen by sex and site

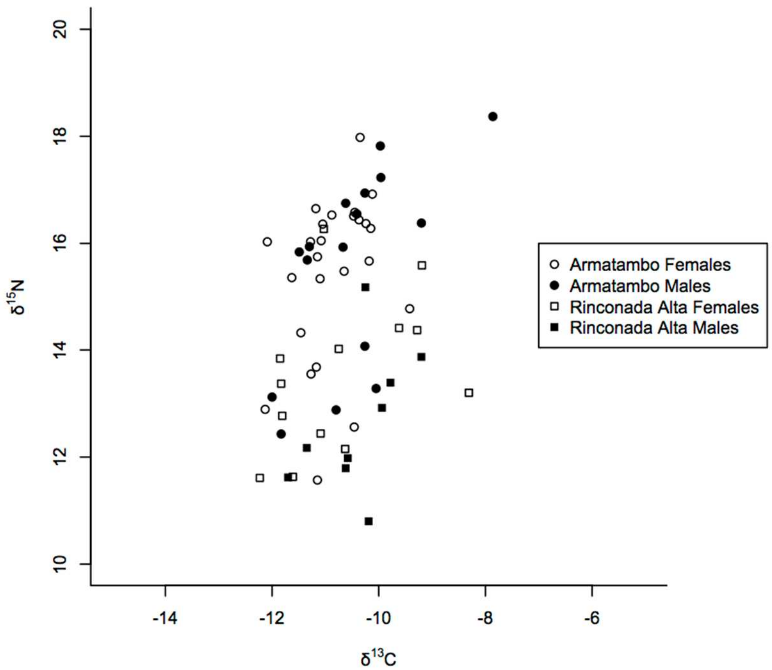


Figure 7.6. Histograms of $\delta^{15}N_{col[AIR]}$ in bone collagen by sex at Armatambo and Rinconada Alta

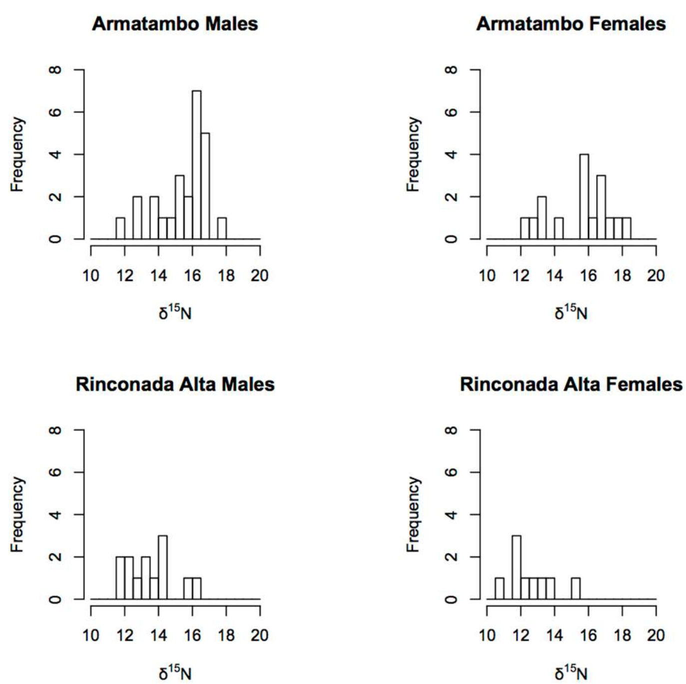


Table 7.3. Comparison of mean $\delta^{13}C_{col(VPDB)}$ and $\delta^{15}N_{col(AIR)}$ in bone collagen by sex

	$\delta^{13}C_{col\ (VPDB)}$ [a]				Levene's test[b]		Shapiro-Wilk test[b]			
	Sex						Females		Males	
	F	**M**	***t***	***P***	***W***	***P***	***W***	***P***	***W***	***P***
Total sample	-10.8 (*n*=38)	-10.5 (*n*=25)	-1.48	0.12	$W_{1,61}$= 0.02	0.89	0.96	0.18	0.95	0.26
Site										
Armatambo	-10.9 (*n*=25)	-10.5 (*n*=16)	-1.37	0.18	$W_{1,39}$= 1.93	0.17	0.96	0.50	0.94	0.30
Rinconada Alta	-10.7 (*n*=13)	-10.4 (*n*=9)	-0.66	0.52	$W_{1,20}$= 1.80	0.2	0.91	0.19	0.97	0.90
	$\delta^{15}N_{col\ (VPDB)}$ [a]				Levene's test[b]		Shapiro-Wilk test[b]			
	Sex						Females		Males	
	F	**M**	***t***	***P***	***W***	***P***	***W***	***P***	***W***	***P***
Total sample	14.8 (*n*=38)	14.5 (*n*=25)	0.51	0.61	$W1_{,61}$= 2.74	0.10	0.94	***0.03***	0.95	0.21
Site										
Armatambo	15.4 (*n*=25)	15.6 (*n*=16)	-0.28	0.78	$W_{1,39}$= 0.66	0.42	0.90	***0.02***	0.92	0.17
Rinconada Alta	13.5 (*n*=13)	12.6 (*n*=9)	1.45	0.16	$W_{1,20}$= 0.09	0.77	0.96	0.72	0.96	0.77

[a] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined. '*t*' = *t* statistic; Bolded *P*-values are significant at the 0.05 α-level.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

required for the *t*-test is violated for the total sample comparison of mean bone collagen δ^{13}C between the two sites as well as for the comparison of females between the two sites (Table 7.4). Similarly, the assumption of normality is violated for the Armatambo sample in the adult age group comparison (Table 7.4) For this reason, a non-parametric Mann-Whitney *U* test was also performed for each of these three comparisons. The results of these tests also show no significant difference in mean bone collagen δ^{13}C between the two sites for these specific groups (Mann-Whitney test [Total sample]: U=1318.5, P=0.19; Mann-Whitney test [Females]: U=164, P=0.98; Mann-Whitney test [Adults]: U=347.5, P=0.41). Statistical tests were not performed for the *in utero* and adolescent age groups due to the very small size of these samples.

In contrast to the results of the comparisons of mean bone collagen δ^{13}C between groups of individuals buried at Armatambo and Rinconada Alta, comparisons of mean bone collagen δ^{15}N between groups buried at the two sites reveal significantly increased mean bone collagen δ^{15}N for individuals buried at Armatambo (Table 7.4). This trend is observed in the comparison of the total sample, all age groups assessed, and both sexes (Table 7.4). The assumption of normality required for the *t*-test is violated for the Armatambo sample in the adult group comparison of mean bone collagen δ^{15}N between the two sites, as well as for in the comparison of females between the two sites (Table 7.4). Mann-Whitney *U* tests performed for these two comparisons also indicate significant differences in mean bone collagen δ^{15}N between the two sites for both of these groups (Mann-Whitney test [Adults]: U=679, P=0.00; Mann-Whitney test [Females]: U=266, P=0.00). Examining the distribution of bone collagen δ^{15}N values for the entire

Table 7.4. Comparison of mean δ^{13}C and by δ^{15}N in bone collagen by site

	$\delta^{13}C_{col\ (VPDB)}$ [a]				**Levene's test** [b]		**Shapiro-Wilk test** [b]			
							Armatambo:		**Rinconada Alta:**	
	Armatambo	**Rinconada Alta**	***t***	***P***	***W***	***P***	***W***	***P***	***W***	***P***
Total sample	-10.5 (*n*=67)	-10.2 (*n*=46)	-1.03	0.25	$W_{1,111}$= 6.89	***0.01***	0.98	0.45	0.96	0.13
Age category [c]										
In utero	-9.1 (*n*=1)	-12.1 (*n*=2)	-	-	-	-	-	-	-	-
Infant	-9.7 (*n*=14)	-9.7 (*n*=18)	0.04	0.97	$W_{1,30}$= 0.75	0.39	0.89	0.09	0.93	0.20
Child	-10.9 (*n*=10)	-9.8 (*n*=4)	-1.46	0.17	$W_{1,12}$= 0.31	0.59	0.95	0.94	0.95	0.71
Adolescent	-11.0 (*n*=2)	-11.7 (*n*=2)	-	-	-	-	-	-	-	-
Adult	-10.7 (*n*=40)	-10.5 (*n*=20)	-0.93	0.36	$W_{1,58}$= 1.90	0.17	0.94	***0.04***	0.95	0.32
Sex [d]										
F	-10.9 (*n*=25)	-10.7 (*n*=13)	-0.49	0.63	$W_{1,36}$= 5.47	***0.03***	0.96	0.50	0.91	0.19
M	-10.5 (*n*=16)	-10.4 (*n*=9)	-0.25	0.80	$W_{1,23}$= 0.50	0.49	0.94	0.30	0.97	0.90

Table 7.4. continued

	$\delta^{15}N_{col\ (VPDB)}$ [a]				Levene's test[b]		Shapiro-Wilk test[b]			
							Armatambo:		**Rinconada Alta:**	
	Armatambo	**Rinconada Alta**	***t***	***P***	***W***	***P***	***W***	***P***	***W***	***P***
Total sample	16.2 (*n*=67)	13.6 (*n*=46)	6.66	***0.00***	$W_{1,111}$= 0.12	0.73	0.97	0.17	0.99	0.90
Age category										
In utero	18.7 (*n*=1)	13.6 (*n*=2)	-	-	-	-	-	-	-	-
Infant	18.0 (*n*=14)	14.5 (*n*=18)	4.33	***0.00***	$W_{1,30}$= 0.03	0.86	0.90	0.10	0.93	0.21
Child	15.8 (*n*=10)	12.2 (*n*=4)	4.79	***0.00***	$W_{1,12}$= 0.00	0.95	0.92	0.39	0.95	0.73
Adolescent	14.3 (*n*=2)	12.0 (*n*=2)	-	-	-	-	-	-	-	-
Adult	15.7 (*n*=40)	13.3 (*n*=20)	5.12	***0.00***	$W_{1,58}$= 0.20	0.65	0.94	***0.03***	0.97	0.84
Sex[c]										
F	15.4 (*n*=25)	13.5 (*n*=13)	3.73	***0.00***	$W_{1,36}$= 0.00	0.95	0.90	***0.02***	0.96	0.72
M	15.6 (*n*=16)	12.6 (*n*=9)	4.17	***0.00***	$W_{1,23}$= 0.76	0.39	0.92	0.17	0.96	0.77

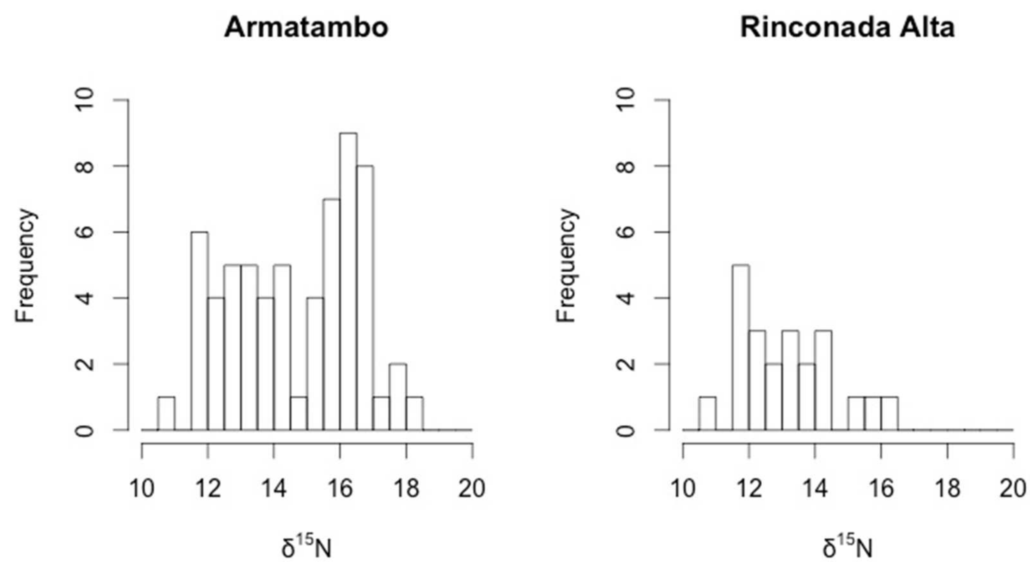
[a] '*t*' = *t* statistic; Bolded *P*-values are significant at the 0.05 α-level.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

[c] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

adult group shows that the bimodal distribution observed among the females buried at Armatambo discussed above is also observed in the total adult sample from Armatambo (Figure 7.7). Although statistical tests were not performed for the *in utero* and adolescent age groups due to the very small size of these samples, all observed bone collagen δ^{15}N values from individuals in these two groups are increased in Armatambo individuals relative to Rinconada Alta individuals (Appendix I; Table 7.4).

Figure 7.7. Histograms of $\delta^{15}N_{col[AIR]}$ in bone collagen of adults at Armatambo and Rinconada Alta



Carbon data from archaeological bone apatite samples are presented in Appendix I. Total bone apatite δ^{13}C values range from -12.6‰ to -3.0‰ with an average of -6.7‰±1.6‰ (*n*=114, 1σ). Comparison of δ^{13}C bone collagen and bone apatite pairs was possible for 113 total individuals (Appendix I). When total mean individual differences are examined, bone collagen is depleted in δ^{13}C relative to bone apatite by an average of -3.7‰±1.0‰ (1σ), with the total range from -6.0‰ to -0.2‰.

To assess the source of dietary protein (C_3, C_4, and/or marine) and dietary energy from carbohydrates and lipids (C_3, C_4, and/or mixed), carbon isotope values ($\delta^{13}C$) of collagen and apatite are plotted against regression lines based on signatures from experimental fauna (Figures 7.8-7.9) (Kellner and Schoeninger 2007). Adult and adolescent bone samples cluster tightly between the marine protein and C_4 protein regression lines and in the center of these lines (Figure 7.9). This location indicates consumption of a mixture of marine and C_4 protein resources and consumption of a mixture of both C_3 and C_4 energy resources from carbohydrates and lipids (Kellner and Schoeninger 2007). Juvenile bone samples exhibit less homogeneity but, as a whole, are similarly positioned in the carbon isotope model (Figure 7.8). With the exception of two outliers with low collagen and apatite $\delta^{13}C$ values, Rinconada Alta juveniles appear to exhibit increased consumption of C_4 energy resources versus C_3 energy resources relative to Armatambo juveniles as a whole (Figure 7.8).

Figure 7.8. Carbon isotope values from juvenile bone apatite ($\delta^{13}C_{ap[VPDB]}$) versus bone collagen ($\delta^{13}C_{col[VPDB]}$) plotted against regression lines from Kellner and Schoeninger's (2007) carbon isotope model. The dashed line represents C_3 protein, the solid line represents marine protein, and the dotted line represents C_4 protein sources. The upper ends of each line indicate 100% C_4 energy and the lower ends of each line represent 100% C_3 energy. Regression lines are based on experimental fauna and are unaffected by body size or trophic level.

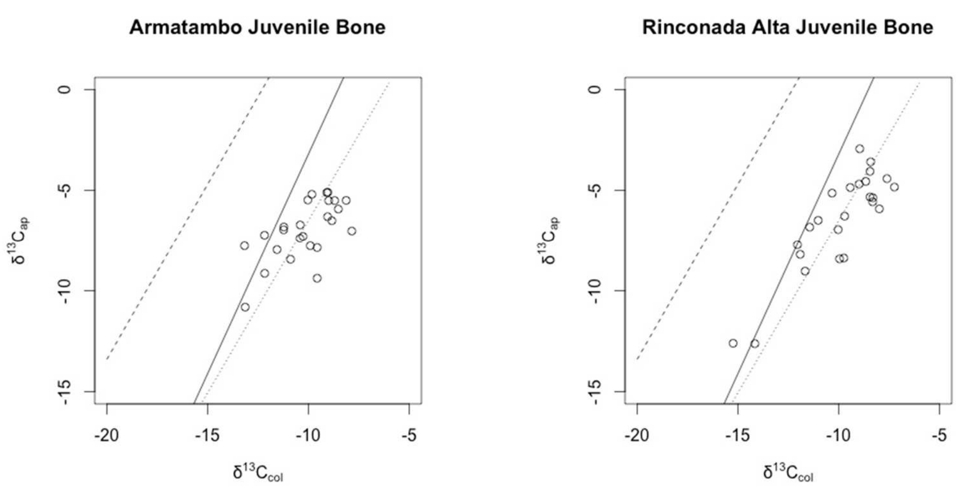
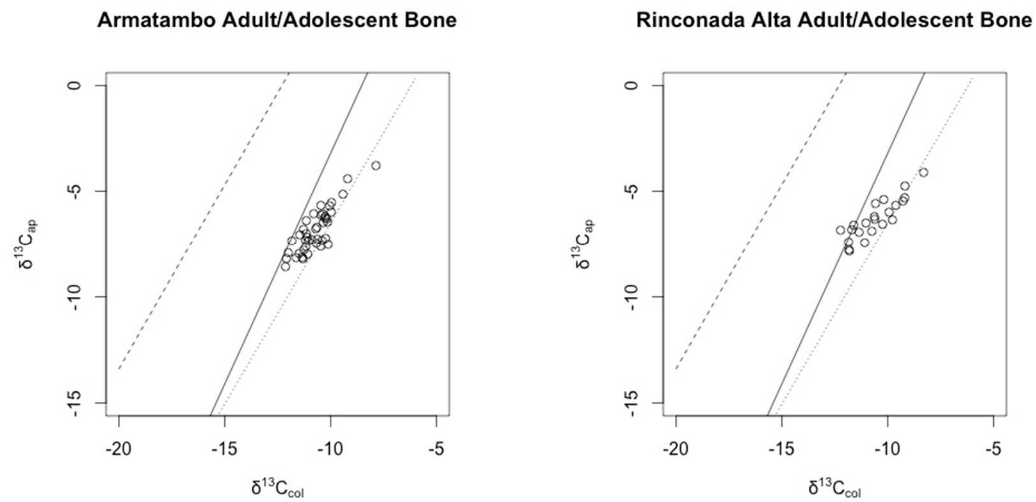


Figure 7.9. Carbon isotope values from adult and adolescent bone apatite ($\delta^{13}C_{ap[VPDB]}$) versus bone collagen ($\delta^{13}C_{col[VPDB]}$) plotted against regression lines from Kellner and Schoeninger's (2007) carbon isotope model. Dashed line represents C_3 protein, solid line represented marine protein, and the dotted line represents C_4 protein sources. The upper ends of each line indicate 100% C_4 energy and the lower ends of each line represent 100% C_3 energy. Regression lines are based on experimental fauna and are unaffected by body size or trophic level.



Reconstruction of Human Diet from Stable Carbon and Nitrogen Isotopes in Archaeological Bone Collagen ($\delta^{13}C_{col[VPDB]}$ and $\delta^{15}N_{col[AIR]}$) and Apatite ($\delta^{13}C_{ap[VPDB]}$) in a Multivariate Model

In the above results, stable carbon and nitrogen isotopes in bone collagen present a model for the reconstruction of dietary protein that indicates consumption of marine and/or C_4 and CAM resources by individuals buried at Armatambo and Rinconada Alta. The bivariate carbon model of stable carbon isotopes in bone collagen and bone apatite used to reconstruct whole diet and dietary protein also indicates individuals from these two sites consumed marine and/or C_4 protein resources and mixture of C_3 and C_4 carbohydrate and lipid energy resources. While these models are useful, they are limited in that they cannot readily distinguish between C_4 and marine protein resource consumption. Froehle and colleagues (2012) offer a multivariate model for reconstructing diet from stable carbon and nitrogen isotopes in bone collagen and stable carbon isotopes in bone apatite. This model is used here to further refine interpretations of the foods consumed by individuals buried at Armatambo and Rinconada Alta.

For adult and adolescent individuals with available bone collagen and bone apatite results, values of $\delta^{13}C$ and $\delta^{15}N$ in bone collagen and $\delta^{13}C$ in bone apatite were used to calculate function scores using the following functions produced by Froehle and colleagues' (2012) discriminant function analysis of archaeological human samples with substantial nonisotopic dietary evidence and tested against isotopic data from experimental animals with known diets:

Carbon: $F1 = (0.322 \times \delta^{13}C_{apatite}) + (0.727 \times \delta^{13}C_{collagen}) + (0.219 \times \delta^{15}N) + 9.354$

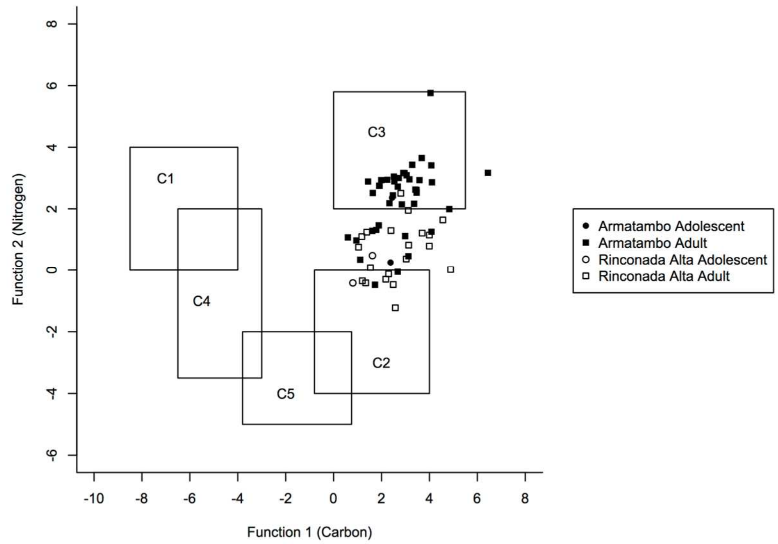
Nitrogen: $F2 = (-0.393 \times \delta^{13}C_{apatite}) + (0.133 \times \delta^{13}C_{collagen}) + (0.622 \times \delta^{15}N) - 8.703$

The resulting function scores are plotted in Figure 7.10 against Froehle and colleagues' (2012) dietary clusters. As expected given the results of $\delta^{13}C$ and $\delta^{15}N$ in bone collagen and the bivariate carbon model described above, the function scores for the majority (71%, *n*=30/42) of adult and adolescent individuals buried at Armatambo and two adult individuals buried at Rinconada Alta (9%, *n*=2/22) fall within the range for Cluster 3 characterized by a 50% C_3 and 50% C_4 overall diet and 100% marine dietary protein. The carbon function score for one Armatambo adult is greater than the Cluster 3 range but nearer to this cluster than to any other cluster. The function scores of two (18%) Armatambo adults and seven (32%) Rinconada Alta adults and adolescents fall within the range of Cluster 2 characterized by an overall diet of 30% C_3 resources and 70% C_4 resources and greater than 50% C_4 protein. The function scores of the remaining

11 (26%) Armatambo adults and adolescents and 13 (59%) Rinconada Alta adults and adolescents fall in between Clusters 2 and 3, which may suggest a mixture of such dietary types.

In sum, these results appear to indicate that most, but not all, Armatambo individuals obtained the majority of the protein in their diets from marine products with non-protein dietary resources, carbohydrates and lipids, obtained from a mixture of C_3 and C_4 resources. Two adult individuals from Rinconada Alta consumed a similar diet. The majority of Rinconada Alta adolescent and adult individuals and approximately one-third (29%, *n*=12/42) of Armatambo adolescent and adult individuals consumed a diet with some marine protein, but relatively less than the individuals described previously, with a portion of protein from C_4 resources. The nonprotein portion of these individuals' diet was also comprised of both C_3 and C_4 resources, likely with a relatively greater proportion of C_4 nonprotein resources than the larger Armatambo dietary group.

Figure 7.10. Function scores for adult and adolescent individuals from Armatambo and Rinconada Alta compared to Froehle et al.'s (2012) dietary clusters. Cluster 1 (C1) = 100% C_3 diet/protein; Cluster 2 (C2) = 30:70 C_3:C_4 diet, >50% C_4 protein; Cluster 3 (C3) = 50:50 C_3:C_4 diet, marine protein; Cluster 4 (C4) = 70:30 C_3:C_4 diet, ≥65% C_3 protein; Cluster 5 (C5) = 30:70 C_3:C_4 diet, ≥65% C_3 protein.



Reconstruction of Dietary Changes Over the Life Course through Comparison of Stable Carbon and Nitrogen Isotopes in Hair Keratin ($\delta^{13}C_{ker[VPDB]}$ and $\delta^{15}N_{ker[AIR]}$) versus Bone Collagen ($\delta^{13}C_{col[VPDB]}$ and $\delta^{15}N_{col[AIR]}$)

Carbon and nitrogen data from archaeological hair keratin samples are presented in Appendix J. Overall, mass fractions of carbon (wt% C) and nitrogen (wt% N) suggest that the hair keratin samples are well preserved (Appendix J). Expected values for mass fractions range from 43-46 wt% for carbon and 13-14 wt% for nitrogen (Roy et al. 2005; Valković 1988). Here, measured percent yields of carbon range from 38.7-44.0 wt% with an average of 41.8wt%±0.8wt% (n=89, 1σ) and percent yields of nitrogen range from 13.6-15.6 wt% with an average of 14.8wt%±0.4wt% (n=89, 1σ). In addition, the range of C:N for the hair keratin samples is 3.2-3.5, which suggests minimal diagenetic contamination (Knudson et al. 2007).

Total hair keratin $\delta^{13}C$ values range from -19.3‰ to -8.5‰ with an average of -12.1‰±1.6‰ (1σ), and $\delta^{15}N$ values range from 8.0‰ to 20.2‰ with an average of 14.8‰±2.7‰ (1σ) (Appendix J). Comparison of $\delta^{13}C$ and $\delta^{15}N$ in bone collagen and hair keratin pairs was possible for 89 total individuals with hair samples available for analysis (Appendix J). When total mean individual differences are examined, bone collagen is enriched in $\delta^{13}C$ by 1.8‰±1.2‰ (1σ) and is enriched in $\delta^{15}N$ by 0.3‰±1.4‰ (1σ) relative to hair keratin (Table 7.5). This overall pattern of mean enrichment in bone collagen $\delta^{13}C$ and $\delta^{15}N$ relative to hair keratin is similar to that observed by O'Connell et al. (2001) except that the current study sample exhibits greater variation around the mean. The large variation observed for the total sample is maintained across age and sex groups (Table 7.5).

Table 7.5. Mean differences in bone collagen and hair keratin $\delta^{13}C$ and by $\delta^{15}N$

		$\Delta\delta^{13}C_{col\text{-}ker}$ (‰)			**$\Delta\delta^{15}N_{col\text{-}ker}$ (‰)**		
	***n*[a]**	**$\bar{x}$[b]**	***s*[c]**	**SE[d]**	**$\bar{x}$[b]**	***s*[c]**	**SE[d]**
Total sample	89	1.8	1.2	0.1	0.3	1.4	0.2
Age category							
In utero	2	2.5	1.4	1.0	-0.8	0.8	0.6
Infant	24	1.5	0.9	0.2	0.9	0.9	0.2
Child	10	1.3	1.5	0.5	0.1	0.8	0.2
Adolescent	3	1.9	1.0	0.6	1.2	0.8	0.5
Adult	50	1.9	1.3	0.2	0.1	1.6	0.2
Sex[e]							
Females	30	2.0	1.4	0.3	0.0	1.6	0.3
Males	23	1.9	1.0	0.2	0.3	1.7	0.4

[a]*n* = sample size
[b]$\bar{x}$ = sample mean
[c]*s* = standard deviation
[d]SE = standard error
[e] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

For the majority of individuals, bone collagen is enriched in δ^{13}C by +0.1‰ to +7.5‰ relative to hair keratin (Appendix J). Four individuals (ARMA-D04.II-CF007B, ARMA-D04.II-CF110, ARMA-PER97-ENT12, RINC-G9698.II-0567-ENT116) show bone collagen values depleted in δ^{13}C by -1.0‰ to -0.1‰ relative to hair keratin (Appendix J). For δ^{15}N, differences between bone collagen and hair keratin values range from depletion in bone collagen δ^{15}N relative to hair keratin as low as -3.4‰ to enrichment in bone collagen δ^{15}N relative to hair keratin as high as +5.9‰ (Appendix J). To determine which individual differences represent dietary changes in the last months of life and which are due to normal variation in the spacing between these two tissues, the results from animal feeding experiments and analyses of δ^{13}C and δ^{15}N in modern humans with known diets must be considered. Animal feeding experiments suggest that collagen should be enriched in δ^{13}C by 2-3‰ relative to keratin, with negligible differences in δ^{15}N between the two tissues (see O'Connell et al. 2001). Modern humans with diets known to be unchanged during the last weeks and months prior to sampling exhibit collagen values enriched in δ^{13}C relative to keratin by +0.8‰ to +2.2‰, with an overall mean difference of +1.4‰±0.5‰ (n=8, 1σ), and collagen values enriched in δ^{15}N relative to hair keratin by +0.7‰ to +1.1‰ with an overall mean difference of +0.9‰±0.2‰ (n=8, 1σ) (O'Connell et al. 2001). Taking these studies into consideration, the normal range of variation for the enrichment of collagen relative to keratin is defined here as +0.8‰ to +3‰ for δ^{13}C and as 0 to +1‰ for δ^{15}N. Individual differences in bone collagen and hair keratin δ^{13}C and δ^{15}N outside of these ranges are considered to represent possible changes in diet during the last months of life. Minimal differences in bone collagen and hair keratin δ^{13}C ($\Delta\delta^{13}C_{col\text{-}ker}$=-1.0‰ to +0.8‰) and δ^{15}N ($\Delta\delta^{15}N_{col\text{-}ker}$=-0.7‰ to -1.4‰) that are only slightly below the expected range and may potentially represent slight changes in diet are excluded from the current discussion in order to be conservative.

Among the juveniles in the sample, none show differences in bone collagen and hair keratin δ^{13}C outside of the normal range of variation (Figure 7.11; Table 7.6). Seven juveniles show differences in bone collagen and hair keratin δ^{15}N outside of the normal range (Figure 7.11; Table 7.6). One infant from Armatambo (ARMA-D04.II-CF007B) exhibits a large depletion of bone collagen δ^{15}N relative to hair keratin δ^{15}N ($\Delta\delta^{15}N_{col\text{-}ker}$=-1.8‰), which may represent an increase in δ^{15}N in the diet during his or her last months of life (Figure 7.11; Table 7.6). Six other juveniles show enrichment of bone collagen δ^{15}N relative to relative to hair keratin δ^{15}N greater than the normal range of 0 to +1‰ ($\Delta\delta^{15}N_{col\text{-}ker}$=+1.6‰-+3.2‰; Figure 7.11; Table 7.6). These large collagen-keratin differences likely reflect a decrease in δ^{15}N in the diet during the last months of life among these infants and child (Figure 7.11; Table 7.6).

Figure 7.11. Armatambo and Rinconada Alta juvenile bone collagen and hair keratin pairs with difference in $\delta^{15}N_{col[AIR]}$ outside the range of normal variation

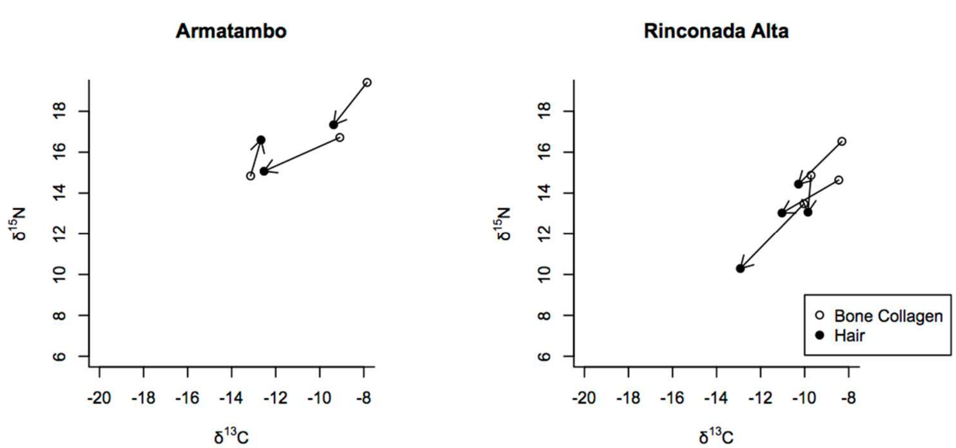


Table 7.6. Juvenile individuals with differences in bone collagen and hair keratin δ^{13}C and/or δ^{15}N values outside of the range of normal variation

Site	Individual	Age[a]	$\delta^{13}C_{collagen}$	$\delta^{13}C_{keratin}$	$\Delta_{col-ker}$ δ^{13}C (‰)[b]	$\delta^{15}N_{collagen}$	$\delta^{15}N_{keratin}$	$\Delta_{col-ker}$ δ^{15}N (‰)[b]
Armatambo	ARMA-D04.II-CF007B	I	-13.1	-12.7	-0.5	14.8	16.6	**-1.8**
	ARMA-D04.II-CF055B (#2931)	I	-7.9	-9.4	1.5	19.4	17.3	**2.1**
	ARMA-D04.II-CF084	C	-9.1	-12.5	3.4	16.7	15.1	**1.7**
Rinconada Alta	RINC-D02.IIA-CF05	I	-8.4	-11.0	2.6	14.6	13.0	**1.6**
	RINC-D02.IIA-CF77	I	-9.7	-9.9	0.1	14.9	13.1	**1.8**
	RINC-G9698.II-0560-ENT110	I	-10.0	-12.9	2.9	13.5	10.3	**3.2**
	RINC-G9698.V-0520.2-ENT078	I	-8.3	-10.3	2.0	16.5	14.4	**2.1**

[a] Age categories: I = Infant, C = Child

[b] Difference in δ^{13}C values ($\Delta_{col-ker}$ δ^{13}C) and δ^{15}N values ($\Delta_{col-ker}$ δ^{15}N) between bone collagen and hair keratin. Bolded values are outside range of normal variation of Δ_{col-ke}r δ^{13}C and Δcol-ker δ^{15}N as defined in the text.

Differences in bone collagen and hair keratin δ^{13}C and δ^{15}N outside of the normal range of variation among adults and adolescents in the sample are shown in Figure 7.12 and Table 7.7. One older adult female from Rinconada Alta (RINC-D02.IIA-CF95) presents a large enrichment of bone collagen δ^{13}C relative to relative to hair keratin δ^{13}C greater than the normal range of +0.8‰ to +4‰ ($\Delta\delta^{13}C_{col-ker}$=+7.5‰; Figure 7.12; Table 7.7). This large difference suggests a decrease in δ^{13}C in the diet during this female's last months of life. This same individual also presents the greatest enrichment of bone collagen δ^{15}N relative to relative to hair keratin δ^{15}N, indicating a concomitant decrease in δ^{15}N in her diet during her last months of life ($\Delta\delta^{15}N_{col\text{-}ker}$=+5.9‰; Figure 7.12; Table 7.7). Three other adults and one adolescent from Rinconada Alta and two adults from Armatambo show similar enrichment of bone collagen δ^{15}N relative to relative to hair keratin δ^{15}N, indicating a decrease in δ^{15}N in the diet during the last months of life ($\Delta\delta^{15}N_{col\text{-}ker}$=+1.9‰-+3.0‰; Figure 7.12; Table 7.7). In contrast, eight adults from Armatambo show a depletion in bone collagen δ^{15}N relative to relative to hair keratin δ^{15}N, suggesting an increase in δ^{15}N in the diet during the last months of life ($\Delta\delta^{15}N_{col\text{-}ker}$=-3.4‰ to -1.5‰; Figure 7.12; Table 7.7).

Figure 7.12. Armatambo and Rinconada Alta adults and adolescents with differences in bone collagen and hair keratin $\delta^{13}C_{col[VPDB]}$ and/or $\delta^{15}N_{col[AIR]}$ outside the range of normal variation.

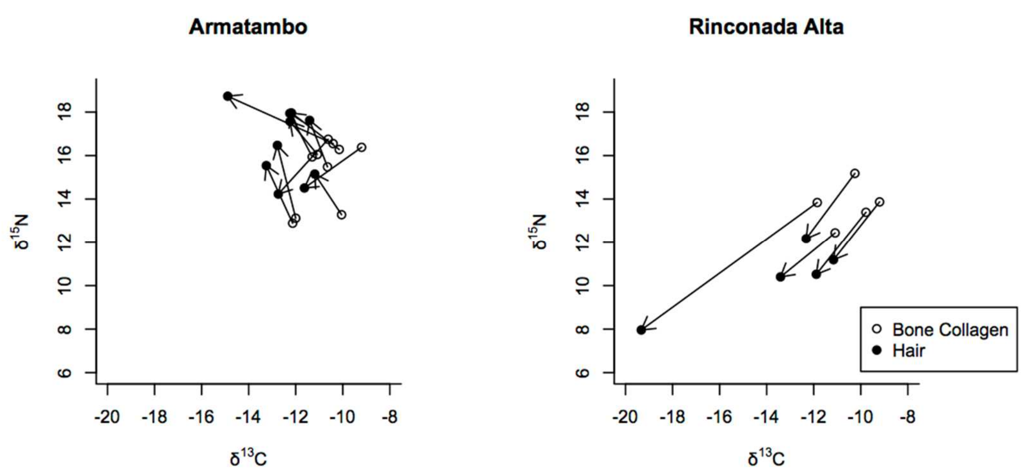


Table 7.7. Adult and adolescent individuals with differences in bone collagen and hair keratin $\delta^{13}C$ and/or $\delta^{15}N$ values outside of the range of normal variation

Site	Individual	Age[a]	Sex[b]	$\delta^{13}C_{col}$	$\delta^{13}C_{ker}$	$\Delta_{col\text{-}ker}$ $\delta^{13}C$ (‰)[c]	$\delta^{15}N_{col}$	$\delta^{15}N_{ker}$	$\Delta_{col\text{-}ker}$ $\delta^{15}N$ (‰)[c]
Armatambo	ARMA-D04.II-CF057	MA	F	-11.1	-12.2	1.2	16.0	17.6	**-1.5**
	ARMA-D04.II-CF103	OA	M	-10.4	-14.9	4.5	16.5	18.7	**-2.2**
	ARMA-D04.II-CF118	MA	F	-10.6	-11.4	0.8	15.5	17.6	**-2.1**
	ARMA-D04.II-CF121	MA	M	-10.6	-12.7	2.1	16.8	14.2	**2.5**
	ARMA-D04.II-CF122	MA	M	-11.3	-12.2	0.9	15.9	17.9	**-2.0**
	ARMA-D04.II-CF127	MA	F	-10.2	-12.2	2.0	16.3	18.0	**-1.7**
	ARMA-D04.II-CF129	MA	F	-12.1	-13.3	1.1	12.9	15.5	**-2.6**
	ARMA-D04.II-CF141	MA	M	-12.0	-12.8	0.8	13.1	16.5	**-3.4**
	ARMA-D04.II-CF182	YA	M	-9.2	-11.6	2.4	16.4	14.5	**1.9**
	ARMA-D04.II-CF188	YA	M	-10.0	-11.2	1.1	13.3	15.2	**-1.9**
Rinconada Alta	RINC-D02.IIA-CF59	MA	M	-10.2	-12.3	2.1	15.2	12.2	**3.0**
	RINC-D02.IIA-CF95	OA	F	-11.8	-19.3	**7.5**	13.8	8.0	**5.9**
	RINC-G9698.II-0563-ENT053	YA	M	-9.2	-11.2	2.0	13.9	11.2	**2.7**
	RINC-G9698.IIAE-1169	Adol	F	-11.1	-13.4	2.3	12.4	10.4	**2.0**
	RINC-G9698.IIAE-1183	YA	M	-9.8	-11.9	2.1	13.4	10.5	**2.9**

[a] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult, Adult = Unknown Adult

[b] Sex categories: F = Female or Probable Female, M = Male or Probable Male

[c] Difference in $\delta^{13}C$ values ($\Delta_{col\text{-}ker}$ $\delta^{13}C$) and $\delta^{15}N$ values ($\Delta_{col\text{-}ker}$ $\delta^{15}N$) between bone collagen and hair keratin. Bolded values are outside range of normal variation of $\Delta_{col\text{-}ker}\delta^{13}C$ and $\Delta_{col\text{-}ker}\delta^{15}N$ as defined in the text.

Summary of Results

In sum, stable carbon and nitrogen isotope values in local botanical and faunal baseline samples pattern in expected ways based on known isotopic distinctions among food types. Comparing archaeological human bone collagen stable carbon and nitrogen isotope values to baseline values indicates that individuals from Armatambo and Rinconada Alta consumed dietary protein from marine fish and invertebrates, C_4- and CAM-photosynthetic plants, and/or terrestrial animals that consumed these resource types.

At Armatambo, infants exhibit significantly increased mean bone collagen stable carbon isotope values relative to adults and children and significantly increased mean nitrogen isotope values relative to adults. No significant differences in mean bone collagen stable carbon and nitrogen isotope values are observed among age groups at Rinconada Alta or between sexes at either site. Comparing individuals between the two sites, Armatambo individuals exhibit significantly increased mean stable nitrogen isotope values relative to Rinconada Alta individuals in the total sample, across all age groups with sufficient sample sizes for comparison, and both sexes. Stable carbon isotope values are not significantly different between the two sites.

Combining stable carbon and nitrogen isotope values in bone collagen with stable carbon isotope values in bone apatite reveals evidence of dietary protein and dietary carbohydrate and lipid energy sources combined. Specifically, results indicate that individuals from both sites consumed marine and/or C_4 protein resources and a mixture of both C_3 and C_4 energy resources. Importing values from adult and adolescent samples into Froehle and colleagues' (2012) multivariate stable carbon and nitrogen isotope model shows that most Armatambo individuals and two Rinconada Alta individuals likely consumed a diet characterized by marine dietary protein and a mixture of C_3 and C_4 non-protein resources. The same model reveals that the majority of Rinconada Alta individuals and approximately one-third of Armatambo individuals consumed a diet characterized by a lesser portion of marine protein with some C_4 protein and a mixture of C_3 and C_4 non-protein resources, with a greater proportion of nonprotein from C_4 resources than the larger Armatambo dietary group.

Comparison of stable carbon and nitrogen isotope values in bone collagen and hair keratin from the same individuals reveals that one older adult female from Rinconada Alta, RINC-D02.IIA-CF95, experienced a significant change in dietary protein resources during her last months of life. Specifically, this individual's hair keratin stable nitrogen and carbon isotope values are depleted relative to her bone collagen values. This depletion is consistent with a shift in consumption of low trophic level marine protein and/or C_4 protein, typical of most Rinconada Alta individuals, to the consumption of decreased relative amounts of marine and/or C_4 protein and increased C_3 protein resources.

Chapter 8

RECONSTRUCTING DIET FROM DENTAL WEAR AND PATHOLOGY

Dental wear and pathology provide an additional means of assessing paleodiet directly from archaeological human remains. Chapter 8 presents the background of this technique, the methods used to collect and analyze dental wear and pathological data in the current study, and the results obtained. The first section reviews the use of dental wear, dental calculus, dental caries, dental abscesses, and antemortem tooth loss to reconstruct certain aspects of diets in the past. The next section describes data collection and analytical methods used in the current study, followed by a presentation of the results of these analyses.

Using Dental Wear and Dental Pathology to Reconstruct Diet

Dental wear and dental pathology are commonly assessed to reconstruct particular aspects of diet in past populations. Because dental indicators vary with subsistence strategy, dental lesions and wear patterns can be combined with biogeochemical analyses to infer differences in dietary practices (e.g., Hutchinson and Norr 2006; Scherer et al. 2007). For example, intensive high-protein marine subsistence is typically associated with extensive tooth wear and wear-associated abscesses, low rates of caries and antemortem tooth loss, and increased rates of calculus, while intensive agricultural subsistence, rich in carbohydrates, is generally linked with mild tooth wear, high rates of caries and associated abscesses and antemortem tooth loss, and low rates of calculus (Littleton and Frohlich 1993; Lukacs 1989; Smith 1984; Walker and Erlandson 1986). Below, each of these types of dental indicators is reviewed in detail.

Dental Wear

Dental wear, or erosion of the occlusal surface of teeth, is caused by attrition from opposing or neighboring teeth and abrasion by outside materials including food and grit (Hillson 1996; Larsen 1997; Powell 1985; Smith 1984). Dental occlusal wear increases over time and is thus positively associated with age and has been used to develop methods for estimates of age at death (e.g., Mays 2002; Miles 2001; Molnar et al. 1983). Differences in diet are commonly associated with differences in dental wear patterns due to variation in structural properties of foods associated with both food types and preparation practices (Larsen 1997; Powell 1985). For example, increased agricultural subsistence and consumption of carbohydrates is linked with reduced rates of dental wear, while hunting and gathering and increased consumption of meats and shellfish is associated with increased rates of dental wear (e.g., Littleton and Frohlich 1993; Lukacs 1989; Okumura and Eggers 2005; Valentin et al. 2006). In addition, food processing techniques may lead to decreased rates of wear due to refinement of tougher natural materials or increased rates of wear associated with the introduction of hard particles such as through the erosion of stone grinders (Larsen 1997). Increased rates of dental wear are also observed among populations inhabiting sandy environments where sand particles may be commonly introduced to the mouth unintentionally (e.g., Lev-Tov Chattah and Smith 2006). Cultural practices involving the teeth such as the chewing of particular plant or animal products during material production processes may also contribute to dental wear patterns (e.g., Blakely and Beck 1984; Molnar 2011). Observed archaeological dental wear patterns thus reflect the accumulation of dietary, environmental, and cultural influences over the course of an individual's lifespan.

Dental Calculus

Dental calculus forms through the mineralization of dental plaque deposits on tooth surfaces (Hillson 1986, 1996). Specifically, calcium phosphate crystals are deposited within an organic layer on the tooth surface derived from oral fluids and colonized by bacteria (Hillson 1996; Lieverse 1999). Multiple interacting factors are thought to influence calculus formation, including sex, age, oral health, and diet (Al-Zahrani et al. 2004; Hillson 1979, 1996; Lieverse 1999). Controlled animal studies and clinical studies suggest an association between poor diet quality and increased calculus formation (Al-Zahrani et al. 2004). Hillson (1979) argues that increased protein in the diet leads to higher rates of calculus formation due to increased mineralization of plaque in the presence of high alkaline waste products produced by the metabolism of protein by oral bacteria. Increased rates of calculus have been associated variously with increased protein intake, increased dietary imbalance, increased reliance on hunting and gathering subsistence, increased reliance on agricultural subsistence, and with mixed agriculture and pastoralism or fishing subsistence (Hillson 1979; Lieverse 1999; Lillie 1996; Littleton and Frohlich 1993; Lukacs 1989), suggesting a complex relationship between dental calculus and diet (Lieverse 1999). Cultural practices involving the teeth, oral hygiene, and taphonomic and conservation processes may also influence the presence and severity of dental calculus and require consideration in analyses and interpretations of this variable as an indicator of diet (Buikstra and Ubelaker 1994; Lieverse 1999).

Recently, scholars have begun to analyze plant microfossils and stable carbon and nitrogen isotopes in dental calculus to aid in reconstructions of paleodiet, although the latter technique remains controversial (e.g., Eerkens et al. 2014; Mickleburgh and Pagán-Jiménez 2012; Salazar-García et al. 2014; Scott and Poulson 2012).

Dental Caries

In the first stage of digestion, oral bacteria ferment carbohydrates producing as a byproduct organic acids that cause localized demineralization of tooth structures known as dental caries (Hillson 1996; Larsen 1997). This process is influenced by the relative proportion of carbohydrates in the diet, as well as a variety of other factors including specific aspects of the oral environment, features of each specific tooth, individual characteristics such as age, sex, life history, and nutritional status, and cultural influences such as oral hygiene practices (Hillson 1996; Larsen 1997; Lukacs and Largaespada 2006).

Increased rates of dental caries among archaeological human teeth are generally interpreted as evidence of increased reliance on cariogenic foods, through increased production of agricultural carbohydrate products or increased refinement of such products (Cucina et al. 2011; Gagnon and Wiesen 2011; Hillson 1996; Klaus and Tam 2010; Larsen 1995, 1997; Littleton and Frohlich 1993; Lukacs 1989; Scherer et al. 2007; Turner 1979; Walker and Erlandson 1986).

Periapical Dental Abscesses

In cases where extreme dental wear or dental caries causes inflammation of a tooth's pulp chamber, and eventual death of the pulp, inflammation may pass through the root canal leading to the accumulation of pus at the root apex (Hillson 1996). Drainage channels formed through resorption of buccal or lingual aspects of the alveolar bone to relieve pressure from the pus buildup at the root apex are distinct in intact dry bone specimens (Buikstra and Ubelaker 1994; Hillson 1996). Increased rates of periapical dental abscesses are generally associated with increased rates of occlusal wear or dental caries (Hillson 1996; Littleton and Frohlich 1993; Turner 1979).

Antemortem Tooth Loss

Advanced inflammation of the tooth and surrounding alveolar bone resulting from carious lesions or extensive attrition may ultimately lead to the complete loss of a tooth (Lukacs 1989, 2007; Ortner 2003). Antemortem tooth loss may also be caused by trauma, nutritional deficiencies, or intentional tooth removal practices (Lukacs 2007). Resorption of the alveolar bone in the region of the tooth socket provides evidence of antemortem tooth loss in archaeological dentitions (Buikstra and Ubelaker 1994). Increased rates of antemortem tooth loss are most often associated with subsistence practices linked with increased rates of carious lesions such as agriculture (Klaus and Tam 2010; Larsen 1995; Littleton and Frohlich 1993; Lukacs 1989).

Methods for Dental Wear and Dental Pathology Data Collection and Analysis

The current study focuses on dental wear, dental calculus, dental caries, dental abscesses, and antemortem tooth loss in adult or adolescent individuals. These data are intended to complement information about the diets of individuals buried at Armatambo and Rinconada Alta obtained in the above isotopic analyses. Methods used to collect and analyze dental wear and pathology data are presented below.

Dental Wear

Dental wear was scored for each tooth in occlusion that presented a completely intact and observable occlusal surface. When part of the occlusal surface was unobservable due to the presence of a large caries or postmortem damage, such teeth were excluded. Individuals lacking dentition due to postmortem damage and individuals in mummy bundles with teeth unobservable were necessarily excluded from the study.

Dental wear scores were assigned following standard scoring systems (Buikstra and Ubelaker 1994; Scott 1979; Smith 1984). Anterior teeth and premolars were scored as wear stage 1-8 and each molar quadrant was scored as wear stage 1-10 (Scott 1979; Smith 1984). Because each molar quadrant is scored independently and summed to determine the tooth score (Buikstra and Ubelaker 1994; Scott 1979), quadrant scores were averaged for comparison to scores of incisors, canines, and premolars (e.g., Klaus and Tam 2010). In order to compare dental wear scores among individuals, a total average wear score was calculated for each individual as the sum of incisor, canine, premolar, and average molar scores divided by the total number of all teeth with observable occlusal surfaces (i.e., the number of teeth with wear scores). Differences in the total average wear scores with site, sex, and age at death were analyzed using *t*-tests and analysis of variance (Zar 2010).

Dental Calculus

Dental calculus was recorded following standard scoring procedures (Brothwell 1981; Buikstra and Ubelaker 1994). Each lingual and buccal or labial surface was scored individually with a code of 0 through 3, where 0 indicates little to no calculus present, 1 indicates a small amount of calculus present, generally as a distinct thin line, 2 indicates a moderate amount of calculus present generally in the form of a wide band, and 3 indicates a large amount of calculus present covering most of the tooth surface (Brothwell 1981). Lingual and buccal or labial surfaces that were partially unobservable due to postmortem damage or presence of soft tissue or other adhered materials, such as textile or cotton, were not scored. An average calculus score was calculated for each individual as the sum of all calculus scores divided by the total number of observable lingual and buccal or labial surfaces. Differences in average calculus scores with site, sex, and age at death were analyzed using Mann-Whitney *U* and Kruskal-Wallis tests as discussed below (Zar 2010).

Dental Caries

Dental caries were recorded by visual examination following standard scoring procedures (Buikstra and Ubelaker 1994; Moore and Corbett 1971). Number and location of caries were recorded. Noncarious pulp chamber exposures caused by extensive wear were not included in the caries count and were identified by location in the center of the occlusal surface in severely worn teeth. A penlight was used to aid observation of interproximal surfaces. Caries frequencies were analyzed as the number of carious teeth divided by the total number of observable teeth. Teeth that were unobservable due to postmortem damage or loss were excluded from analysis. Differences in caries frequencies were assessed through chi-square analyses (Zar 2010).

Periapical Dental Abscesses

Periapical dental abscesses were identified as smooth-walled perforations of the alveolar bone located at the tooth root apex for accommodation of a drainage channel (Buikstra and Ubelaker 1994). Location at the lingual or buccal/labial aspect of the alveolar bone was recorded for each periapical abscess. Frequencies of periapical abscesses are reported relative to the total number of observable alveolar bone loci, defined as two per tooth, one for the alveolar bone surface associated with the lingual aspect of the tooth root and one for the alveolar bone surface associated with the labial or buccal aspect of the tooth root. Alveolar bone loci unobservable due to postmortem damage or presence of adhering soft tissue or textiles were excluded. Differences in dental abscess frequencies were assessed through chi-square analyses (Zar 2010).

Antemortem Tooth Loss

Antemortem tooth loss was identified by the absence of a tooth combined with moderate to complete resorption of the associated alveolar bone (Buikstra and Ubelaker 1994). Only alveolar sockets exhibiting moderate to complete resorption to such a degree that postmortem loss could be ruled out were scored as antemortem loss. Questionable cases that could have potentially held a small tooth root were counted as postmortem tooth loss. Frequencies of antemortem tooth loss are reported as the total number of teeth lost antemortem relative to the total number of observable alveolar sockets or loci, one per tooth. Alveolar socket loci that were unobservable due to postmortem damage or presence of adhering soft tissue or textiles were excluded. Chi-square analyses were used to test differences in antemortem tooth loss frequencies (Zar 2010).

Dental Wear and Dental Pathology Results

Dental Wear and Dental Pathology Study Sample

Of the 276 total individuals in the entire osteological study sample, 116 individuals were included in the dental wear and dental pathology analyses, including 90 individuals from Armatambo and 26 individuals from Rinconada Alta. A total of 160 individuals were thus excluded from the dental wear and dental pathology analyses. Of these, 125 were juveniles, including 11 fetal, 81 infants, and 33 children. An additional 35 adult individuals were excluded due to unobservable dentition, including 24 individuals with mummified soft tissue or preserved bundle wrappings obscuring observation of most or all of dentition and 11 skeletons with dentition absent due to postmortem loss. Finally, one adult (ARMA-D04.II-CF057) was excluded because the majority of teeth could not be identified because extreme dental wear and dental caries had reduced teeth to multiple, very small loose root fragments associated with alveolar bone in advanced stages of resorption. The distribution of age at death and sex estimates across the final dental sample for each site is presented in Table 8.1. The sample size for Rinconada Alta (*n*=26) is only approximately one third of the Armatambo sample size (*n*=90). Within the Armatambo sample, approximately half (*n*=47, 52%) of the individuals are middle adults, and most other individuals are young adults (*n*=23, 26%) or older adults (*n*=16, 18%). In contrast, for Rinconada Alta, the largest proportion of adults is in the young adult age category (*n*=10, 38%), followed by the middle adults (*n*=7, 27%) and the older adults (*n*=6, 23%). Very few adolescents are present in the sample (Armatambo: *n*=4, 4%, Rinconada Alta: *n*=1, 4%). Given the differences in the age at death distributions at each site and the positive correlation between dental wear and dental pathology with age, total comparisons of mean scores on each variable between sites may be biased towards the Armatambo sample due to the larger number and proportion of middle and older adults present relative to the Rinconada Alta sample. Therefore, all comparisons between sites presented below are also performed within each age category separately.

The distribution of individuals by sex in the dental wear and dental pathology study sample is fairly similar at each site, with approximately 60% of individuals estimated as female (Armatambo: n=57, 63%; Rinconada Alta: n=16, 62%) and approximately 40% of individuals estimated as male (Armatambo: n=33, 37%; Rinconada Alta: n=11, 42%). Despite this similar distribution, the larger total number of females at Armatambo may also bias results of total comparisons of mean dental scores between sites if underlying sex differences exist due to biological or cultural factors (Larsen 1997; Lukacs and Largaespada 2006). For this reason, comparisons between sites presented below are also carried out within each sex category separately.

Table 8.1. Distribution of individuals in dental wear and dental pathology sample by age for combined sex categories

	Armatambo (n = 90)					Rinconada Alta (n = 26)				
Age category[a]	F[b]	M[c]	A[d]	UD[e]	% Site Total	F	M	A	UD	% Site Total
Adol	3	1	0	0	**4/90 (4%)**	1	0	0	0	**1/26 (4%)**
YA	13	10	0	0	**23/90 (26%)**	3	7	0	0	**10/26 (38%)**
MA	26	21	0	0	**47/90 (52%)**	3	4	0	0	**7/26 (27%)**
OA	15	1	0	0	**16/90 (18%)**	6	0	0	0	**6/26 (23%)**
Adult	0	0	0	0	**0/90 (0%)**	1	0	1	0	**2/26 (8%)**
Total	**57**	**33**	**0**	**0**		**14**	**11**	**1**	**0**	
% Site Total	**57/90 (63%)**	**33/90 (37%)**	**0/90 (0%)**	**0/90 (0%)**	**% Site Total**	**14/26 (54%)**	**11/26 (42%)**	**1/26 (4%)**	**0/26 (0%)**	

[a] Adult age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult, Adult = Unknown Adult

[b] Includes individuals estimated as 'Female' and 'Probable Female'.

[c] Includes individuals estimated as 'Male' and 'Probable Male'.

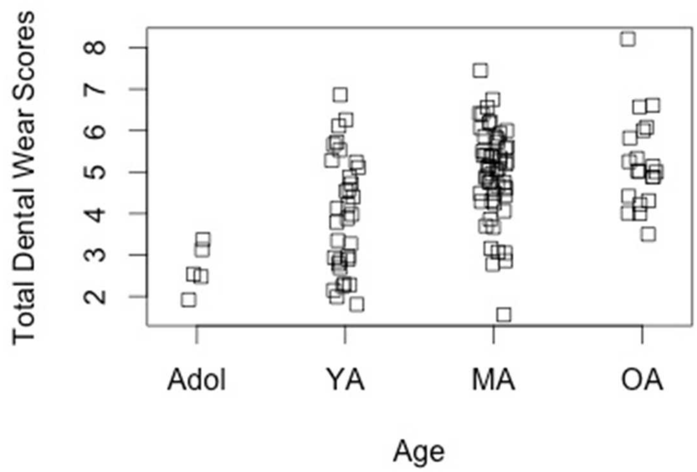
[d] Ambiguous

[e] Undetermined

Dental Wear Results

Dental wear is examined through the total average wear score, calculated from individual tooth dental wear scores and counts of total observable occlusal surfaces as described above. Total average wear scores for each individual in the sample are listed in Appendix K. Two individuals (ARMA-D04.II-CF126 and ARMA-PER97-ENT49) lacking teeth with observable occlusal surfaces were excluded (Appendix K). For the entire sample, mean total average wear equals 4.61±1.33 (n=114, 1σ). Observation of dental wear scores by age group shows highest scores among middle and older adults and lower scores among adolescents and young adults, with the exception of one middle adult outlier with the lowest wear score (Figure 8.1).

Figure 8.1. Total average dental wear scores by age for the entire study sample.



A one-factor ANOVA on mean total average wear among young adults, middle adults, and older adults indicates that the means are not the same for these age groups (Table 8.2). A Tukey-Kramer test indicates that young adult mean total average wear is significantly different from middle adult and older adult means, which are not significantly different from one another (Table 8.2). The same tests on mean total average wear scores of individuals from Armatambo produces the same results (Table 8.2). In contrast, mean total average wear among the three adult age groups at Rinconada Alta is not significantly different (Table 8.2). A comparison of female and male mean total average wear indicates that male mean total average wear is greater than the female mean for the overall sample and for the Armatambo sample (Table 8.3). Mean total average wear is not significantly different between males and females at Rinconada Alta (Table 8.3).

Table 8.2. Results of ANOVA and Tukey-Kramer tests of mean total average wear scores among age groups

	ANOVA results[a]		Levene's test[b]		Shapiro-Wilk test[b]		Tukey-Kramer test results[c]		
	F	***P***	***W***	***P***	***W***	***P***	**Comparison**	**Difference in means**	***P***
Total sample	$F_{2,104}$= 8.84	***0.00***	$W_{2,104}$= 2.61	0.08	0.99	0.94	YA vs. MA	-0.98	***0.00***
							YA vs. OA	-1.23	***0.00***
							MA vs. OA	0.25	0.70
Armatambo	$F_{2,81}$= 7.52	***0.00***	$W_{2,81}$= 0.65	0.53	0.99	0.93	YA vs. MA	1.05	***0.00***
							YA vs. OA	1.34	***0.00***
							MA vs. OA	0.28	0.72
Rinconada Alta	$F_{2,20}$= 1.49	0.25	$W_{2,20}$= 3.54	0.05	0.97	0.67	YA vs. MA	-	-
							YA vs. OA	-	-
							MA vs. OA	-	-

[a] *F* = *F* statistic; Bolded P-values are significant at the 0.05 α-level.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

[c] Age categories: YA = Young Adult, MA = Middle Adult, OA = Older Adult; Bolded P-values are significant at the 0.05 α-level.

Table 8.3. Comparison of mean total average dental wear score by sex

	Mean total average wear score[a]				Levene's test[b]		Shapiro-Wilk test[b]			
	Sex						Females		Males	
	F	**M**	***t***	***P***	***W***	***P***	***W***	***P***	***W***	***P***
Total sample	4.34 (*n*=68)	5.02 (*n*=45)	-2.74	***0.01***	$W_{2,111}$= 2.30	0.10	0.98	0.23	0.98	0.68
Site										
Armatambo	4.47 (*n*=52)	5.05 (*n*=32)	-2.05	***0.04***	$W_{1,82}$= 2.11	0.15	0.98	0.56	0.97	0.52
Rinconada Alta	4.29 (*n*=12)	5.25 (*n*=11)	-1.8	0.09	$W_{1,21}$= 0.98	0.33	0.90	0.14	0.96	0.76

[a] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined. '*t*' = *t* statistic; Bolded *P*-values are significant at the 0.05 α-level.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

Results of two sample *t*-tests of mean total average wear scores between the two sites are shown in Table 8.4. All Levene's tests of equal variance and Shapiro-Wilk's tests of normality are non-significant at the 0.05 α-level, indicating that the assumptions of the *t*-test are met for all comparisons, despite the small sample sizes of several of the

Rinconada Alta groups. None of the *t*-test results are significant at the 0.05 α-level, indicating that mean total average wear scores are not significantly different between the two sites for the total sample or within each age and sex category.

Table 8.4. Comparison of mean total average dental wear score by site.

	Mean total average wear score[a]				**Levene's test**[b]		**Shapiro-Wilk test**[b]			
	ARMA	**RINC**	***t***	***P***	***W***	***P***	**Armatambo: *W***	***P***	**Rinconada Alta: *W***	***P***
Total sample	4.60 (*n*=88)	4.64 (*n*=26)	-0.14	0.89	0.00	0.99	0.98	0.28	0.96	0.40
Age category[c]										
Adol	2.58 (*n*=4)	3.13 (*n*=1)	-0.83	0.47	0.66	0.48	0.95	0.69	-	-
YA	3.88 (*n*=23)	4.22 (*n*=10)	-0.63	0.54	1.43	0.24	0.96	0.52	0.92	0.33
MA	4.93 (*n*=47)	5.13 (*n*=7)	-0.44	0.66	0.76	0.39	0.97	0.24	0.94	0.60
OA	5.22 (*n*=14)	5.21 (*n*=6)	0.02	0.98	0.68	0.42	0.93	0.26	0.93	0.62
Sex[d]										
F	4.37 (*n*=55)	4.2 (*n*=13)	0.38	0.70	0.01	0.92	0.98	0.55	0.92	0.22
M	4.98 (*n*=33)	5.14 (*n*=12)	-0.41	0.68	0.00	0.98	0.97	0.49	0.96	0.73

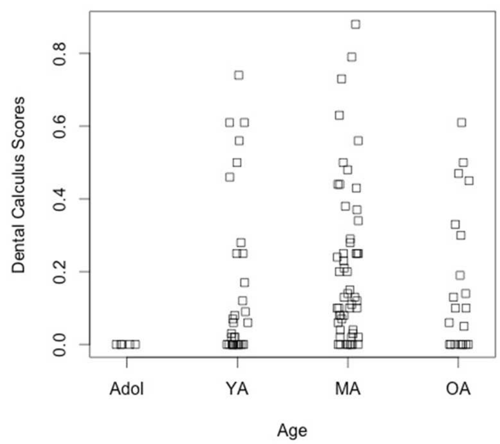
[a] ARMA = Armatambo, RINC = Rinconada Alta; *t* = *t* statistic; Bolded *P*-values are significant at the 0.05 α-level.
[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.
[c] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult
[d] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

Dental Calculus Results

Individual dental calculus scores represent the sum of all calculus scores divided by the total number of observable buccal, labial, and lingual surfaces as described above. Individual calculus scores are shown in Appendix L. Two individuals (ARMA-D04.II-

CF126 and RINC-D02.IIA-CF57) exhibit no observable buccal, labial, and lingual surfaces and are excluded from the analyses (Appendix L). For the overall sample, the mean dental calculus score equals 0.18±0.22 (*n*=114, 1σ). The majority of individuals in all age categories present dental calculus scores at or near zero, with highest scores present among middle adults (Figure 8.2).

Figure 8.2. Dental calculus scores by age for the entire study sample



To compare calculus scores across age groups, a Kruskal-Wallis test was performed (Table 8.5). The calculus score data present a very left-skewed distribution, and do not meet the assumption of normality required by the ANOVA test (Shapiro-Wilk test: W=0.84, P=0.00). Because the variances of the residuals are not significantly different (Levene's test: $W_{3,108}$=135, P=0.26) and the shape of the age group distributions are similar, a Kruskal-Wallis test is appropriate to test whether the distribution of dental calculus scores is the same across all adult age groups (Zar 2010). Adolescents were excluded from the test since all scores equal zero. Results of the Kruskal-Wallis tests for the overall sample and within each site show that the distributions of dental calculus scores are not significantly different among the three adult age groups (Table 8.5).

Table 8.5. Results of Kruskal-Wallis tests of distributions of dental calculus scores among age groups

	Kruskal-Wallis test results[a]			**Levene's test**[b]	
	H	**ν**	***P***	***W***	***P***
Total sample	5.10	2	0.08	$W_{3,108}$= 1.35	0.26
Armatambo	4.39	2	0.11	$W_{2,82}$= 0.14	0.87
Rinconada Alta	0.78	2	0.68	$W_{2,19}$= 0.25	0.78

[a] *H* = *H* statistic; ν = degrees of freedom; Bolded P-values are significant at the 0.05 α-level.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

A Mann-Whitney *U* test on male and female dental calculus score distributions for the overall sample indicates that males and females have significantly different dental calculus scores (Table 8.6). Mann-Whitney *U* tests of the distributions between sexes within Armatambo and within Rinconada Alta, show that the distributions of male and female dental calculus scores are significantly different for Armatambo males and females, but not for Rinconada Alta males and females (Table 8.6).

Table 8.6. Comparison of dental calculus score distributions by sex

	Mann-Whitney *U* test results[a]				**Levene's test**[b]	
		Sample sizes				
	U	n_F	n_M	***P***	***W***	***P***
Total sample	1036.50	69	44	***0.00***	$W_{2,111}$= 2.02	0.14
Site						
Armatambo	595.00	52	32	***0.03***	$W_{1,82}$= 1.83	0.18
Rinconada Alta	37.50	12	11	0.14	$W_{1,20}$= 1.46	0.24

[a] *U* = *U* statistic; n_F = sample size of females and probable females combined; n_M = sample size of males and probable males combined; Bolded P-values are significant at the 0.05 α-level.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

Comparisons of dental calculus scores between the two sites are shown in Table 8.7. Kruskal-Wallis tests comparing the dental calculus score distributions between Armatambo and Rinconada Alta are not significant for the total sample, any of the adult age groups, or either sex. A test of adolescent scores was not performed because all are zero scores (Appendix L). In sum, the results indicate that individuals buried at the two sites do not have significantly different calculus scores.

Table 8.7. Comparison of dental calculus score distributions by site

	Mann-Whitney *U* test results[a]				Levene's test[b]	
		Sample sizes				
	U	n_A	n_R	***P***	***W***	***P***
Total sample	1062.50	89	25	0.73	$W_{1,112}$= 1.67	0.19
Age category[c]						
Adol	-	4	1	-	-	-
YA	112.50	23	10	0.94	$W_{1,31}$= 1.00	1.00
MA	128.00	47	6	0.73	$W_{1,51}$= 0.75	0.39
OA	37.50	15	6	0.58	$W_{1,19}$= 0.66	0.43
Sex[d]						
F	386.00	56	13	0.73	$W_{1,67}$= 0.00	0.97
M	180.50	33	11	0.99	$W_{1,42}$= 0.32	0.57

[a] *U* = *U* statistic; n_A = sample size of Armatambo individuals; n_R = sample size of Rinconada individuals; Bolded P-values are significant at the 0.05 α-level. Test not performed for adolescents as all scores equal 0.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

[c] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult

[d] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

Dental Caries Results

Dental caries data are presented in Appendix M. Three individuals (ARMA-D04.II-CF126, ARMA-PER97-ENT49, and RINC-D02.IIA-CF57) were excluded from the analyses due to a lack of observable teeth (Appendix M). Among the 113 individuals in the final sample, a total of 431 (19.1%) carious teeth were observed out of 2,260 total observable teeth.

Rates of dental caries are higher for middle and older adult teeth than young adult teeth (Table 8.8). Chi-square goodness of fit tests of the independence of dental caries and age indicate that dental caries frequency is not independent of age among young adults, middle adults, and older adults (Table 8.8). Specifically, the null hypothesis that dental caries is independent of age is rejected in tests of the total sample, the Armatambo sample, and the Rinconada Alta sample (Table 8.8).

Table 8.8. Comparison of frequencies of carious teeth by age

	Young Adult *N* carious teeth/ *N* observable (%)	**Middle Adult** *N* carious teeth/ *N* observable (%)	**Older Adult** *N* carious teeth/ *N* observable (%)	χ^{2} [a]	***P*** [b]
Total sample	93/762 12%	256/1078 24%	69/182 38%	47.22	***0.00***
Site					
Armatambo	65/520 13%	216/947 23%	44/149 30%	31.27	***0.00***
Rinconada Alta	28/242 12%	40/131 31%	25/102 25%	21.42	***0.00***

[a] Chi-square statistic.

[b] Bolded *P*-values are significant at the 0.05 α-level.

Comparisons between the sexes indicate that females and males overall exhibit similar rates of frequencies of carious teeth. Chi-square goodness of fit tests of the independence of caries and sex reveals that caries frequency is independent of sex within the total sample and within the Armatambo sample (Table 8.9). Within the Rinconada Alta sample, however, the frequency of carious teeth is significantly higher for females than males (Table 8.9).

Table 8.9. Comparison of frequencies of carious teeth by sex

	Females [a] *N* carious teeth/ *N* observable (%)	**Males** [a] *N* carious teeth/ *N* observable (%)	χ^2 [b]	***P*** [c]
Total sample	253/1300 19%	170/944 18%	0.75	0.38
Site				
Armatambo	195/1040 19%	130/677 19%	0.05	0.82
Rinconada Alta	58/260 22%	40/267 15%	4.67	***0.03***

[a] 'Females' include 'Female' and 'Probable Female' categories combined. 'Males' include 'Male' and 'Probable Male' categories combined.

[b] Chi-square statistic.

[c] Bolded *P*-values are significant at the 0.05 α-level.

Comparisons of frequencies of carious teeth between Armatambo and Rinconada Alta reveal that caries frequency is independent of burial site location. Specifically, chi-square goodness of fit tests indicate that there is no significant difference in frequencies of carious teeth between the two sites for the total sample, for any of the three adult age categories, or for either sex (Table 8.10). A Fisher's exact test was used instead of a chi-square test for the comparison of adolescent carious teeth frequencies between the two sites because of the small sample size and low expected frequencies with this group. The results of the Fisher exact test indicate that the proportion of adolescent carious teeth at Rinconada Alta is not significantly greater than the proportion of adolescent carious teeth at Armatambo (Table 8.10).

Table 8.10. Comparison of frequencies of carious teeth by site

	Armatambo *N* carious teeth/ *N* observable (%)	**Rinconada Alta** *N* carious teeth/ *N* observable (%)	χ^{2} [a]	*P* [b]
Total sample	325/1717 19%	106/543 20%	0.09	0.76
Age category[c]				
Adol	0/101 0%	2/32 6%	*Fisher's Exact	0.06
YA	65/520 13%	28/242 12%	0.13	0.72
MA	216/947 23%	40/131 31%	3.79	0.05
OA	44/149 30%	25/102 25%	0.77	0.38
Sex[d]				
F	195/1040 19%	58/260 22%	2.90	0.09
M	130/677 19%	40/267 15%	1.68	0.20

[a] Chi-square statistic. For the adolescent category, a Fisher's exact test was used.
[b] Bolded *P*-values are significant at the 0.05 α-level.
[c] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult
[d] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

Periapical Dental Abscesses Results

Data on periapical dental abscesses are shown in Appendix N. One individual (RINC-D02.IIA-CF57) from the total sample was excluded from analyses of dental abscesses due to the lack of observable alveolar bone surfaces (Appendix N). As described above, frequencies of periapical abscesses are reported relative to the total number of observable alveolar bone loci, defined as two per tooth, one for the alveolar bone surface associated with the lingual aspect of the tooth root and one for the alveolar bone surface associated with the labial or buccal aspect of the tooth root. For the total sample of 115 individuals, 106 (1.6%) periapical abscesses were observed out of 6,630 total observable alveolar loci.

As with dental caries, overall rates of periapical dental abscesses are higher for middle and older adults than young adults (Table 8.11). Chi-square goodness of fit tests of the independence of dental abscesses and age indicate that frequency of dental abscesses is not independent of age among young adults, middle adults, and older adults within the total sample and within the Armatambo sample (Table 8.11). In contrast, the test of the Rinconada Alta sample, indicates that dental abscesses are independent of age among adult individuals buried at this site (Table 8.11). Females and males exhibit similar rates of frequencies of periapical dental abscesses (Table 8.12). Chi-square goodness of fit tests of the independence of dental abscesses and sex show that caries frequency is independent of sex within the total sample, the Armatambo sample, and the Rinconada Alta sample (Table 8.12). When rates of dental abscesses are compared between the sites of Armatambo and Rinconada Alta, no significant differences are observed within any adult age category (Table 8.13). In addition, no significant difference in dental abscesses frequency is observed between females buried at each site, nor among males buried at each site (Table 8.13).

Table 8.11. Comparison of frequencies of periapical dental abscesses by age

	Young Adult [a] *N* periapical abscesses/ *N* observable alveolar loci (%)	**Middle Adult** [a] *N* periapical abscesses/ *N* observable alveolar loci (%)	**Older Adult** [a] *N* periapical abscesses/ *N* observable alveolar loci (%)	χ^2 [b]	***P*** [c]
Total sample	17/1938 0.88%	69/3054 2.26%	19/1212 1.57%	13.75	***0.00***
Site					
Armatambo	10/1346 0.74%	62/2676 2.32%	10/856 1.17%	15.08	***0.00***
Rinconada Alta	7/592 1.18%	7/378 1.85%	9/356 2.53%	2.40	0.30

[a] '*N* observable alveolar loci' is calculated as the total number of observable alveolar bone loci, defined as the alveolar bone surfaces associated with the lingual and labial or buccal aspects of each tooth root (i.e., two alveolar loci possible per tooth).

[b] Chi-square statistic.

[c] Bolded *P*-values are significant at the 0.05 α-level.

Table 8.12. Comparison of frequencies of periapical dental abscesses by sex

	Females [a] *N* periapical abscesses/ *N* observable alveolar loci (%)	**Males** [a] *N* periapical abscesses/ *N* observable alveolar loci (%)	χ [a]	***P*** [c]
Total sample	60/4016 1.49%	46/2552 1.80%	0.94	0.33
Site				
Armatambo	47/3254 1.44%	35/1860 1.88%	1.43	0.23
Rinconada Alta	13/762 1.71%	11/692 1.59%	0.03	0.86

[a] 'Females' include 'Female' and 'Probable Female' categories combined. 'Males' include 'Male' and 'Probable Male' categories combined. 'N observable alveolar loci' is calculated as the total number of observable alveolar bone loci, defined as the alveolar bone surfaces associated with the lingual and labial or buccal aspects of each tooth root (i.e., two alveolar loci possible per tooth).

[b] Chi-square statistic.

[c] Bolded *P*-values are significant at the 0.05 α-level.

Table 8.13. Comparison of frequencies of periapical dental abscesses by site

	Armatambo [a] *N* periapical abscesses/ *N* observable alveolar loci (%)	**Rinconada Alta** [a] *N* periapical abscesses/ *N* observable alveolar loci (%)	χ^2 [a]	***P*** [c]
Total sample	82/5114 1.60%	24/1516 1.58%	0.00	0.96
Age category[d]				
Adol	0/236 0%	0/64 0%	-	-
YA	10/1346 0.74%	7/592 1.18%	0.91	0.34
MA	62/2676 2.32%	7/378 1.85%	0.32	0.57
OA	10/856 1.17%	9/356 2.53%	3.01	0.08
Sex[e]				
F	47/3254 1.44%	13/762 1.71%	0.29	0.59
M	35/1860 1.88%	11/692 1.59%	0.24	0.62

[a] 'N observable alveolar loci' is calculated as the total number of observable alveolar bone loci, defined as the alveolar bone surfaces associated with the lingual and labial or buccal aspects of each tooth root (i.e., two alveolar loci possible per tooth).

[b] Chi-square statistic.

[c] Bolded *P*-values are significant at the 0.05 α-level.

[d] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult

[e] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

Antemortem Tooth Loss Results

Data on antemortem tooth loss are presented in Appendix O. One individual (RINC-D02.IIA-CF57) was excluded from analyses of antemortem due to the lack of observable alveolar tooth sockets (Appendix O). Frequencies of antemortem tooth loss are reported relative to the total number of observable alveolar loci defined as alveolar tooth socket locations, one per tooth as described above. Within the total sample of 115 individuals included in the analysis, 742 (20.9%) antemortem tooth losses were observed out of 3,556 total observable alveolar tooth socket loci.

Distributions of antemortem tooth loss frequencies are not independent of age as shown by chi-square goodness of fit tests (Table 8.14). Within the adult age groups, rates of antemortem tooth loss are increased among middle adults relative to young adults and increased among older adults relative to both young and middle adults (Table 8.14). This pattern is observed in the total sample as well as within the Armatambo sample and within the Rinconada Alta sample (Table 8.14). In addition, chi-square goodness of fit tests of the independence of antemortem tooth loss and sex are significant for the total sample, the Armatambo sample, and the Rinconada Alta sample (Table 8.15). These results indicate that females present significantly increased rates of antemortem tooth loss relative to males in each of the samples (Table 8.15).

Table 8.14. Comparison of frequencies of antemortem tooth loss by age

	Young Adult [a] *N* teeth lost antemortem/ *N* observable alveolar sockets (%)	**Middle Adult** [a] *N* teeth lost antemortem/ *N* observable alveolar sockets (%)	**Older Adult** [a] *N* teeth lost antemortem/ *N* observable alveolar sockets (%)	χ^2 [a]	***P*** [c]
Total sample	101/1025 10%	318/1640 19%	306/669 46%	316.87	***0.00***
Site					
Armatambo	77/724 11%	271/1450 19%	235/483 49%	264.22	***0.00***
Rinconada Alta	24/301 8%	47/190 25%	71/186 38%	65.51	***0.00***

[a] '*N* observable alveolar sockets' is calculated as the total number of observable alveolar bone sockets, one per tooth.

[b] Chi-square statistic.

[c] Bolded *P*-values are significant at the 0.05 α-level.

Table 8.15. Comparison of frequencies of antemortem tooth loss by sex

	Females [a] *N* teeth lost antemortem/ *N* observable alveolar sockets (%)	**Males** [a] *N* teeth lost antemortem/ *N* observable alveolar sockets (%)	χ^2 [a]	***P*** [c]
Total sample	525/2161 24%	211/1364 15%	39.42	***0.00***
Site				
Armatambo	424/1771 24%	159/1013 16%	26.46	***0.00***
Rinconada Alta	101/390 26%	52/351 15%	13.85	***0.00***

[a] 'Females' include 'Female' and 'Probable Female' categories combined. 'Males' include 'Male' and 'Probable Male' categories combined. 'N observable alveolar sockets' is calculated as the total number of observable alveolar bone sockets, one per tooth.

[b] Chi-square statistic.

[c] Bolded *P*-values are significant at the 0.05 α-level.

Comparisons of antemortem tooth loss frequencies between the sites of Armatambo and Rinconada Alta are shown in Table 8.16. Rates of antemortem tooth loss are similar between the two sites in the comparison including the total sample (Table 8.16). No antemortem tooth loss was observed in the adolescent sample, and antemortem tooth loss frequencies are independent of burial location among the young adult sample (Table 8.16). Significantly increased rates of antemortem tooth loss are observed for the Rinconada Alta middle adult alveolar loci relative to the Armatambo middle adult loci, while the opposite trend is observed within the older adult sample. Specifically, Armatambo older adult alveolar loci present increased rates of antemortem tooth loss relative to the Rinconada Alta older adult alveolar loci (Table 8.16). Antemortem tooth loss frequencies are not significantly different between females buried at the two sites, or between males buried at the two sites (Table 8.16).

Table 8.16. Comparison of frequencies of antemortem tooth loss by site

	Armatambo [a] *N* teeth lost antemortem/ *N* observable alveolar sockets (%)	**Rinconada Alta** [a] *N* teeth lost antemortem/ *N* observable alveolar sockets (%)	χ^2 [a]	***P*** [c]
Total sample	583/2784 21%	168/836 20%	0.04	0.83
Age category[d]				
Adol	0/127 0%	0/32 0%	-	-
YA	77/724 11%	24/301 8%	1.70	0.19
MA	271/1450 19%	47/190 25%	3.93	***0.05***
OA	235/483 49%	71/186 38%	5.94	***0.01***
Sex[e]				
F	424/1771 24%	101/390 26%	0.67	0.41
M	159/1013 16%	52/351 15%	0.15	0.69

[a] 'N observable alveolar sockets' is calculated as the total number of observable alveolar bone sockets, one per tooth.

[b] Chi-square statistic.

[c] Bolded *P*-values are significant at the 0.05 α-level.

[d] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult

[e] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

Summary of Results

In review, results of dental wear and dental pathology overall reveal similar patterns at Armatambo and Rinconada Alta. No significant difference is observed in mean total average dental wear scores, dental calculus score distributions, caries frequencies, or periapical dental abscess frequencies for the total sample or within each age and sex category. Rates of antemortem tooth loss are also not significantly different between the two sites in comparisons of the total sample, or in comparisons within each sex category. Rates of antemortem tooth loss are significantly higher, however, among Rinconada Alta middle adults versus Armatambo middle adults and significantly lower among Rinconada Alta older adults versus Armatambo older adults.

When individuals are compared among adult age categories for the total sample, mean dental wear scores, rates of caries, and rates of antemortem tooth loss significantly increase with age. When separated by sample, these trends with age remain statistically significant within the Armatambo sample, but not within the Rinconada Alta sample, with the exception of rates of antemortem tooth loss. Rates of antemortem tooth loss increase significantly with age within the total sample and within samples at both sites. Rates of periapical dental abscesses are significantly higher among middle adults followed by older adults in the total sample and within the Armatambo sample, but are not significantly different among age groups at Rinconada Alta. Dental calculus scores are not significantly different across adult age groups for the total sample or within the Armatambo or Rinconada Alta samples.

Comparisons between males and females show significantly increased dental wear among males in the Armatambo sample. Increased mean dental wear observed among males versus females at Rinconada Alta does not reach statistical significance. Similarly, dental calculus scores show significantly different distributions between males and females within the Armatambo sample, but not within the Rinconada Alta sample. Rates of dental caries are significantly greater among females than males buried at Rinconada Alta, but are not significantly different between the sexes at Armatambo. For periapical dental abscesses, no significant differences were observed between males and females at either site. In contrast, rates of antemortem tooth loss are significantly greater among females versus males at both sites.

Chapter 9

RECONSTRUCTING MORTUARY RITUALS FROM ARCHAEOLOGICAL CONTEXTS

Various aspects of mortuary rituals in past societies may be inferred through analysis of archaeological mortuary contexts. Chapter 9 first presents an overview of the advantages and disadvantages of reconstructing mortuary rituals from archaeological contexts and next reviews the theoretical approaches to mortuary analysis presented in Chapter 2 in the context of the Ychsma case study. Following this review, the methods used in the current study to collect and analyze mortuary contextual data from Armatambo and Rinconada Alta are described, and the chapter ends with a presentation of the results of these analyses.

Using Archaeological Mortuary Contexts to Reconstruct Mortuary Rituals

Due to the unique and complex nature of archaeological mortuary contexts, multiple factors must be taken into consideration when using archaeological data to reconstruct mortuary rituals. Like all archaeological data, mortuary archaeological contexts provide only a fragmentary view of the past actions involved in their creation as only the physical remnants of practices are preserved and only a fraction of these are recovered (Härke 1997; Lucas 2012). Taphonomic processes also influence which physical materials are and are not preserved, such that important aspects of a funerary ritual involving material types less likely to preserve, such as textiles or botanical remains, may be unobservable. Similarly, differential preservation rates of such materials within a region, site, or cemetery may lead to observations of false differences in practices, if, for example, certain materials are better preserved in areas of a site not prone to groundwater versus other areas continually penetrated by groundwater.

In addition, it is important to consider the representativeness of a burial sample. Chronologically, cemeteries reflect variation in mortuary rituals over the course of multiple generations and centuries (Chapman 2005). In spatial terms, differential burial practices may lead to underrepresentation of particular social groups, such as age or class groups, in a particular mortuary sample. For instance, spatially distinct burial locations might include different areas of a site or different locations within a cemetery. Other sample biases might arise through differential recovery and reporting techniques among project directors.

Inferring Ychsma Social Identification Practices Through Mortuary Analysis

The following analysis of mortuary contextual data to reconstruct Ychsma mortuary rituals draws on the various theoretical approaches discussed in Chapter 2 in its design and understanding of mortuary rituals as potential mechanisms of social identification. Here, this mortuary theory is reviewed briefly with specific consideration for the Ychsma case study. Spatial location and variation of mortuary treatment are the focus of this discussion.

The Ychsma burials at Armatambo and Rinconada Alta were recovered from distinct cemeteries at each site (Díaz 2002, 2004b, 2004c; Guerrero 1996-1998; Pérez 1997). Using cross-cultural ethnographic surveys some researchers have proposed that the practice of burying the dead in such separate, specialized locations reflects the legitimization of rights to group resources through lineal descent from the dead (e.g., Goldstein 1981; Morris 1991; Saxe 1970). From a social perspective, the landscape of the cemeteries can be understood as a socially-produced space (Silverman and Small 2002), such that formal and public burial locations would have provided an environment for establishing and evaluating individual and group identities (Charles and Buikstra 2002; Chesson 2001). The present study examines the evidence of such identification processes through an analysis of observed variation in mortuary treatments.

As described in detail in Chapter 2, mortuary treatment variation may be influenced by a variety of factors. Differences in burial treatment may represent the variable social roles held by the deceased in life considered appropriate for representation in death (e.g., Binford 1971; Brown 1971; Saxe 1970, 1971). Alternatively or additionally, burial may involve practices intended to create, transform, or conceal social relationships, rather than to represent them directly (e.g., Curet and Oliver 1998; Hodder 1982a, 1984; Parker Pearson 1982; Shanks and Tilley 1982). Further influences on mortuary practices include historical, cultural, religious, political, and circumstantial factors (e.g., Buikstra 1995; Carr 1995; Hodder 1982b, 1987).

In addition, beliefs about or relationships with the deceased may also influence mortuary treatments (e.g., Crandell and Martin 2014; Parker Pearson 1999; Rakita and Buikstra 2005). The dead, who may remain linked with the corpse or transferred to another location following death, may be social actors who influence the lives of the living (e.g., Parker Pearson 1999; Rakita and Buikstra 2005; Tung 2014; Velasco 2014). Religious beliefs regarding the transcendence of death or rituals requiring tools made from parts of the corpse or skeleton may also impact the nature of mortuary treatments (e.g., Malville 2005; McNeill 2005; Naji 2005; Scott 2011). Because the life of the living person may not always be the primary factor influencing mortuary practices, mortuary analyses should consider not only patterns associated with the individual characteristics of the deceased person receiving the treatment, but also large-scale similarities and small-scale idiosyncrasies in treatments potentially reflective of overarching societal concepts of the deceased and/or flexibility in the performance of rituals related to such ideas (Pollock 2011; Scott 2011).

In the context of pre-Columbian Andean ideology, as revealed by the survey of widespread ethnographic evidence presented in Chapter 3, mortuary practices likely served to reify the social ties that link humans, the dead, and their landscape both corporeally and spiritually. Human-like qualities, emotions, and needs of the dead, as well as capacity of the dead to affect the environment and livelihoods of the living may have had a strong influence on burial practices. A need to care for the dead and concretize social relationships, for instance, may have outweighed representations of individual social identities of the deceased.

These various potential influences are taken into consideration in the present mortuary analysis in a number of ways. First, as many mortuary contextual variables as possible are analyzed, and each variable is considered separately such that those aspects of mortuary treatment impacted by shared beliefs or identities, for example, may be distinguished from other aspects of treatment that may have been influenced by the social persona of the deceased, particular circumstances of death, interactions with the deceased, and/or beliefs about death and afterlife. Similarly, all variables are assessed for large-scale trends, with consideration also given to sub-group trends associated with sex and age at death, as well as deviations from trends. In Chapter 10, the observed patterns and irregularities within them are compared to those presented previously for the dietary and residential mobility data. In this way, a variety of potential factors impacting the nature of burial treatments may be assessed.

Mortuary Contextual Data Collection and Analytical Methods

Mortuary contextual data analyzed in the current project were collected from excavation reports currently on file at the Ministerio de Cultura in San Borja, Lima, Peru, and from original field notes from Guerrero and colleagues' excavations at Rinconada Alta currently on file at the Archives of the Museo Nacional de Antropología, Arqueología e Historia del Perú in Pueblo Libre, Lima, Peru (Díaz 2002, 2004b, 2004c; Guerrero et al. 1999; Pérez 1997). Data were only collected from contexts with associated human remains present in the collections at the Museo Nacional de Antropología, Arqueología e Historia del Perú. All contexts that were disturbed or associated with pre-Ychsma or Inca periods based on stratigraphy and/or associated artifacts were also excluded from analysis. In total, 276 individuals were analyzed, the same sample of individuals included in the osteological analyses and drawn from in the isotopic analyses.

Variables were chosen for the mortuary analysis based on the frequency and consistency with which information was recorded by the various project directors. All data available for each burial context was first compiled. From the total information available, the following variables were the most consistently recorded: burial structural form, shape of burial matrix or cist, presence and type of funerary litter, body flexion, body position, number of ceramic vessels present as grave goods, the presence or absence of specific ceramic vessel types as grave goods, and the presence or absence of specific non-ceramic artifact types as grave goods.

Burial Structure and Shape

Burial structural form is defined here as the overall nature of the burial structure. Structural forms include (1) the absence of a structure, in which only the burial matrix was observed, (2) the presence of a structure, including either walls or a roof, (3) the presence of a grave marker without the presence of a structure. Grave markers consist of either wooden logs or adobe bricks. Cases in which structural form could not be determined during excavation were excluded. Juveniles described as associated with an adult individual in burial are scored as having the same burial structure as the adult burial. Similarly, individuals that share a mortuary context with other individuals, but are not mentioned explicitly in the excavation report, are assumed to have the same burial structure as that described for the context.

The shapes of each burial matrix or cist were grouped into the following four categories: (1) circular, (2) oval, described variously as oblong, elongated, oval-shaped, or ellipsoidal, (3) quadrangular, and (4) irregular. As with burial structural form, burial shapes that could not be determined during excavation were excluded, and individuals that shared burial contexts but were not specifically mentioned in the excavation report are assumed to have the same burial shape as described for the other individuals from the same context.

Funerary Litter

A funerary litter is defined here as a structural frame or mat associated with an individual body, presumably used to carry the corpse. Funerary litters at both sites exist in two main forms, (1) an *armazon* or cane structure framing the body or (2) a mat or stretcher constructed variably from canes and/or vegetal fiber. The *armazon* litter type is most generally associated with an upright, flexed body position. Canes are located at one or both sides of the individual, and vary in number from one to eight. The mat or stretcher litter type is most frequently associated with a horizontal, extended body position. Because of variation in the amount of detail used to describe funerary litters, the present analysis focuses on the presence or absence of these two main funerary litter types.

Body Flexion and Position

Body flexion in the present study refers to the degree to which the lower limbs are bent towards or away from the torso. Three body flexion position are observed: flexed, semi-flexed, and extended. A flexed body position is one in which the legs are bent tightly inwards towards the torso in a sitting or fetal position. In a semi-flexed position, the legs are also bent, but to a lesser degree than the flexed position. Finally, in the extended position, legs are straight and away from the torso. In all such positions, the arms may be flexed or extended. Body position in the current study refers to the way in which the body is placed into the grave. Body positions include a vertical position, with the head oriented towards the grave opening, a supine or face up position, a prone or face down position, a left side down position, and a right side down position.

Number of Ceramic Vessels

The number of ceramic vessels is a count of the total number of complete or nearly complete ceramic vessels present in the grave. Small isolated ceramic fragments are excluded as are non-vessel ceramic artifacts. Individuals buried in graves containing multiple individuals are excluded from this analysis as association of certain vessels with particular individuals was not usually possible.

Ceramic Vessel Types

Eight ceramic vessel types were defined for the present study using detailed descriptions, photographs, and sketches of ceramic vessels present as grave goods. Definitions of the ceramic vessel types are presented in Table 9.1. Ceramic vessel types are analyzed for overall frequency among the burial populations. Because some vessels could be not categorized due to a lack of sufficiently detailed information required for determining vessel category, frequencies are underestimated. As with the total number of ceramic vessels variable, individuals buried in graves containing multiple individuals are excluded from this analysis since association of certain vessels with particular individuals was not usually possible.

Grave Good Artifact Types

Various additional artifacts present as grave goods were assessed for frequencies among burials. The number of each type could not be analyzed as counts or weights are rarely presented in burial descriptions and are more likely to be biased with slight differences in preservation. Due to the large degree of differential preservation of textile artifacts among burials and different levels of detail in descriptions of such artifacts, all textile objects were excluded from the current analysis. Descriptions of grave good artifact types are presented in Table 9.2. Although overall frequencies are very low for many types, the combination of similar types of objects was avoided to prevent the creation of false categories. For example, the different types of agricultural crops present in low frequencies were not combined into a single category since these items may hold different meanings in the context of death.

Table 9.1. Definitions of ceramic vessel types used in the current study

TYPE	Broad definition	Variations in form
BOTELLA	Narrow neck and mouth	Body is usually globular, but may occasionally be oblong, cylindrical, carinated (with a ridge), compound, or bi-convex (lenticular). Neck is typically tall, or occasionally short, but is always very narrow. Neck is typically everted or flared and occasionally may be compound. Handles may or may not be present. When present handles typically connect the neck to the body of the vessel and are ribbon-shaped or cylindrical and vary in number from 1 to 4, but are most commonly present in pairs.
OLLA WITHOUT PEDESTAL	Globular body with wide mouth	Body is globular, or in rare instances compound or with a conical base. Neck is always very wide, but may be short or tall. Neck is typically everted with a lip that flares outward, though rare variations include a compound neck or a closed, convex neck. Handles may or may not be present. When present, handles generally occur in pairs laterally, either on the body or connecting the neck or lip to the body. Handles are most commonly ribbon-shaped, but occasionally are cylindrical. Note that *ollas* with pedestals are given a separate category below.
OLLA WITH PEDESTAL	*Olla* (see above definition) with a pedestal base	See variations in *olla* definition.
CANTARO	Globular body with a rounded or conical base and mouth mid-sized between olla and botella	The base is typically rounded or conical, but on rare occasions may be flat. The neck may be tall or short and is typically everted. Rarely the neck may be tulip-shaped or compound. Face-neck (*caragollete*) *cantaros* are given a separate category below. Ribbon-shaped handles are occasionally present, generally in pairs and are located either on the body or connect the neck to the body.
CUENCO	Bowl	Sides may be tall or short and curved or straight.
CARAGOLLETE	*Cantaro*-like vessels with the neck modeled into a face	Note that ARMA-D04.II-CF123 (V.5) is categorized as a *caragollete* and not an applique, even though it also presents an applique of a snake, as the overall form is assumed primary.
APPLIQUE	Any vessel shape with a small sculptured applique attached to the body or handle of the vessel.	Applique sculpture types include monkey, snake, feline, dog, or anthropomorph.
SCULPTURED	Any sculptured into a human, animal, or plant.	Sculpture types include an anthropomorph with or without a small bag, a bird, dog with a large phallus, and a pumpkin-shaped squash, and other fruit.

Table 9.2. Definitions of artifact types used in the current study

Artifact type	**Definition**
Ash	Ash
Basket	Vegetal fiber basket
Bean	Bean pods
Calero	Wooden holder for lime used in coca chewing
Camelid remains	Camelid remains, including bones and/or fur
Cavia porcellus remains	Guinea pig remains (*Cavia porcellus*), includes one "rodent' (RINC-D02.IIA-CF33)
Ceramic object	Non-vessel ceramic objects including cubes, discs, or modeled figures.
Ceramic vessel	Complete or nearly complete ceramic vessel. Does not include ceramic fragments.
Copper	Copper artifacts, sheets or fragments
Corn	Corn cobs
Cotton	Cotton or cotton seeds
Fish	Fish remains, including anchovies
Gold	Gold sheets or fragments
Gourd container	*Lagenaria* sp. gourd container, including those used as lids on ceramic vessels
Instrument	Instruments including cane pan flute
Lithic	Lithic artifact
Metal	Unspecified metal object or fragment
Mussel	Mussel shell
Nectandra sp. necklace	Necklace of *Nectandra* sp. seeds
Needles	Needles made from wood or other unspecified material
Peanut	Peanut remains
Plant bundle	Bundle of flowers or small branches
Red pigment	Red pigment, usually cinnabar
Scallop	Peruvian scallop (*Agropectum purpuratum*)
Seeds	Unidentified seeds, excluding those described as part of a *Nectandra* sp. necklace above
Silver	Silver sheets or fragments
Small mask	Small mask
Spindle	Spindle
Spondylus	Spondylus shell
Tupu	Pin for securing clothes made from wood, copper, or other unspecified material
Tweezers	Tweezers made from copper or other unspecified material
Whorl	Spindle whorl
Wood	Piece of wood

Results of Mortuary Contextual Data Analyses

Burial Structure and Shape

Data collected on burial structural form and the shape of the burial structure or matrix are shown in Appendix P. Of the 276 individuals in the study sample, 216 individuals had information about burial structural form available, and information about the shape of the burial structure was available for 164 individuals (Appendix P).

The large majority individuals from Armatambo and Rinconada Alta were recovered from burial contexts formed directly in the sand with no distinct burial structure created (Armatambo: *n*=144/149, 97%; Rinconada Alta: *n*=66/67, 99%). The burial context of one adult male at Armatambo (ARMA-PER97-ENT12) exhibited four large adobe bricks along one wall of the structure and was defined on its three other sides by the walls and floor of a compound into which it intrudes. The burial context of a second individual at Armatambo (ARMA-PER97-ENT75A), an infant, was covered by a cane roof. Wooden markers were found at the mouth of two additional Armatambo tombs, one containing a middle adult male (ARMA-D04.II-CF122) and the second containing one middle adult female and one child (ARMA-D04.II-CF144A and ARMA-D04.II-CF144B). Finally, the mouth of the tomb of an infant (RINC-D02.IIA-CF10) at Rinconada Alta was covered with two large adobe bricks.

Thus, of the 216 total individuals with burial structural form information available, only 3% (*n*=5/149) of Armatambo individuals and 1% (*n*=1/67) of Rinconada Alta individuals presented a form of burial structure or marker. To assess whether the proportion of individuals associated with a burial structure or marker is significantly different between the two sites, a Fisher's exact test was performed because of the low expected frequencies. The results of the Fisher's exact test reveal that proportion of individuals associated with a structure or marker is not significantly different between the two sites (P=0.66).

The shape of the burial matrices was also very uniform across the two sites, with the majority of individuals buried in circular or oval-shaped matrices (Armatambo: *n*=93/103, 90%; Rinconada Alta: *n*=51/53, 96%; Appendix P). Nine individuals from Armatambo were buried in matrices described as irregular in shape. Finally, one child from Armatambo (ARMA-D04.II-CF187) and two individuals from Rinconada Alta, one middle adult male and one adolescent probable female (RINC-G9698.IIAE-1183 and RINC-G9698.IV-0226), were buried in quadrangular-shaped matrices. A Fisher's exact test indicates the proportion of individuals buried in circular or oval-shaped matrices versus the other matrix shapes is not significantly different between the two sites (P=0.22).

Funerary Litter

Information regarding the presence or absence of a funerary litter was available for 241 individuals in the study sample, including a total of 152 individuals from Armatambo and a total of 89 individuals from Rinconada Alta. The distribution of funerary litters by age group and sex at each site is shown in Tables 9.3 and 9.4, respectively. The majority of individuals buried at Rinconada Alta was not buried with a funerary litter (*n*=63/89, 71%), nor was a large proportion of individuals buried at Armatambo (*n*=69/152, 45%). The presence of a cane frame as a funerary litter was most frequent among individuals buried at Armatambo (*n*=81/152, 53%; Table 9.3), with only two individuals buried with a cane or vegetal fiber mat at the site (*n*=2/152, 1%; Table 9.3). In contrast, the presence of a cane or vegetal fiber mat was the most frequent type of funerary litter observed among the individuals buried at Rinconada Alta (*n*=15/89, 17%; Table 9.3), followed by the cane frame (*n*=11/89, 12%; Table 9.3).

Analyses of frequencies indicate that the proportion of individuals buried with a cane frame funerary litter is significantly greater at Armatambo than Rinconada Alta for the total sample (Table 9.5). The frequency of cane frame funerary litters is not significantly different between the two sites for individuals of fetal, infant, child, or adolescent ages at death (Table 9.5). Frequencies of cane frame funerary litters are significantly higher at Armatambo than Rinconada Alta for individuals of young adult, middle adult, and older adult age, and for both males and females (Table 9.5).

In contrast, the frequency of mat funerary litters is significantly greater at Rinconada Alta than Armatambo for the total sample (Table 9.6). When individuals are divided according to age and sex, only young adults exhibit a significantly greater frequency of mat funerary litters at Rinconada Alta than Armatambo (Table 9.6). No significant difference in mat funerary litter frequency is observed between the two sites for individuals in the fetal, infant, middle adult, and older adult categories (Table 9.6). No individuals in the child or adolescent categories were buried with mat funerary litters at either site (Table 9.6). In addition, no significant difference in mat funerary litter frequency is observed between sites for females or males (Table 9.6).

Table 9.3. Distribution of funerary litters by age group

	Armatambo:						Rinconada Alta:					
Age category	**Abs[a]**	**% age group total**	**Cane frame**	**% age group total**	**Mat**	**% age group total**	**Abs[a]**	**% age group total**	**Cane frame**	**% age group total**	**Mat**	**% age group total**
In utero	2	67%	1	33%	0	0%	1	17%	2	33%	3	50%
Infant	17	71%	7	29%	0	0%	25	66%	7	18%	6	16%
Child	13	57%	10	43%	0	0%	6	100%	0	0%	0	0%
Adolescent	2	50%	2	50%	0	0%	2	100%	0	0%	0	0%
Young Adult	12	41%	17	59%	0	0%	8	67%	0	0%	4	33%
Middle Adult	16	33%	31	63%	2	4%	10	91%	1	9%	0	0%
Older Adult	4	25%	12	75%	0	0%	5	71%	1	14%	1	14%
Unknown Adult	3	75%	1	25%	0	0%	6	86%	0	0%	1	14%
Total	**69**	**45%**	**81**	**53%**	**2**	**1%**	**63**	**71%**	**11**	**12%**	**15**	**17%**

[a] Abs = Absent

Table 9.4. Distribution of funerary litters by sex

	Armatambo						Rinconada Alta					
Sex	**Abs[a]**	**% sex total**	**Cane frame**	**% sex total**	**Mat**	**% sex total**	**Abs[a]**	**% sex total**	**Cane frame**	**% sex total**	**Mat**	**% sex total**
Females	19	32%	39	66%	1	2%	14	78%	2	11%	2	11%
Males	16	40%	23	58%	1	3%	13	81%	0	0%	3	19%
Total	**35**	**35%**	**62**	**63%**	**2**	**2%**	**27**	**79%**	**2**	**6%**	**5**	**15%**

[a] Abs = Absent

Table 9.5. Comparison of cane frame funerary litter frequencies by site

	Armatambo *N* individuals with cane frame/ *N* observable (%)	**Rinconada Alta** *N* individuals with cane frame/ *N* observable (%)	χ^2 [a]	***P*** [b]
Total sample	81/152 53%	11/89 12%	39.84	***0.00***
Age category [c]				
In utero	1/3 33%	2/6 33%	*Fisher's exact	0.57
Infant	7/24 29%	7/38 18%	0.97	0.32
Child	10/23 43%	0/6 0%	*Fisher's exact	0.07
Adol	2/4 50%	0/2 0%	*Fisher's exact	0.47
YA	17/29 59%	0/12 0%	12.02	***0.00***
MA	31/49 63%	1/11 9%	10.59	***0.00***
OA	12/16 75%	1/7 14%	*Fisher's exact	***0.02***
Sex [d]				
F	39/59 66%	2/18 11%	16.75	***0.00***
M	23/40 58%	0/16 0%	15.61	***0.00***

[a] Chi-square statistic. Where noted, a Fisher's exact test was used.

[b] Bolded *P*-values are significant at the 0.05 α-level.

[c] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult

[d] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

Table 9.6. Comparison of vegetal fiber mat funerary litter frequencies by site

	Armatambo *N* individuals with mat/ *N* observable (%)	**Rinconada Alta** *N* individuals with mat/ *N* observable (%)	χ^2 [a]	***P*** [b]
Total sample	2/152 1%	15/89 17%	20.67	***0.00***
Age category [c]				
In utero	0/3 0%	3/6 50%	*Fisher's exact	0.46
Infant	0/24 0%	6/38 16%	*Fisher's exact	0.07
Child	0/23 0%	0/6 0%	-	-
Adol	0/4 0%	0/2 0%	-	-
YA	0/29 0%	4/12 33%	*Fisher's exact	***0.00***
MA	2/49 4%	0/11 0%	*Fisher's exact	1.00
OA	0/16 0%	1/7 14%	*Fisher's exact	0.30
Sex [d]				
F	1/59 2%	2/18 11%	*Fisher's exact	0.13
M	1/40 3%	3/16 19%	*Fisher's exact	0.07

[a] Chi-square statistic. Where noted, a Fisher's exact test was used.
[b] Bolded *P*-values are significant at the 0.05 α-level.
[c] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult
[d] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

Body Flexion and Position

Information regarding body flexion was available for 198 individuals in the study sample, including 138 from Armatambo and 59 from Rinconada Alta. Distribution of body flexion styles by age group and sex is presented in Tables 9.7 and 9.8, respectively. No significant difference is observed between the two sites in the frequency of burials in the total samples buried in a flexed position (Armatambo: *n*=115/138, 83%; Rinconada Alta: *n*=45/60, 75%; χ^2=1.87, P=0.17), in an extended position (Armatambo: *n*=18/138, 13%; Rinconada Alta: *n*=12/60, 20%; χ^2=1.57, P=0.21), or in a semi-flexed position (Armatambo: *n*=5/138, 4%; Rinconada Alta: *n*=3/60, 5%; Fisher's exact test, P=0.70).

Within the infant age group, a larger proportion of Armatambo infants were buried in an extended position (*n*=12/20, 60%) compared to infants buried at Rinconada Alta (*n*=8/21, 38%; Table 9.7). This difference, however, is not statistically significant (χ^2=1.97, P=0.16). Additionally, a greater proportion of infants at Rinconada Alta (*n*=13/21, 62%) were buried in a flexed position than at Armatambo (*n*=7/20, 35%), but this difference is not statistically significant (χ^2=2.97, P=0.08).

At both sites, the overwhelming majority of children were buried in a flexed position (Armatambo: n=17/18, 94%; Rinconada Alta: n=4/4, 100%; Table 9.7). The fetal and adolescent age categories at both sites have small samples sizes, with one to two individuals typically buried in each style at both sites (Table 9.7). Among the Armatambo adults, the large majority were flexed when buried, with three adults buried in a semi-flexed position, and two middle adults buried in an extended position (Table 9.7). Similarly, at Rinconada Alta, most adult individuals were buried in a flexed position, with two young adults buried in a semi-flexed position and two young adults buried in an extended position (Table 9.7).

Table 9.7. Distribution of body flexion styles by age group

	Armatambo:						Rinconada Alta:					
Age category	**Flex[a]**	**% age group total**	**Semi[a]**	**% age group total**	**Ext[a]**	**% age group total**	**Flex[a]**	**% age group total**	**Semi[a]**	**% age group total**	**Ext[a]**	**% age group total**
In utero	1	33%	0	0%	2	67%	1	33%	1	33%	1	33%
Infant	7	35%	1	5%	12	60%	13	62%	0	0%	8	38%
Child	17	94%	0	0%	1	6%	4	100%	0	0%	0	0%
Adolescent	2	50%	1	25%	1	25%	2	67%	0	0%	1	33%
Young Adult	26	96%	1	4%	0	0%	6	60%	2	20%	2	20%
Middle Adult	45	96%	0	0%	2	4%	9	100%	0	0%	0	0%
Older Adult	15	94%	1	6%	0	0%	6	100%	0	0%	0	0%
Unknown Adult	2	67%	1	33%	0	0%	4	100%	0	0%	0	0%
Total	**115**	**83%**	**5**	**4%**	**18**	**13%**	**45**	**75%**	**3**	**5%**	**12**	**20%**

[a] Flex = Flexed, Semi = Semi-flexed, Ext = Extended

Table 9.8. Distribution of body flexion styles by sex

	Armatambo:						Rinconada Alta:					
Sex	**Flex[a]**	**% sex total**	**Semi[a]**	**% sex total**	**Ext[a]**	**% sex total**	**Flex[a]**	**% sex total**	**Semi[a]**	**% sex total**	**Ext[a]**	**% sex total**
Females	54	95%	1	2%	2	4%	14	93%	0	0%	1	7%
Males	34	89%	3	8%	1	3%	11	73%	2	13%	2	13%
Total	**88**	**93%**	**4**	**4%**	**3**	**3%**	**25**	**83%**	**2**	**7%**	**3**	**10%**

[a] Flex = Flexed, Semi = Semi-flexed, Ext = Extended

Distribution of body flexion styles by sex is also similar at Armatambo and Rinconada Alta (Table 9.8). At both sites, the overwhelming majority of females were buried in a flexed position (Armatambo: *n*=54/57, 95%; Rinconada Alta: *n*=14/15, 93%; Table 9.8). One female (2%) at Armatambo was buried in a semi-flexed position, while no females were buried in this position at Rinconada Alta (Table 9.8). Two Armatambo females (4%) were extended in burial, as was one (7%) Rinconada Alta female (Table 9.8). Most males at both sites were also buried in a flexed position (Armatambo: *n*=34/38, 89%; Rinconada Alta: *n*=11/15, 73%; Table 9.8). Three Armatambo males (8%) and two Rinconada Alta males (13%) were buried in a semi-flexed position (Table 9.8). In addition, one Armatambo male (3%) and two Rinconada Alta males (13%) were buried in extended positions.

Information regarding body position was available for 138 individuals including 88 from Armatambo and 49 from Rinconada Alta. Distribution of body flexion styles by age group and sex is presented in Tables 9.9 and 9.10, respectively. At both sites, the majority of individuals were buried in a vertical position (Armatambo: *n*=62/88, 70%; Rinconada Alta: *n*=32/49, 65%). A smaller proportion of individuals were buried in a supine position (Armatambo: *n*=16/88, 18%; Rinconada Alta: *n*=14/49, 29%), and a few individuals were buried in another position, including prone or the left or right side (Armatambo: *n*=10/88, 11%; Rinconada Alta: *n*=3/49, 6%).

At Armatambo, a significantly greater proportion of infants were buried in a supine position (*n*=10/13, 77%) than infants at Rinconada Alta (*n*=8/20, 40%; χ^2=4.33, P=0.04). Conversely, at Rinconada Alta, a significantly greater proportion of infants were buried in a vertical position (*n*=12/20, 60%) than infants at Armatambo (*n*=3/13, 23%; χ^2=4.33, P=0.04). Most Armatambo children (*n*=10/12, 83%) were buried in a vertical position (Table 9.9). Only two children from Rinconada Alta are associated with body position information, one was buried vertically while the other was buried on its right side (Table 9.9; Appendix P). Once again, only a few individuals from the fetal and adolescent age categories are associated with body position information and present one to two individuals in each position category (Table 9.9; Appendix P). Among all adult categories at both sites, the large majority of individuals were buried in a vertical position, with only a few adult individuals buried in supine or alternative positions (Table 9.9; Appendix P). At both sites, the majority of females and males were buried in the vertical position (Table 9.10). The second most common body position for each sex at both sites was the supine position, and a few individuals of each sex were also buried in one of the other body position styles (Table 9.10).

Table 9.9. Distribution of body position styles by age group

	Armatambo:						Rinconada Alta:					
Age category	**Vert[a]**	**% age group total**	**Sup[a]**	**% age group total**	**Other[a]**	**% age group total**	**Vert[a]**	**% age group total**	**Sup[a]**	**% age group total**	**Other[a]**	**% age group total**
In utero	1	100%	0	0%	0	0%	1	50%	1	50%	0	0%
Infant	3	23%	10	77%	0	0%	12	60%	8	40%	0	0%
Child	10	83%	0	0%	2	17%	1	50%	0	0%	1	50%
Adolescent	2	50%	1	25%	1	25%	1	50%	1	50%	0	0%
Young Adult	12	71%	3	18%	2	12%	5	71%	1	14%	1	14%
Middle Adult	26	81%	2	6%	4	13%	7	88%	1	13%	0	0%
Older Adult	7	100%	0	0%	0	0%	4	80%	1	20%	0	0%
Unknown Adult	1	50%	0	0%	1	50%	1	33%	1	33%	1	33%
Total	**62**	**70%**	**16**	**18%**	**10**	**11%**	**32**	**65%**	**14**	**29%**	**3**	**6%**

[a] Vert = Vertical or seated, Sup = Supine or dorsal, Other = Prone or left or right side

Table 9.10. Distribution of body position styles by sex

	Armatambo:						Rinconada Alta:					
Sex	**Vert[a]**	**% sex total**	**Sup[a]**	**% sex total**	**Other[a]**	**% sex total**	**Vert[a]**	**% sex total**	**Sup[a]**	**% sex total**	**Other[a]**	**% sex total**
Females	30	81%	3	8%	4	11%	9	75%	2	17%	1	8%
Males	17	71%	3	13%	4	17%	9	75%	2	17%	1	8%
Total	**47**	**77%**	**6**	**10%**	**8**	**13%**	**18**	**75%**	**4**	**17%**	**2**	**8%**

[a] Vert = Vertical or seated, Sup = Supine or dorsal, Other = Prone or left or right side

Notably, a relationship exists between body flexion and body position style, but the relationship is not absolute. Of the 95 total individuals buried in a vertical position, 89 (94%) were also flexed, three (3%) were semi-flexed, one (1%) was extended, and two have no associated body flexion information (Appendix P). Of the 30 total individuals buried in a supine or dorsal position, 15 (50%) were extended, 11 (37%) were flexed, and three have no associated body flexion information (Appendix P). Three total individuals were buried in a prone position (Appendix P). Of these, two (67%) were extended and one (33%) was flexed (Appendix P). Nine total individuals were buried on the right side, and seven (78%) of these were flexed and two (22%) were semi-flexed (Appendix P). Finally, two individuals were buried on their left sides, one flexed and one extended (Appendix P).

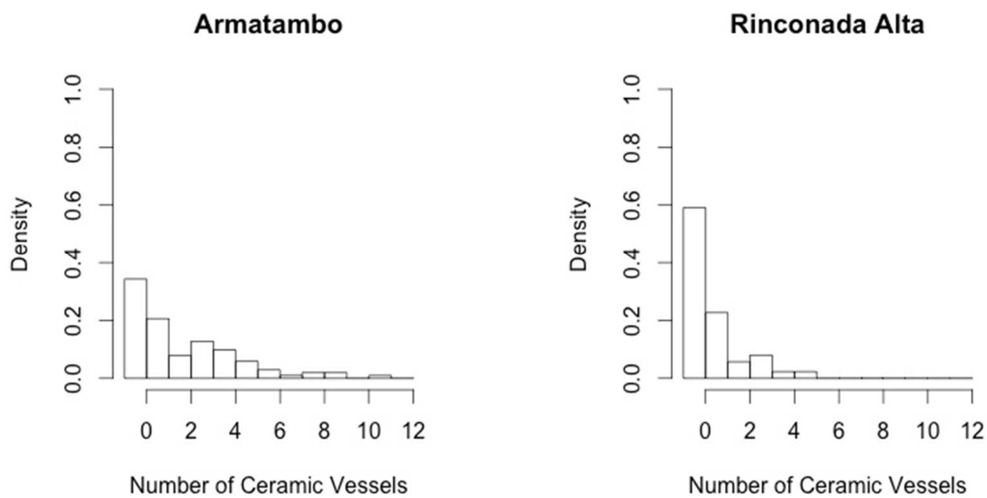
Number of Ceramic Vessels

Results of the data collection on grave goods are shown in Appendix P. Three individuals (RINC-G9698.II-0434-ENT033, RINC-G9698.II-0463-ENT040, and RINC-G9698.II-0477-ENT044) were excluded from analyses due to a lack of associated information regarding grave goods for these individuals. Additionally, 83 individuals from burials containing multiple individuals were excluded since these individuals shared graves with one or more other individuals and thus the grave goods could not be clearly associated with one specific individual. The final sample analyzed consists of 190 individuals, including 102 from Armatambo and 88 from Rinconada Alta.

The mean number of ceramic vessels for individuals buried at Armatambo is 2.12 ± 2.42 (n=101, 1σ), and the mean number of ceramic vessels for individuals buried at

Rinconada Alta 0.78±1.23 (n=89, 1σ). A Mann-Whitney U test indicates that this difference in mean number of ceramic vessels is significant (U=6018.5, P=0.00). A significantly greater proportion of individuals at Rinconada Alta were buried with no ceramic vessels (n=52/88, 59%) than at Armatambo (n=35/102, 34%; χ^2=11.68, P=0.00). In addition, no individuals at Rinconada Alta are buried with more than five ceramic vessels, while nine Armatambo individuals (9%) were buried with more than five ceramic vessels (Figure 9.1).

Figure 9.1. Distribution of number of ceramic vessels as grave goods at Armatambo and Rinconada Alta



Excluding individuals buried without ceramic vessels, the mean number of ceramic vessels per burial is also significantly higher for the total sample at Armatambo (Table 9.11). When individuals buried with ceramic vessels are divided by age group and sex, however, comparisons of mean number of ceramic vessels between Armatambo and Rinconada Alta within each category are not significantly different (Table 9.11).

Table 9.11. Comparison of mean number of ceramics by site for individuals buried with one or more ceramic vessels present as grave goods

	Mean number ceramic vessels		**Mann-Whitney *U* test results**[a]		**Levene's test**[b]	
	Armatambo	**Rinconada Alta**	***U***	***P***	***W***	***P***
Total sample	3.22 (*n*=67)	1.92 (*n*=36)	1624.50	***0.00***	$W_{1,101}$= 7.19	***0.01***
Age category[c]						
In utero	1.00 (*n*=1)	1.00 (*n*=1)	-	-	-	-
Infant	2.43 (*n*=7)	1.70 (*n*=10)	44.50	0.33	$W_{1,15}$= 0.81	0.38
Child	4.40 (*n*=10)	1.50 (*n*=2)	17.00	0.16	$W_{1,10}$= 1.10	0.32
Adol	1.00 (*n*=2)	1.00 (*n*=1)	-	-	-	-
YA	2.50 (*n*=8)	1.67 (*n*=6)	36.00	0.12	$W_{1,12}$= 0.03	0.86
MA	3.23 (*n*=30)	2.80 (*n*=5)	78.50	0.89	$W_{1,33}$= 0.49	0.49
OA	3.88 (*n*=8)	2.17 (*n*=6)	34.00	0.21	$W_{1,12}$= 0.71	0.42
Unknown adult	3.00 (*n*=1)	2.00 (*n*=5)	-	-	-	-
Sex[d]						
F	3.07 (*n*=29)	2.00 (*n*=12)	227.00	0.18	$W_{1,40}$= 2.33	0.14
M	3.31 (*n*=16)	2.13 (*n*=8)	96.00	0.18	$W_{1,24}$= 0.51	0.48

[a] *U* = *U* statistic; Bolded P-values are significant at the 0.05 α-level. Test not performed for groups with *n*=1.

[b] *W* = *W* test statistic; Bolded P-values are significant at the 0.05 α-level.

[c] Age categories: Adol = Adolescent, YA = Young Adult, MA = Middle Adult, OA = Older Adult

[d] Sex categories: F = 'Female' and 'Probable Female' combined. M = 'Male' and 'Probable Male' combined.

For the total sample of individuals with sex estimations buried with one or more ceramic vessels, mean number of ceramic vessels for females is 2.76±2.16 (*n*=42, 1σ), and for males the mean is 2.92±2.16 (*n*=44, 1σ). A Mann-Whitney *U* test of these means indicates that the difference in mean number of ceramic vessels is observed between males and females is not significant (*U*=501.50, P=0.56). Similarly, no significant difference is observed between males and females within the Armatambo sample (*U*=244.00, P=0.58) or within the Rinconada Alta sample (*U*=45.00, P=0.83). In addition, the mean number of ceramic vessels buried with females at Armatambo compared to females at Rinconada Alta is also not significantly different (*U*=227.00; P=0.18; Table 9.11). Likewise, comparison of male mean number of ceramic vessels between the two sites also reveals no significant difference in the two means (*U*=96.00; P=0.18; Table 9.11).

Ceramic Vessel Types

Frequencies of ceramic vessel types for individuals buried with one or more ceramic vessels at Armatambo and Rinconada Alta are shown in Table 9.12. Both sites show similar frequencies of *botellas, ollas* without a pedestal base, and *cuencos*. Two vessel types, however, occur in significantly greater frequency in Armatambo burials. Specifically, frequencies of *ollas* with a pedestal base (χ^2=8.85, P=0.00) and sculptured vessels (Fisher's exact test: P=0.02) are significantly greater in Armatambo burials (Table 9.12). While appliqued and *caragollete* vessels also occur in greater frequencies in Armatambo burials, the difference is not significantly different (Appliqued: Fisher's exact test, P=0.09; *Caragollete*: Fisher's exact test, P=0.25; Table 9.12). At Rinconada Alta, *cantaros* occur in significantly greater frequency than at Armatambo (χ^2=4.98, P=0.03)

When ceramic vessel type frequencies among individuals buried with one or more ceramics are broken into age groups, sample sizes are greatly reduced precluding tests of additional differences by age (Table 9.13). Differences in ceramic vessel type frequencies by sex are shown in Table 9.14. Of the ceramic types that occur at both sites, *botellas* occur significantly more frequently in male burials than female burials at Rinconada Alta (Fisher's exact test, P=0.02), while no significant difference is observed in *botella* frequency between the sexes at Armatambo (Fisher's exact test, P=0.17). Frequencies of *ollas* without pedestals are not significantly different between sexes at Armatambo (χ^2=2.01, P=0.16) or at Rinconada Alta (Fisher's exact test, P=1.00). Similarly, frequencies of *cantaros* are not significantly different between males and females at Armatambo (Fisher's exact test, P=0.29) or at Rinconada Alta (Fisher's exact test, P=1.00).

Of the ceramic types that occur only in Armatambo burials, no difference is observed in frequency of *ollas* with a pedestal (Fisher's exact test, P=0.72), in frequency of *caragollete* vessels (Fisher's exact test, P=0.66), in frequency of applique vessels (Fisher's exact test, P=0.14), or in frequency of sculptured vessels (Fisher's exact test, P=0.09) between the sexes. *Cuenco* frequency was not tested for significance because only one such vessel was observed in one Armatambo female burial (Table 9.14).

Table 9.12. Presence of ceramic types by site among single burials containing one or more ceramic vessels

Ceramic type	**Num Armatambo burials with type present**	**% Total Armatambo burials (*N*=66)**	**Num Rinconada Alta burials with type present**	**% Total Rinconada Alta burials (*N*=36)**
Botella	21	32%	8	22%
Olla without pedestal	31	47%	19	53%
Olla with pedestal	14	21%	0	0%
Cantaro	20	30%	19	53%
Cuenco	2	3%	1	3%
Caragollete	7	11%	1	3%
Applique	6	9%	0	0%
Sculptured	9	14%	0	0%

Table 9.13. Presence of ceramic types by site and age among single burials containing one or more ceramic vessels

Armatambo

Ceramic type	**Num (% Total) *in utero* burials with type present (*N* = 1)**	**Num (% Total) infant burials with type present (*N* = 6)**	**Num (% Total) child burials with type present (*N* = 10)**	**Num (% Total) adol burials with type present (*N* = 2)**	**Num (% Total) YA burials with type present (*N* = 8)**	**Num (% Total) MA burials with type present (*N* = 30)**	**Num (% Total) OA burials with type present (*N* = 8)**	**Num (% Total) Unknown adult burials with type present (*N* = 1[a])**
Botella	1 (100%)	3 (50%)	5 (50%)	0 (0%)	2 (25%)	8 (27%)	2 (22%)	0 (0%)
Olla without pedestal	0 (0%)	2 (33%)	4 (40%)	1 (50%)	4 (50%)	14 (47%)	6 (67%)	0 (0%)
Olla with pedestal	0 (0%)	0 (0%)	3 (30%)	0 (0%)	1 (13%)	6 (20%)	4 (44%)	0 (0%)
Cantaro	0 (0%)	3 (50%)	6 (60%)	0 (0%)	1 (13%)	7 (23%)	3 (33%)	0 (0%)
Cuenco	0 (0%)	1 (17%)	0 (0%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)	0 (0%)
Caragollete	0 (0%)	0 (0%)	1 (10%)	0 (0%)	1 (13%)	4 (13%)	1 (11%)	0 (0%)
Applique	0 (0%)	1 (17%)	1 (10%)	0 (0%)	1 (13%)	3 (10%)	0 (0%)	0 (0%)
Sculptured	0 (0%)	1 (17%)	1 (10%)	0 (0%)	1 (13%)	5 (17%)	1 (11%)	0 (0%)

Rinconada Alta

Ceramic type	**Num (% Total) *in utero* burials with type present (*N* = 1)**	**Num (% Total) infant burials with type present (*N* = 10)**	**Num (% Total) child burials with type present (*N* = 2)**	**Num (% Total) adol burials with type present (*N* = 1)**	**Num (% Total) YA burials with type present (*N* = 6)**	**Num (% Total) MA burials with type present (*N* = 5)**	**Num (% Total) OA burials with type present (*N* = 6)**	**Num (% Total) Unknown adult burials with type present (*N* = 5)**
Botella	0 (0%)	1 (10%)	1 (50%)	1 (50%)	4 (67%)	1 (20%)	0 (0%)	0 (0%)
Olla without pedestal	0 (0%)	6 (60%)	1 (50%)	0 (0%)	3 (50%)	3 (60%)	3 (50%)	3 (60%)
Olla with pedestal	0 (0%)	0 (0)%	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Cantaro	1 (100%)	4 (40%)	1 (50%)	0 (0%)	2 (33%)	4 (80%)	4 (67%)	3 (60%)
Cuenco	0 (0%)	1 (10%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Caragollete	0 (0%)	1 (10%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Applique	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Sculptured	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

[a] None of the vessels of the Armatambo adult of unknown age could be categorized.

Table 9.14. Presence of ceramic types by site and sex among single burials containing one or more ceramic vessels

	Armatambo				Rinconada Alta			
Ceramic type	**Num female burials with type present**	**% Total female burials (*N*=30)**	**Num males burials with type present**	**% Total male burials (*N*=18)**	**Num female burials with type present**	**% Total female burials (*N*=12)**	**Num males burials with type present**	**% Total male burials (*N*=8)**
Botella	10	33%	2	11%	1	8%	5	63%
Olla without pedestal	18	60%	7	39%	7	58%	4	50%
Olla with pedestal	6	20%	5	28%	0	0%	0	0%
Cantaro	5	17%	6	33%	7	58%	4	50%
Cuenco	1	3%	0	0%	0	0%	0	0%
Caragollete	3	10%	3	17%	0	0%	0	0%
Applique	1	3%	3	17%	0	0%	0	0%
Sculptured	2	7%	5	28%	0	0%	0	0%

Grave Good Artifact Types

Frequencies of all grave goods artifact types among burials containing a single individual and one or more grave goods are shown in Table 9.15. For the overall sample, three artifact types occur in significantly different frequencies between the two sites. As expected, at Armatambo, ceramic vessels occur at a significantly greater frequency than at Rinconada Alta (χ^2=5.94, P=0.01; Table 9.15), as do seed (*Nectandra* sp.) necklaces (χ^2=10.59, P=0.00). Rinconada Alta burials show a significantly greater frequency of gourd containers (*Lagenaria* sp.) than burials at Armatambo (χ^2=21.86, P=0.00; Table 9.15). Other artifacts with higher frequencies at Armatambo, such as copper (χ^2=3.55, P=0.06), needles (χ^2=2.32, P=0.13), and spindles (χ^2=0.99, P=0.32) do not reach statistical significance.

Table 9.16 shows frequencies of grave good artifact types for individuals separated by age. Unfortunately, small sample sizes preclude statistical tests of differences by age. Differences in grave good artifact types by sex are shown in Table 9.17. Fisher's exact tests between the sexes within each site indicate that, of the observed trends, only two artifact types at Armatambo occur in significantly greater frequencies in female versus male burials: needles (P=0.00) and spindles (P=0.00). No artifact types occur in significantly greater frequencies in male versus female burials at either site.

Table 9.15. Presence of grave good artifact types by site among single burials containing one or more grave goods

Artifact type	**Num Armatambo burials with type present**	**% Total Armatambo burials (*N*=85)**	**Num Rinconada Alta burials with type present**	**% Total Rinconada Alta burials (*N*=58)**
Ash	2	2%	2	3%
Basket	0	0%	0	0%
Bean	1	1%	1	2%
Calero	0	0%	2	3%
Camelid remains	0	0%	2	3%
Cavia porcellus remains	10	12%	5	9%
Ceramic object	1	1%	3	5%
Ceramic vessel	66	78%	34	59%
Copper	13	15%	3	5%
Corn	6	7%	7	12%
Cotton	12	14%	7	12%
Fish	4	5%	1	2%
Gold	0	0%	0	0%
Gourd container	14	16%	31	53%
Instrument	2	2%	0	0%
Lithic	2	2%	2	3%
Metal	11	13%	12	21%
Mussel	0	0%	0	0%
Nectandra sp. necklace	14	16%	0	0%
Needles	13	15%	4	7%
Peanut	1	1%	1	2%
Plant bundle	0	0%	2	3%
Red pigment	16	19%	10	17%
Scallop	4	5%	3	5%
Seeds	3	4%	3	5%
Silver	3	4%	0	0%
Small mask	3	4%	0	0%
Spindle	12	14%	5	9%
Spondylus	0	0%	2	3%
Tupu	0	0%	2	3%
Tweezers	3	4%	1	2%
Whorl	2	2%	4	7%
Wood	4	5%	3	5%

Table 9.16. Presence of grave good artifact types by site and age among single burials containing one or more grave goods. Artifact types with frequency of zero among all single burials (see Table 9.15) are excluded.

	Armatambo							
Artifact type	**Num (% Total) *in utero* burials with type present (*N* = 1)**	**Num (% Total) infant burials with type present (*N* = 8)**	**Num (% Total) child burials with type present (*N* = 14)**	**Num (% Total) adol burials with type present (*N* = 2)**	**Num (% Total) YA burials with type present (*N* = 14)**	**Num (% Total) MA burials with type present (*N* = 36)**	**Num (% Total) OA burials with type present (*N* = 9)**	**Num (% Total) Unknown adult burials with type present (*N* = 1)**
Ash	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (6%)	0 (0%)	0 (0%)
Bean	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)	0 (0%)
Calero	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Camelid remains	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Cavia porcellus remains	0 (0%)	1 (13%)	4 (29%)	0 (0%)	3 (21%)	2 (6%)	0 (0%)	0 (0%)
Ceramic object	0 (0%)	0 (0%)	1 (7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Ceramic vessel	1 (100%)	6 (75%)	10 (71%)	2 (100%)	9 (64%)	28 (78%)	9 (100%)	1 (100%)
Copper	0 (0%)	1 (13%)	2 (14%)	0 (0%)	2 (14%)	7 (19%)	1 (11%)	0 (0%)
Corn	0 (0%)	0 (0%)	1 (7%)	0 (0%)	1 (7%)	4 (11%)	0 (0%)	0 (0%)
Cotton	0 (0%)	2 (25%)	2 (14%)	0 (0%)	2 (14%)	5 (14%)	1 (11%)	0 (0%)
Fish	0 (0%)	0 (0%)	2 (14%)	0 (0%)	0 (0%)	2 (6%)	0 (0%)	0 (0%)
Gourd container	0 (0%)	0 (0%)	5 (36%)	0 (0%)	1 (7%)	6 (17%)	2 (22%)	0 (0%)
Instrument	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (6%)	0 (0%)	0 (0%)
Lithic	0 (0%)	0 (0%)	1 (7%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)	0 (0%)
Metal	0 (0%)	0 (0%)	1 (7%)	0 (0%)	0 (0%)	9 (25%)	1 (11%)	0 (0%)
Nectandra sp. necklace	0 (0%)	1 (13%)	4 (29%)	0 (0%)	1 (7%)	8 (22%)	0 (0%)	0 (0%)
Needles	0 (0%)	0 (0%)	1 (7%)	1 (50%)	1 (7%)	9 (25%)	1 (11%)	0 (0%)
Peanut	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (3%)	0 (0%)	0 (0%)
Plant bundle	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Red pigment	0 (0%)	0 (0%)	1 (7%)	0 (0%)	4 (29%)	9 (25%)	2 (22%)	0 (0%)
Scallop	0 (0%)	0 (0%)	0 (0%)	1 (50%)	2 (14%)	1 (3%)	0 (0%)	0 (0%)
Seeds	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (8%)	0 (0%)	0 (0%)
Silver	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (14%)	1 (3%)	0 (0%)	0 (0%)
Small mask	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (6%)	1 (11%)	0 (0%)

Table 9.16. Continued

Spindle	0 (0%)	0 (0%)	2 (14%)	1 (50%)	2 (14%)	6 (17%)	1 (11%)	0 (0%)
Spondylus	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Tupu	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Tweezers	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (7%)	2 (6%)	0 (0%)	0 (0%)
Whorl	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (6%)	0 (0%)	0 (0%)
Wood	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	3 (8%)	1 (11%)	0 (0%)

	Rinconada Alta							
Artifact type	**Num (% Total) *in utero* burials with type present (*N* = 2)**	**Num (% Total) infant burials with type present (*N* = 20)**	**Num (% Total) child burials with type present (*N* = 4)**	**Num (% Total) adol burials with type present (*N* = 1)**	**Num (% Total) YA burials with type present (*N* = 7)**	**Num (% Total) MA burials with type present (*N* = 9)**	**Num (% Total) OA burials with type present (*N* = 7)**	**Num (% Total) Unknown adult burials with type present (*N* = 8)**
Ash	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (11%)	0 (0%)	1 (13%)
Bean	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (14%)	0 (0%)	0 (0%)	0 (0%)
Calero	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (25%)
Camelid remains	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (29%)	0 (0%)
Cavia porcellus remains	1 (50%)	1 (5%)	0 (0%)	0 (0%)	0 (0%)	1 (11%)	2 (29%)	0 (0%)
Ceramic object	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (11%)	1 (14%)	1 (13%)
Ceramic vessel	1 (50%)	10 (50%)	2 (50%)	1 (100%)	6 (86%)	4 (44%)	6 (86%)	4 (50%)
Copper	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1 (14%)	0 (0%)	1 (14%)	0 (0%)
Corn	0 (0%)	4 (20%)	0 (0%)	0 (0%)	0 (0%)	1 (11%)	0 (0%)	2 (25%)
Cotton	1 (50%)	2 (10%)	0 (0%)	0 (0%)	1 (14%)	1 (11%)	2 (29%)	0 (0%)
Fish	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (13%)
Gourd container	1 (50%)	9 (45%)	3 (75%)	0 (0%)	3 (43%)	5 (56%)	5 (71%)	5 (63%)
Instrument	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Lithic	0 (0%)	2 (10%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Metal	0 (0%)	2 (10%)	1 (25%)	0 (0%)	1 (14%)	3 (33%)	4 (57%)	0 (0%)
Nectandra sp. necklace	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Needles	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1 (11%)	2 (29%)	0 (0%)
Peanut	0 (0%)	1 (10%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Plant bundle	0 (0%)	0 (0%)	1 (25%)	0 (0%)	0 (0%)	0 (0%)	1 (14%)	0 (0%)

Table 9.16. Continued

Red pigment	0 (0%)	2 (10%)	0 (0%)	0 (0%)	3 (25%)	1 (11%)	2 (29%)	2 (25%)
Scallop	0 (0%)	1 (10%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (25%)
Seeds	0 (0%)	1 (10%)	1 (25%)	0 (0%)	0 (0%)	1 (11%)	0 (0%)	0 (0%)
Silver	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Small mask	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Spindle	0 (0%)	0 (0%)	1 (25%)	0 (0%)	0 (0%)	1 (11%)	3 (43%)	0 (0%)
Spondylus	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (14%)	0 (0%)	1 (14%)	0 (0%)
Tupu	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (14%)	1 (13%)
Tweezers	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (14%)	0 (0%)	0 (0%)	0 (0%)
Whorl	0 (0%)	1 (10%)	0 (0%)	0 (0%)	0 (0%)	1 (11%)	2 (29%)	0 (0%)
Wood	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (14%)	0 (0%)	1 (14%)	0 (0%)

Table 9.17. Presence of grave good artifact types by site and sex among single burials containing one or more grave goods. Artifact types with frequency of zero among all single burials (see Table 9.15) are excluded.

	Armatambo				**Rinconada Alta**			
Artifact type	**Num female burials with type present**	**% Total female burials (*N*=37)**	**Num male burials with type present**	**% Total male burials (*N*=24)**	**Num female burials with type present**	**% Total female burials (*N*=17)**	**Num male burials with type present**	**% Total male burials (*N*=11)**
Ash	2	5%	0	0%	0	0%	2	18%
Bean	1	3%	0	0%	0	0%	1	9%
Calero	0	0%	0	0%	0	0%	1	9%
Camelid remains	0	0%	0	0%	2	12%	0	0%
Cavia porcellus remains	4	11%	1	4%	3	18%	0	0%
Ceramic object	0	0%	0	0%	2	12%	0	0%
Ceramic vessel	29	78%	19	79%	12	71%	6	55%
Copper	5	14%	5	21%	2	12%	1	9%
Corn	4	11%	1	4%	2	12%	1	9%
Cotton	6	16%	2	8%	2	12%	2	18%
Fish	1	3%	1	4%	0	0%	0	0%
Gourd container	6	16%	3	13%	9	53%	7	64%
Instrument	1	3%	1	4%	0	0%	0	0%
Lithic	0	0%	1	4%	0	0%	0	0%
Metal	4	11%	6	25%	6	35%	3	27%
Nectandra sp. necklace	5	14%	4	17%	0	0%	0	0%
Needles	12	32%	0	0%	4	24%	0	0%
Peanut	0	0%	1	4%	0	0%	0	0%
Plant bundle	0	0%	0	0%	1	6%	0	0%
Red pigment	9	24%	6	25%	3	18%	4	36%
Scallop	2	5%	2	8%	1	6%	0	0%
Seeds	2	5%	1	4%	0	0%	1	9%
Silver	3	8%	0	0%	0	0%	0	0%
Small mask	2	5%	1	4%	0	0%	0	0%
Spindle	10	27%	0	0%	4	24%	0	0%
Spondylus	0	0%	0	0%	1	6%	1	9%
Tupu	0	0%	0	0%	2	12%	0	0%
Tweezers	0	0%	3	13%	0	0%	1	9%
Whorl	2	5%	0	0%	3	18%	0	0%
Wood	3	8%	1	4%	1	6%	1	9%

Summary of Results

In sum, results of mortuary analyses reveal both similarities and differences in mortuary treatments at Armatambo and Rinconada Alta. Overall similarities in mortuary treatments between the two sites are observed in burial structure, burial matrix shape, and body flexion and position styles. Burial structure and burial matrix shapes are overall largely homogenous across the two sites with the vast majority of individuals buried without a burial structural form in circular or oval-shaped burial matrices. Similar are body flexion and body position styles, with the bodies of the large majority of individuals at both sites flexed and oriented vertically.

Significant differences in mortuary treatments between the sites are observed in funerary litter styles, mean number of ceramic vessels, and frequencies of ceramic vessel types and other grave good artifact types. For the overall samples, Armatambo burials exhibit a significantly increased frequency of cane frame funerary litters, increased frequency of the presence of ceramic vessels as grave goods, increased mean number of ceramic vessels as grave goods, and increased frequencies of the presence of two ceramic types, *ollas* with a pedestal base and sculptured vessels. At Rinconada Alta, burials exhibit a significantly increased frequency of mat funerary litters, increased frequency of the presence of *cantaro* ceramic vessels, and increased frequency of gourd containers as grave goods.

Significant differences between the two sites are further refined when age at death and sex are taken into account. Infant body positions vary significantly different between the two sites, with an increased proportion buried in a supine position at Armatambo and an increased proportion buried in a vertical position at Rinconada Alta. Cane frame funerary litter presence is significantly greater at Armatambo for all three adult age categories, and both males and females, while mat funerary litter presence is significantly greater at Rinconada Alta only within the young adult age category. Mean number of ceramic vessels between sites is not significantly different within each age and sex category. Ceramic vessel type and overall grave good artifact type frequencies are too small for statistical comparison among age categories. Comparison of ceramic vessel types and grave good artifact type frequencies by sex reveal only a significant difference in *botella* frequency in male versus female burials at Rinconada Alta.

Chapter 10

SOCIAL DIVERSITY AND YCHSMA COMMUNITY IDENTITY CONSTRUCTION

The above reconstructions of the residential mobility, dietary practices, and mortuary rituals of the Ychsma individuals buried at Armatambo and Rinconada Alta offer various insights into the process of Ychsma community formation and demonstrate the utility of a bioarchaeological approach for addressing this process in past societies. Here, Chapter 10 combines the above results to address the research questions presented in Chapter 4 within the theoretical framework introduced in Chapters 2 and 3 to inform on how Ychsma community identities were formed. In particular, this discussion emphasizes the significance of the internal social diversity observed to the process of community construction.

In Chapter 4, three research questions were presented to address the following three specific features of community identity formation within the Ychsma society: (1) the relationship between symbolic community boundaries and geographic space; (2) the presence and influence of diverse discourses in the social construction of community identity; and (3) the permeability and negotiation of community boundaries. These three aspects of Ychsma community identity formation are each discussed below. Then, the implications of these findings for current understandings of Ychsma social organization and group interactions are proposed. The final section argues for the importance of the bioarchaeology of community construction as a field of research and offers suggestions for future studies.

Socially Created Community Boundaries at Armatambo and Rinconada Alta

The relationship between symbolic community boundaries and geographic space is considered here through the examination of patterns in Ychsma dietary practices and mortuary rituals in relation to burial location at each site. As discussed in Chapter 2, the community is a collective identity socially produced by diverse individuals who share a sense of similarity to one another generated through a shared sense of difference from others (Barth 1969; Cohen 1985; Jenkins 2014). As such, a community's boundaries are symbolic in nature, taking the form of practices, language, or materials (Anderson 1991; Cohen 1985). Thus, while numerous archaeological studies emphasize place as a necessary context for the social practices and interactions used to create group identity (e.g., Knapp 2003; Kolb and Snead 1997; Varien and Potter 2008b), others argue that only frequent co-presence is required for social interactions, and some have demonstrated empirically that community boundaries may crosscut geographic boundaries (e.g., Goldstein 2000; Isbell 2000; Preucel 2000; Yaeger and Canuto 2000). For this reason, the correspondence between socially formed community boundaries and geographic space must be tested rather than assumed.

Here, this relationship between symbolic boundaries and spatial boundaries is tested through an examination of dietary practices and mortuary rituals as social practices potentially used to symbolically construct community identities. In the Andes, as described in Chapter 3, collective identities at multiple social scales including families, households, communities, and multiple communities often create and maintain social bonds through food sharing practices. Furthermore, food production, food preparation, food sharing, and food symbolism are often referenced and/or practiced in the context of mortuary rituals or other activities for the dead, while agricultural and food preparation practices often reference mortuary or other rituals for the dead suggesting that the social ties forged through food sharing are emphasized and reified in the context of death and through relationships with the dead. The recurrence of such ideas and practices across a large number of widespread ethnographic studies in the Andean and Amazonian regions suggests that dietary practices and mortuary rituals likely have a long history of use as social mechanisms of identification in these areas. Thus, diet and mortuary rituals may have been used to define and distinguish community boundaries in prehistoric Andean societies, including the Ychsma society. Archaeological evidence presented in Chapter 4 further supporting this idea includes evidence for the importance of feasting and food symbolism in Ychsma activities, including burial practices, as well as other evidence that demonstrates the complexity and variation in Ychsma mortuary rituals themselves.

Ethnohistoric models of Ychsma social organization that link Ychsma communities with archaeological sites and hypothesize economic specialization and resource exchange among communities imply that Ychsma community boundaries were territorial in nature (Cornejo 2000; Paredes 2004; Rostworowski 2002b). The site of Armatambo is linked ethnohistorically with a fishing specialist community that formed part of the Surco *Señorío* due to its strategic location at the southern point of the Lima Bay (Cornejo 2004; Rostworowski 2004a, 2005a). The site of Rinconada Alta, located 15 km inland from Armatambo, is associated ethnohistorically with the Ate *Señorío* and the Ate Canal, a principal canal in the lower Rimac Valley that irrigated agricultural lands that were highly sought after according to Spanish colonial records (Cornejo 1999; Díaz and Vallejo 2005; Rostworowski 2002c, 2004b). Contrasting ethnohistoric models for contemporaneous highland polities postulate that communities in the adjacent highlands obtained diverse resources by directly colonizing noncontiguous territories rather than through community specialization and exchange (Murra 1972; Spalding 1984).

Large-scale trends in diet and mortuary rituals at Armatambo and Rinconada Alta reconstructed in Chapters 7 through 9 offer important insights regarding the nature of Ychsma community boundaries in relation to spatial site boundaries. First, the comparison of dietary practices at the level of the site reveals significant differences as well as numerous overall similarities in dietary practices between Armatambo and Rinconada Alta. As shown in Chapter 7, mean stable nitrogen isotopes (δ^{15}N) in bone collagen are significantly higher for Armatambo individuals for the entire sample mean and across all age and sex categories (Table 7.4). This increased mean bone collagen δ^{15}N at Armatambo indicates that individuals buried at that site consumed dietary protein resources enriched in δ^{15}N relative to the dietary protein resources consumed by Rinconada Alta individuals. Comparison of human bone collagen δ^{15}N to local baseline δ^{15}N values suggests the majority of adults and adolescents buried at Armatambo obtained their dietary protein from marine fish and invertebrates (Figure 7.2). In contrast, the majority of Rinconada Alta adults and adolescents and approximately one-third (29%, n=12/42) of Armatambo adults and adolescents have lower bone collagen δ^{15}N values. Comparison of bone collagen δ^{15}N to local baseline δ^{15}N values suggests these individuals may have obtained their dietary protein from low-trophic level marine invertebrates, terrestrial C_4- or CAM-protein resources, or a combination of these protein resources (Figure 7.2). Further clarification in differences in dietary practices between the two sites was achieved by importing δ^{15}N bone collagen values into Froehle and colleagues' (2012) multivariate carbon and nitrogen model, which also takes into account δ^{13}C values from bone collagen and bone apatite (Figure 7.10). This model confirms that the majority of Armatambo adults and adolescents consumed primarily marine protein resources along with carbohydrates and lipids from a more or less equal mixture of C_3 and C_4 resources. The multivariate carbon and nitrogen isotope model also suggests that the majority of Rinconada Alta adult and adolescent individuals and approximately one-third of Armatambo adults and adolescents consumed a mixture of marine and C_4-protein resources and a slightly greater proportion of carbohydrates and lipids from C_4 resources than from C_3 resources.

When the data are considered at the level of the burial population, these results suggest that, as a whole, dietary practices between individuals from the two sites were distinct. The relatively greater consumption of marine protein by Armatambo individuals lends support to the ethnohistoric model that proposes Armatambo inhabitants were fishing specialists (Rostworowski 2005a). The evidence of consumption of a lesser relative proportion of marine protein resources by the majority of Rinconada Alta adults and adolescents also aligns with the ethnohistoric model of complementary specialization which expects exchange of food resources among specialist communities, especially given the nutritional benefits of such exchanges (Reitz et al. 2010; Rostworowski 2005b). Information regarding non-protein resources evident from the multivariate stable carbon and nitrogen isotope model indicates that all adult and adolescent individuals from both sites consumed carbohydrates and lipids from both C_3 and C_4 resources further supports the model of specialization and complementary between the groups buried at the two sites.

A similar investigation of site-level dietary differences within the Late Intermediate Period Chiribaya society of the lower Osmore Valley in southern Peru also found evidence for economic specialization and exchange among fishing and farming groups (Tomczak 2003). Individuals buried at Chiribaya sites nearest the coast show increased δ^{15}N values relative to individuals buried at sites further inland, while specific δ^{15}N values suggest individuals buried at inland sites consumed some marine resources (Buikstra et al. 2005; Tomczak 2003). The mean difference in δ^{13}C carbonate and collagen ($\Delta^{13}C_{ap\text{-}col}$) values for individuals with the highest mean bone collagen δ^{15}N values buried at San Geronimo, the Chiribaya site nearest the ocean suggest consumption of C_3 terrestrial resources (Tomczak 2003). Together these results indicate the possibility of local resource specialization among groups integrated through an exchange network (Tomczak 2003).

In analyses of dietary practices on the central coast at the site of Ancón during the Middle Horizon (c. AD 550-1000), stable carbon and nitrogen isotopes from human bone collagen and stable carbon isotopes from tooth enamel and bone carbonate reveal a mixed diet of marine protein and terrestrial C_4 non-protein resources (Slovak and Paytan 2009). Reliance on C_4 plants such as maize suggests that, in addition to fishing, individuals buried at this coastal site engaged in agricultural activities, exchange networks with agriculturalists, or interregional exchange networks through the Wari Empire (Slovak and Paytan 2009).

In the Rimac Valley during the period of Inca influence in the region (Late Horizon, c. AD 1470-1533), comparable isotopic dietary data are available for individuals buried at the site of Puruchuco-Huaquerones located on the northwestern slopes of Cerro Puruchuco nearby Rinconada Alta (Williams and Murphy 2013). Stable carbon and nitrogen isotopes in bone collagen and stable carbon isotopes in bone apatite indicate individuals buried at Puruchuco-Huaquerones obtained dietary protein from low trophic level terrestrial animals and dietary carbohydrates and lipids from both C_3 and C_4 plant resources (Williams and Murphy 2013). The high quality nature of such a diet combined with osteological and paleopathological data from individuals buried at the same site have been interpreted to indicate that Inca imperial influence in the Rimac Valley had little effect on diet quality and health (Williams and Murphy 2013). The stable carbon and nitrogen isotope results reported here for Rinconada Alta individuals, however, indicate a probable change in dietary practices between the Late Intermediate and Late Horizon Periods for individuals buried on Cerro Puruchuco. While individuals buried at Rinconada Alta consumed lower trophic level marine protein resources or lower overall proportions of marine protein than their Armatambo neighbors, the Rinconada Alta individuals consumed greater proportions of marine protein than the individuals buried at nearby Puruchuco during the Late Horizon. Specifically, increased stable nitrogen isotope results indicate the diets of individuals buried at Rinconada Alta during the Late Intermediate Period included higher trophic level protein or greater proportions of marine protein resources than the diets of individuals buried later at Puruchuco during the Late Horizon. This difference in diet may indicate that the Inca Empire had a greater impact on the lives of Rimac Valley groups than previously supposed.

In addition to the overall differences in dietary protein between individuals buried at Armatambo compared to individuals buried at Rinconada Alta evidenced through mean differences in bone collagen $\delta^{15}N$ values, overall similarities in dietary practices are also observed at the two sites. Specifically, stable carbon isotope results and dental indicators of diet suggest similarities in diet. As shown in Chapter 7, stable carbon isotopes in bone collagen are not significantly different among individuals buried at the two sites, even within each age and sex category. Combining stable carbon isotopes in bone collagen and bone apatite in Kellner and Schoeninger's (2007) carbon isotope model and in Froehle and colleagues' (2012) multivariate carbon and nitrogen stable isotope model reveals that individuals from both sites consumed a mixture of both C_3 and C_4 energy resources from carbohydrates and lipids as mentioned above. While stable nitrogen isotopes reveal that individuals buried at Armatambo overall consumed a greater relative amount and/or trophic level of marine protein resources than individuals buried at Rinconada Alta, as discussed above, the likelihood of certain similarities in diets at the two sites indicated by the stable carbon isotopes is further supported by dental indicators of diet.

As shown in detail in Chapter 8, dental wear and dental calculus scores and rates of dental caries and dental abscesses are not significantly different between the two sites, for the total sample or within each age and sex category. Similar rates of dental wear suggest similarly abrasive materials in the diet such as bones, shellfish, or sand particles from the local desert environment or stone grinding processes (Larsen 1997; Lev-Tov Chattah and Smith 2006; Littleton and Frohlich 1993; Lukacs 1989; Powell 1985). Similar rates of calculus may suggest similarities in protein intake or similarities to overall dietary quality between the two sites (Al-Zahrani et al. 2004; Hillson 1979), while similar rates of dental caries indicates similar amounts of cariogenic foods in the diet, such as agricultural products, along with similar food refinement and/or similar oral hygiene practices (Hillson 1996; Larsen 1997). Because dental abscesses are associated with dental wear and dental caries, similar rates of dental abscesses at the two sites are unsurprising given the similar rates in dental wear and dental caries mentioned above.

As with dietary practices, overall trends in mortuary treatments at Armatambo and Rinconada Alta show evidence of both similarities and differences in mortuary rituals between the two sites at the population level. Mortuary treatments are overall very similar at Armatambo and Rinconada Alta. Specifically, as detailed in Chapter 9, no significant differences were observed for the overall samples in burial structure, burial matrix shape, body flexion and position styles, and in frequencies of many types of grave goods. At both sites individuals were most commonly buried without a burial structure, in circular or oval-shaped matrices, with the body flexed and vertically positioned, and with many similar types of ceramic vessels and other material artifacts included as grave goods. These overall similarities in mortuary rituals at Armatambo and Rinconada Alta, combined with certain similarities in dietary practices described above, indicate that the mourners burying individuals at the two sites may have been unified through their shared practices at a large scale, possibly with multiple other communities in the Ychsma polity also. The observed similarities in mortuary treatments may represent religious beliefs about the transcendence of the deceased held by the larger Ychsma society (cf. Scott 2011). As indicated by the reconstruction of pre-Columbian Andean ideology of the body, self, and social environment in relation to the deceased, it is possible that members of the Ychsma society as a whole may have been concerned with caring for the deceased to prevent them from negatively influencing their livelihoods following death.

Despite the numerous similarities in mortuary treatments at Armatambo and Rinconada Alta, multiple differences in mortuary treatments are also observed, suggesting some large-scale differences in mortuary rituals between the two sites. Specifically, burials at Armatambo show a significantly higher frequency of cane frame funerary litters, a significantly greater mean number of ceramic vessels as grave goods, and a significantly greater frequency of two ceramic types, *ollas* with pedestals and sculptured ceramic vessels. Burials at Rinconada Alta, in turn, present a significantly greater frequency of mat funerary litters and a significantly greater frequency of *cantaro* ceramic vessels and of gourd containers as grave goods. These differences could be interpreted to reflect a greater overall socioeconomic status among individuals buried at Armatambo given the overall increased elaboration in mortuary treatment these patterns suggest. Alternatively, the observed differences may reflect historical differences in traditions or in philosophical or religious beliefs surrounding the inclusion of cane frame versus mat funerary litters or certain ceramic and artifact types in mortuary rituals. Or, these differences may reflect a degree of flexibility and/or improvisation by mourners or ritual specialists performing prescribed mortuary rituals (cf. Pollock 2011). Such differences in mortuary practices may have served as a means by which individuals burying their dead at Armatambo socially differentiated themselves from other groups burying their dead in different nearby locations, such as the Rinconada Alta cemetery.

The observed differences in mortuary practices at the two sites, combined with the observed overall differences in marine resource consumption, thus support the ethnohistoric model that individuals at Armatambo formed a separate community from the Rinconada Alta burial population. Large-scale trends in dietary practices and mortuary rituals at Armatambo and Rinconada Alta reveal evidence of different social practices at the two sites. These differences may represent symbolic community boundaries used by individual members to socially construct distinct communities. Andean ideology of food, death, and identity, suggest that shared dietary practices likely served to form powerful social ties among individuals, their resources, and the historic landscape embodied by local ancestors (Bastien 1978; Butler 2006; Corr 2004). Shared mortuary rituals would have reinforced such social ties during the socially-disrupting process of death (Berger 1990; Hertz 1960). Similarities in mortuary rituals would have reaffirmed inter-community bonds important to potential exchange networks, while differences in mortuary rituals would have served to actively demonstrate distinctions between communities. It is important to emphasize, however, that these large-scale inter-site differences are not universal. In fact, closer examination of aberrations from the overall trends suggests a much more complex picture as discussed in detail below.

Diverse Discourses in Ychsma Community Identity Construction

Although large-scale trends in dietary practices and mortuary rituals at Armatambo and Rinconada Alta suggest population-level evidence of distinct social practices between the two sites, which may indicate that the individuals buried at each site formed two socially-constructed communities, it is equally important to consider the presence or absence of diverse discourses in the social construction of community identity at each site. This topic forms the second important aspect of community identity formation examined in the present study. To assess the internal diversity involved in the creation of Ychsma community boundaries, intra-site patterns in dietary practices and mortuary rituals are examined. Below, deviations within large-scale trends in dietary practices and mortuary rituals at Armatambo and Rinconada Alta are discussed first as a whole. Then observed patterns with sex and age at death are discussed.

Inherently diverse individuals construct shared community identities. The symbolic nature of community boundaries enables members to hold diverse perspectives and interpretations of symbols' meanings while still maintaining a shared sense of solidarity (Anderson 1991; Cohen 1985). Although archaeologists recognize the importance of taking into consideration the impact of such diversity on community formation, evidence of community diversity is often obscured in archaeological data (Allison 2008; Isbell 2000). The bioarchaeological evidence of social practices presented here offers a unique look at the diversity present within large-scale collective social actions. To this end, contradictions and irregularities within large-scale social norms are recognized as highly valuable for understanding important nuances in identification practices and for avoiding the creation of an overly simplistic grand narrative of identity (Geller 2008; Meskell 1999; Stockett 2005). In this approach, collective and individual identities are considered simultaneously. This method is considered appropriate since both collective and individual identities are formed through analogous processes, both of which involve the individual and the collective in central interactive roles as described in Chapter 2.

It is important to reiterate here that individual identity, generated through the body, the nexus between the self and society, is not experienced in the same way across cultures (Csordas 1994; Hallam et al. 1999; Stewart and Strathern 2000). In non-Western cultures, the embodied self may not be discrete and bounded and may include bodies in transformative or non-living states of being such as the dying, the deceased, or the ancestors (Becker 1995; Hallam et al. 1999). In the Andes, as shown in Chapter 3, the physiological body is inextricable from and operates in sync with the inner self or soul, unlike Western biomedical concepts of the body. In addition, Andean bodies/selves are often considered to be able to influence and be influenced by the bodies/selves of other humans as well as the embodied natural landscape (Allen 1988; Bastien 1978, 1985; Classen 1993; Gose 1994; Guzmán 1997; Kuznar 2003; Orta 2000, 2004). Non-living embodied selves in the Andes may include the dead and domesticated plants and animals used as food. Both the dead and plant and animal food resources may share characteristics with the living and require attention and care from the living. Without sufficient care, the dead may detrimentally impact the livelihoods of their descendants by sending sicknesses, by failing to provide protection for crops and animals, or by other more direct attacks (Abercrombie 1998; Allen 1988; Bastien 1978; Classen 1993; Steele and Allen 2004; Urioste 1981). Similarities in such ideologies concerning the nature of the embodied self across widespread regions of the Andes and Amazon suggest such beliefs and the practices associated with them likely originated in the pre-Columbian past indicating their likely relevance for the Ychsma society. Below these related aspects among Andean ideologies of the embodied self are employed to help interpret observed deviations from overall site-level trends in dietary practices and mortuary rituals observed at Armatambo and Rinconada Alta.

Intra-site Deviations from Overall Dietary Trends at Armatambo and Rinconada Alta

Within overall trends in dietary practices at Armatambo and Rinconada Alta, important intra-site deviations exist which hold large significance for interpretations of social organization and relationships. As mentioned briefly above, among adult and adolescent individuals buried at Armatambo, the majority (71%, *n*=30/42) exhibit the high stable nitrogen isotope values characteristic of the large-scale trend observed at this site. Approximately one-third of the Armatambo adults and adolescents (29%, *n*=12/42), however, show lower stable nitrogen isotope values, which are closer in value to those observed among individuals buried at Rinconada Alta. This separation of groups within Armatambo may reflect different consumption of marine resources within the site of Armatambo.

Several potential explanations exist for this difference. First, if the individuals buried at Armatambo represent a socially-constructed community based on the overall differences in dietary and mortuary practices described above, the presence of two distinct diets among individuals buried at Armatambo may suggest the possibility of intra-community economic specialization, with one group focused on procuring marine resources and the other focused on farming subsistence practices. As discussed in Chapter 4, the Surco *Señorío* to which the site of Armatambo belonged during the Late Horizon and colonial periods was comprised of multiple sub-districts, one with its center located at Armatambo. Thus, the two groups with distinct diets buried at Armatambo may represent different sub-districts within the Surco *Señorío* both burying individuals at the Armatambo cemetery. Alternatively, the two groups may reflect specialized sub-groups within the local Armatambo sub-district. Sub-specialization is plausible given the strategic location of the site offering access to not only the Herradura and Chira beaches below the Morro Solar, but also the arable lands at the end of the Surco canal system and the freshwater marshes to the south (Díaz 2004a). This latter explanation is further supported by a lack of differences between the mortuary rituals given to individuals in these two dietary groups. If the two dietary groups represent two Surco *Señorío* communities buried in the same cemetery, group differences are more likely have been symbolized through differential burial practices. The observed lack of variation in mortuary treatment between these two dietary groups at Armatambo may suggest that shared aspects of mortuary rituals were used to underscore community bonds across sub-specialists within the community during the event of a death. The need to provide similar mortuary treatments for intra-community sub-specialists is further understood by taking into consideration Andean ideology of the embodied self, described above. If the deceased themselves were embodied selves with emotions and influence, the care required for the deceased to prevent them from negatively impacting the livelihoods of the living community would have reinforced community bonds across diverse intra-community groups.

If the individuals buried at Armatambo were sub-specialist groups, it is possible that they may not have needed to engage in exchange with agricultural specialist communities such as that hypothesized for Rinconada Alta. If Armatambo and other proposed fishing specialist communities also engaged in farming, how might inland groups, such as the individuals buried at Rinconada Alta, have obtained marine resources observed in their diet? It is possible that Armatambo inhabitants and possibly other fishing groups that also practiced agriculture required exchange for non-food items or for certain agricultural products that may have grown better further inland. Rinconada Alta inhabitants may also have engaged in exchange with other fishing communities along the coast that may not have had agricultural sub-specialist groups. Alternatively, Rinconada Alta inhabitants may have collected their own marine resources. The bone collagen δ^{15}N values observed among Rinconada Alta individuals are consistent with the consumption of low trophic level marine protein resources, such as invertebrates. Marine invertebrates include many mollusk species, which can be collected easily from the shore without any specialized knowledge. Residents of seaside towns south of Lima recall the ease with which large quantities of wedge clams, or *machas* (*Mesoderma donacium*), could be collected at numerous beaches in the area until around the 1980s, and many types of mollusks and other invertebrates are collected today by enterprising individuals in this area (Marsteller, personal observation 2012).

An alternate explanation for the distinctions in diet within Armatambo is a difference in social status between the two groups such that the group with lower $\delta^{15}N$ values had less access to higher trophic level marine protein resources such as fish, carnivorous marine mammals, birds, and sharks, than the majority of individuals buried Armatambo. This case seems unlikely, however, given that burial treatments for these individuals show no differences in degree of elaboration between the two groups. The vertical archipelago model for socioeconomic organization for the highlands offers yet another possible explanation in which these individuals with different diets represent an outside enclave established at Armatambo to obtain direct access to marine resources rather than relying on trade. Again, however, this case seems less plausible given the lack of distinction in mortuary treatments corresponding to the two dietary groups. The lack of isotopic evidence of foreign individuals among the low-$\delta^{15}N$ subgroup at Armatambo indicates only that no immigrants from outside the study region can be identified as present among those analyzed here given the techniques used. Further research on patterns of biological distance, indicators of health and disease, evidence of violent trauma, and cranial modification may help to shed light on the nature of these dietary differences within Armatambo.

One adult individual (ARMA-D04.II-CF038) buried at Armatambo has a bone collagen $\delta^{15}N$ value (21.3‰) approximately 3‰ greater than the next largest $\delta^{15}N$ values (17.8-18.4‰) in bone collagen samples analyzed from other Armatambo adults and adolescents. These results indicate that this individual consumed relatively greater proportions of high trophic level marine protein, most likely from high trophic level marine fauna, than did other Armatambo individuals with high $\delta^{15}N$ values (Appendices H-I; Table 7.1). The bone sample for this individual was obtained from a protruding rib from an otherwise intact and unwrapped mummy bundle such that the individual's sex and age at death could not be estimated. Bundle dimensions and radiographs and indicate the individual was buried in a flexed position. No burial structure or cane frame funerary litter was present. Artifacts included in this individual's burial include three ceramic vessels.

At Rinconada Alta, a young adult female individual (RINC-G9698.IIAE-1119A) presents a $\delta^{15}N$ bone collagen value (16.3‰) much higher than the $\delta^{15}N$ bone collagen values obtained for all of the other individuals buried at Rinconada Alta. In the multivariate stable carbon and nitrogen isotope model, this individual's F2 score (2.506) falls within the Cluster 3 dietary group indicative of a diet in which nearly all protein is obtained from marine resources. Although information about burial form and body position is not available for this female, she was buried without a cane frame following the large-scale trend observed at Rinconada Alta. Her only grave good is a *tupu*, a pin used for securing clothes, which occurs only in one other grave in the study sample, also a female buried at Rinconada Alta, an older adult (RINC-D02.IIA-CF91). Several possible explanations exist to explain RINC-G9698.IIAE-1119A's divergent diet. It may be that she had been associated with a fishing specialist community such as that proposed for Armatambo and subsequently changed her residence and/or group affiliation prior to death. Unfortunately, this individual did not exhibit preserved hair for analysis to identify changes in her diet during her last months of life. As an alternate explanation, this individual may have had a special relationship with outside marine resource specialists, such as those buried at Armatambo or may have been a fishing specialist herself within the Rinconada Alta community who traveled the short distance back and forth between the littoral and the inland agricultural lands on a regular basis. Although some information is lacking regarding her burial treatment, the non-deviant nature of the burial features known suggests those burying her considered her affiliated with the beliefs and social meanings afforded other individuals buried at Rinconada Alta, at least in the context of death.

Intra-site Differences in Diet and Mortuary Rituals Associated with Sex and Age

Also within the large-scale trends in dietary practices and mortuary rituals at Armatambo and Rinconada Alta discussed above, several trends associated with sex and age at death are observed at the two sites. First, differences in dietary practices associated with age at death and sex are present at both sites. Infants exhibit significantly increased stable carbon and nitrogen isotope values relative to adults buried at Armatambo, but no significant differences are observed among the different age categories at Rinconada Alta. This difference may reflect a difference in weaning practices, including weaning ages or types of foods introduced, between groups buried at the two sites. Other differences with age associated with diet include significant increases with age in rates of dental wear, carious teeth, and antemortem tooth loss among adults. These increases are expected given the cumulative effect of these dental features. More difficult to explain are the significantly higher rates of dental abscesses observed among middle age adults at Armatambo compared to both young adults and older adults at the same site (Table 8.11).

Possible differences in diet with sex at Armatambo and Rinconada Alta are observed only through dental indicators of diet. No significant differences in mean bone collagen stable carbon and nitrogen isotope values are observed between males and females at either site (Table 7.3). At Armatambo, males exhibit significantly higher mean dental wear scores as well as significantly different dental calculus score distributions (Tables 8.3, 8.6). Because such scores are expected to be cumulative with age, these results are particularly interesting given the much larger number of older adult females than males at Armatambo (Table 8.1), and may reflect differences in diet between sexes within this group. Specifically, males at Armatambo may have consumed more abrasive food resources, such as animal bones and shellfish, and may have had diets with increased protein or decreased overall quality relative to Armatambo females (Al-Zahrani et al. 2004; Hillson 1979). At Rinconada Alta, females exhibit a significantly higher frequency of carious teeth than males (Table 8.9). At both sites, females exhibit significantly higher frequencies of teeth lost antemortem (Table 8.15). These differences may be artifacts of the much greater number of older adult females than males at both sites (Table 8.1). This difference between the sexes also offers an additional interpretation for the abovementioned observed differences in dental wear associated with sex. Specifically, females may have lost severely worn teeth antemortem at increased rates relative to males, thereby decreasing the rates of dental caries and dental wear observed among females.

Some aspects of mortuary treatments also vary with age at death and sex differently at the two sites, suggesting intragroup differences associated with age and gender may have also varied between the two groups. Significant differences in mortuary treatments with age between the two sites are found only in funerary litter style frequencies. The frequency of cane frame funerary litters is significantly greater at Armatambo than Rinconada Alta within the age categories of young adults, middle adults, and older adults, but not significantly different among fetal, infant, child, or adolescent age categories (Table 9.5). At Rinconada Alta, the frequency of mat funerary litter presence is significantly greater than at Armatambo within the young adult age category, but not significantly different among other age categories tested (Table 9.6). Unfortunately, statistical tests of frequencies of ceramic vessel types and overall grave good artifact types by site and age are not possible here due to small sample sizes.

One significant difference in mortuary treatments with sex is also observed between the two sites. Specifically, *botella* ceramic vessels occur in significantly greater proportion in male versus female burials at Rinconada Alta, while no difference in this burial type is observed between males and females at Armatambo. In addition to the overall differences in mortuary practices observed between the two sites, these observed differences in mortuary practices with age and sex between the two sites indicate an added form of group differentiation associated with burial site location.

Other trends in burial practices associated with age and sex are similar between the two sites, suggesting the existence of some potential similarities between communities in burial treatments associated with age and gender. Specifically, no significant differences are observed within any age or sex category between the two sites in the distribution of body position or body flexion styles or in the mean number of ceramic vessels. Although statistical tests of frequencies of ceramic vessel types and artifact types included as grave goods were not possible between sites within age categories, such tests between sites within sex categories were not significantly different with the exception of the *botella* vessels mentioned above. Together these similarities in trends in mortuary treatments associated with age and sex suggest evidence of shared practices in mortuary treatments at both sites.

Permeability and Negotiation of Ychsma Community Boundaries

The third and final aspect of Ychsma community formation addressed through the current project is the potential permeability and negotiation of community boundaries. Outsiders, by changing social practices to align with those used to socially define a community, may be able to penetrate the community's boundaries and change their group membership (Barth 1969; Belote and Belote 1984; Galaty 1986; Isbell 2000). In other instances, an individual may maintain the social practices of his or her home community, and thus not become incorporated into a community in her or his new location of residence (e.g., Belote and Belote 1984). The nature of interactions among Ychsma communities and interactions between Ychsma and foreign communities is a topic of substantial interest and debate among archaeologists and ethnohistorians (Cornejo 1995, 2004; Díaz 2008; Eeckhout 2004b; Feltham 2005; Macneish et al. 1975; Marcone 2004; Paredes 2004; Sánchez 2000). Potential reasons for changing communities include intermarriage, adoption, or individual quests for increased economic positions as illustrated through ethnohistoric examples (e.g., Spalding 1984). Here, potential negotiation of Ychsma community boundaries is examined through evidence of life history changes in dietary practices and residential location and assessment of differential mortuary treatments of individuals exhibiting such changes.

Life Course Changes in Diet

Only one individual, an older adult female buried at Rinconada Alta (RINC-D02.IIA-CF95), shows isotopic differences between hair keratin and bone collagen large enough to indicate a substantial change in diet during the last months of life. Specifically, this individual's hair keratin δ^{15}N value (8.0‰) is depleted by 5.9‰ relative to her bone collagen δ^{15}N value (13.8‰). In addition, her hair keratin δ^{13}C value (-19.3‰) is depleted by 7.5‰ relative to her bone collagen δ^{13}C value (-11.9‰) (Figure 7.12, Table 7.7). These isotopic depletions are consistent with a decrease in the consumption of the relative amount and/or trophic level of marine protein resources. The bone collagen δ^{15}N value of this individual is consistent with a diet comprised of low trophic level marine protein resources such as marine invertebrates or low trophic level marine fish, while her hair keratin δ^{15}N value is consistent with the consumption of less marine protein resources in the diet. The concomitant depletion in hair keratin δ^{13}C is consistent with the consumption of less marine protein resources and a likely increase in C_3 versus C_4 terrestrial protein resources. Several possible explanations exist for these observed decreases in δ^{13}C and δ^{15}N values in hair keratin relative to bone collagen. Such a decrease in the amount or type of marine resources consumed may reflect a normal seasonal shift in dietary practices or a specific El Niño season in which marine resources in the area become depleted with the entrance of warm waters and concomitant decrease in marine plankton and anchovies and sardines at the base of the food chain.

Alternatively, this change in diet could reflect a socially-mediated shift in dietary habits, perhaps related to a change in social affiliation. The nature of the dietary change suggests a shift away from Rinconada Alta dietary practices, particularly those associated with exchange relationships with outside fishing groups such as at Armatambo and/or direct access to coastal waters. The new diet suggested by the hair keratin δ^{13}C and δ^{15}N values is outside of the normal trend for individuals at both Rinconada Alta and Armatambo and may suggest affiliation with individuals focused on agricultural specialization and terrestrial resource exploitation.

The mortuary treatment for this individual falls within the normal trend at Rinconada Alta. She was placed into a circular burial matrix lacking a burial structure. No cane frame funerary litter was used, and her body was flexed, though no information is available regarding body position within the grave. Types of grave goods present include a ceramic vessel, a gourd, guinea pig (*Cavia porcellus*) remains, a bundle of branches, red pigment, cotton, metal, including a copper bracelet, and camelid remains. None of these mortuary characteristics are unusual for a Rinconada Alta burial suggesting that if this individual did change her group affiliation with her diet prior to her death, her burial at the site does not appear to have been considered unusual by those carrying out her mortuary rituals.

Life Course Changes in Residence

As discussed in Chapter 6, radiogenic strontium and stable oxygen isotopes from archaeological human bone and tooth enamel samples suggest secure evidence of changes in residence over the life history of one individual, an adult female buried at

Rinconada Alta. This female (RINC-G9698.II-0567-ENT116) presents a third permanent molar $^{87}Sr/^{86}Sr$ value (0.71314) that lies far outside the range of the local biologically available $^{87}Sr/^{86}Sr$ range of 0.70470-0.70746. In contrast, this individual's first permanent molar $^{87}Sr/^{86}Sr$ value (0.70727) and bone $^{87}Sr/^{86}Sr$ value (0.70728) fall within the local biologically available $^{87}Sr/^{86}Sr$ range. This individual's bone $\delta^{18}O_{dw(V\text{-}SMOW)}$ value (-8.31‰), however, falls well outside of the local $\delta^{18}O_{mw}$ range of -14.4‰ to -10.4‰.

Together these results suggest that this adult female spent at least part of her life outside of the study region that includes the Rimac and Lurín Valleys and adjacent Huarochirí highlands. Comparing her outlier third permanent molar $^{87}Sr/^{86}Sr$ value (0.71314) to $^{87}Sr/^{86}Sr$ baseline soil data for the southern Andes obtained by Knudson and colleagues (2014) offers insight into potential locations for her movement. Of the 17 regions included in Knudson and colleagues' (2014) study, this Rinconada Alta female's $^{87}Sr/^{86}Sr$ value falls within the range of $^{87}Sr/^{86}Sr$ values observed at Cuzco (0.70771-0.71894) and near to the range of $^{87}Sr/^{86}Sr$ values observed at Puno (0.70696-0.71191). These two locations are also the only two highland regions included in Knudson and colleagues' (2014) survey. This suggests that this female may have traveled to a similar highland site during the formation of her third molar between ages 7-18 years (Hillson 1996). The relatively high $\delta^{18}O_{dw(V\text{-}SMOW)}$ in her bone sample may indicate that her stay in a foreign region contributed to her bone $\delta^{18}O_{ap}$ value. Her local bone $^{87}Sr/^{86}Sr$ value, however, suggests that her last approximately 10 years of her life, when her bone remodeled prior to her death, took place in a region with a different $^{87}Sr/^{86}Sr$ value than that of her late childhood and adolescent years. Unfortunately, her age at death cannot be determined beyond the general adult estimation due to the relatively intact nature of her bundle, preventing observation of the pubic symphyseal face, auricular surfaces, and cranial sutures.

The wide range of $^{87}Sr/^{86}Sr$ values at the two highland regions in Knudson and colleagues' (2014) baseline survey include or are near to this Rinconada Alta female's bone $^{87}Sr/^{86}Sr$ value (0.70728), indicating she may have moved multiple times during her residence in a foreign location. It is also possible that her first permanent molar $^{87}Sr/^{86}Sr$ value, although it falls within the local Rimac and Lurín Valley and Huarochirí range corresponds to a non-local region with similar biologically available $^{87}Sr/^{86}Sr$ values. Indeed, it is important to caution that other individuals with $^{87}Sr/^{86}Sr$ values local to the study region may also be immigrants who cannot be identified as such using this technique due to the similarity of $^{87}Sr/^{86}Sr$ values in this central coast region to $^{87}Sr/^{86}Sr$ values in numerous other regions in the Andes (Knudson et al. 2014).

This individual's diet and mortuary treatment are largely normal among the majority of individuals buried at Rinconada Alta. Her bone $\delta^{13}C_{col}$ (-11.6‰), $\delta^{15}N$ (11.6‰), $\delta^{13}C_{ap}$ (-6.6‰) place her within the normal trend of dietary practices observed at Rinconada Alta. In the multivariate carbon and nitrogen model, her function scores place her within Froehle and colleagues' (2012) Cluster 2 indicating consumption of C_4 protein resources and a larger proportion of C_4 versus C_3 terrestrial non-protein resources.

For the mortuary treatment of RINC-G9698.II-0567-ENT116, this female was buried without a cane frame funerary litter in a flexed position on her right side. No information is available regarding 0567-ENT116's burial structure and shape. The only type of grave good present in her burial was maize (*Zea mays*). The most unusual feature of this mortuary treatment is the placement on the right side. Burial on the right side was only observed in one other Rinconada Alta burial, a child, RINC-D02.IIA-CF23, and among seven burials (*n*=7/88, 8%) at Armatambo, including five adults and two children. It is therefore possible that burial on the right side may indicate a form of foreign affiliation assigned to such individuals by those who buried them.

Social Diversity and Ychsma Community Construction

The above results have important implications for current understandings of Ychsma social organization and group interactions. As described in detail in Chapter 4, Ychsma communities have previously been presented as distinct, endogamous economic specialist groups structured around farming and fishing. Modern toponyms linking archaeological sites to ethnohistorically recorded social groups in the Rimac and Lurín Valleys and a previous lack of archaeological investigation of social interaction between groups and social diversity within groups has led to the unrealistic portrayal of communities as homogenous and bounded entities. The current study serves to test and refine these portrayals of Ychsma communities. Evidence of dietary and mortuary trends at Armatambo and Rinconada Alta suggests that economic specialization likely did occur, but that actual practices were not as neatly divided among *señoríos* or *curacazgos* as previously implied. Furthermore, other evidence of similarities in diet and mortuary rituals between the two sites identifies shared social practices between groups heretofore considered socially isolated and territorially bounded. Finally, evidence of certain individuals with significant changes in diet or residence over the life course indicate that inter-community interactions may have extended beyond the proposed local *curacazgos* at Armatambo and Rinconada Alta.

First, although large-scale trends in dietary practices and mortuary rituals are consistent with the ethnohistoric model of resource specialization and exchange proposed for the central Peruvian coast, several sub-patterns and irregularities observed within these trends reveal a much more complex image for Ychsma sociopolitical and socioeconomic organization and interactions than previously supposed. Overall differences in the degree of reliance on marine resources between individuals buried at Armatambo and Rinconada Alta suggest fishing and agricultural subsistence specialization may have occurred at each site, while evidence of consumption of some marine protein resources at Rinconada Alta aligns with hypotheses of inter-community resource exchange. Each site also reveals evidence of large-scale differences in mortuary practices, specifically funerary litter styles and number and types of ceramic vessels and other grave goods. This evidence is also consistent with a model of collective identification through shared practices suggesting mortuary rituals were also used in the construction of community identities.

Closer examination of overall trends in diet and mortuary practices at each site, however, reveals a more complex picture of Ychsma social organization than the ethnohistoric model allows. Specifically, deviations from large-scale norms at each site indicate that Ychsma communities were not socially homogenous. Most significantly, the presence of a sub-group at Armatambo with distinct dietary practices suggests intra-community economic specialization may have taken place instead of or in addition to inter-community specialization. Specifically, some individuals at Armatambo may have specialized in the production of terrestrial resources while the majority focused on marine resource exploitation. Other deviations from overall trends in diet, such as two adults, one from Armatambo and one from Rinconada Alta, who consumed marine resources in larger proportion or higher trophic level than other individuals buried at their respective sites, similarly indicate that individuals at these sites were not homogenous in their dietary practices.

In addition to the heterogeneity observed in dietary practices at Armatambo and Rinconada Alta, further evidence reveals that the groups associated with the two sites were not as socially isolated and territorially bounded as previously portrayed. First, several similarities in diet and mortuary rituals among all individuals buried at Armatambo and Rinconada Alta suggest that if the sites represent socially-constructed distinct communities, such groups were likely united through other shared social practices as expected given their association within the larger Ychsma society. These shared practices appear to include a similar mixture of C_3 and C_4 non-protein dietary resources, as well as similar oral hygiene habits and/or the consumption of food types or use of food processing techniques that produced similar overall oral health profiles. Similarities in mortuary practices, both at the burial population level and in certain treatments associated similarly with particular age groups or sex, provide further evidence that multiple communities were likely united at a supra-community level perhaps through certain similarities in philosophical religious beliefs and individual-level social identities. Such evidence contrasts greatly with previous portrayals of Ychsma communities as isolated and territorially bounded except for resource exchanges.

Importantly, inter-community interactions were also likely to have extended beyond local communities as evidenced by the two individuals at Rinconada Alta who appear to have had extended contact with foreign groups prior to receiving relatively normal burials at the site. Specifically, one adult female drastically changed her diet in the last years leading up to her death to a diet not observed among any other individuals buried at either site studied here. A second adult female spent a substantial portion of her life outside of the Rimac Valley and larger study region prior to her burial at Rinconada Alta. Such evidence indicates that Ychsma communities were not only in contact with foreign communities, but that such individuals were treated similarly in death as shown by the mortuary treatments of these individuals.

Future Directions for the Bioarchaeology of Community Construction

Beyond the implications this study shows for refining understanding of Ychsma community construction and social relationships, this work also demonstrates the importance of bioarchaeology to the study of community construction in the past and suggests promising avenues for future directions in this field of research. Most importantly, this study reveals the extreme importance of empirically investigating social diversity in the past when considering community construction. A bioarchaeological approach, such as that presented here, can be utilized first to examine large-scale trends in practices indicative of the social creation of symbolic community boundaries. When data are collected at an individual level, sub-trends and deviations within overall trends can be used to bring to light the diverse discourses and potential discord present within communities. Examining multiple practices simultaneously, such as diet, mortuary rituals, and mobility, allows for a greater understanding of how such multiplicity may be united specifically through the symbolic social practices that characterize community formation.

Future bioarchaeological research on community construction will benefit by incorporating multiple lines of biological and biogeochemical evidence to infer similarities and differences in other social practices in addition to diet, mortuary rituals, and mobility and by taking a diachronic perspective of the community formation process. Further studies of community construction among the Ychsma, for example, would benefit by comparing patterns and deviations in additional bioarchaeologically observable practices, such as cranial modification, violence, and endogamous versus exogamous partner exchange, with those examined in the current study. Consideration of potential inequalities in health, for example through analyses of infectious or metabolic diseases could also provide important information about the nature of community formation, diversity, and inequalities. Finally, the examination of all such social practices across time, particularly with major sociopolitical transformations such as Inca imperialism and Spanish colonialism in the context of the current case study will provide important information about how communities develop and change over large time scales and how social diversity impacts such processes.

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APPENDIX A

INVENTORY OF ARCHAEOLOGICAL HUMAN SKELETAL REMAINS FROM ARMATAMBO AND RINCONADA ALTA HOUSED AT THE MUSEO NACIONAL DE ANTROPOLOGÍA, ARQUEOLOGÍA E HISTORIA DEL PERÚ (MNAAHP, PUEBLO LIBRE, LIMA, PERU) AND THE ASSOCIATED ANNEX 1 STORAGE FACILITY (LA VICTORIA, LIMA, PERU)

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT01	MNAAHP (Caja 97, T4D)	Fragments	Few teeth	No	MNI = 4 (1 adult, 1 juvenile, 2 infants)
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT02	No skeleton present in MNAAHP collection for Entierro 02.	NA	NA	NA	NA
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT03	MNAAHP (Caja 96, T4D)	Yes	Yes	Yes	Very incomplete, but well preserved.
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT04	No skeleton present in MNAAHP collection for Entierro 04.	NA	NA	NA	NA
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT05	No skeleton present in MNAAHP collection for Entierro 05.	NA	NA	NA	NA
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT06	MNAAHP (Caja 169, T6B)	UO (fardo)	UO (fardo)	UO (fardo)	UO (fardo)
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT07	MNAAHP (Caja 95, T4D)	Yes, 2 adult crania	Yes (no mandibles for either cranium)	Yes, both	MNI = 3 (2 adults, 1 juvenile), Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT08	MNAAHP (Caja 176, T6C)	Yes	UO	Yes	Yes, unobservable in fardo
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT09	MNAAHP (Caja 174, T6B)	Yes	Yes	No	Yes, very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT10	MNAAHP (Caja 176, T6C)	UO	Yes, mandible only	UO	Yes, unobservable in textile bundle with ENT10.
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT11	MNAAHP (Caja 176, T6C)	UO	Yes, mandible only	UO	Yes, unobservable in textile bundle with ENT10.
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT12	MNAAHP (Caja 82, T4B)	Yes	Yes	Yes	Yes, left femur and tibia absent.
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT13	MNAAHP (Caja 188, T6D)	Yes, fragmented	Yes, fragmented	No	Yes, extremely incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT14	MNAAHP (Caja 87, T4C)	Yes	Yes, maxillary	Yes	Incomplete, no pelvis
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT15	MNAAHP (Caja 82, T4B)	Yes	Yes, severe antemortem loss	Only few strands	Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT16	MNAAHP (Caja 168, T6A)	Yes, fragmented	No	No	Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT16A	MNAAHP (Caja 93, T4D)	No	No	No	MNI = 3 (2 adults, 1 infant), Incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT16B	MNAAHP (Caja 92, T4D)	Yes	Yes	Yes	Incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT16D	MNAAHP (Caja 91, T4D; Caja 162-163, T6A)	Yes	Yes	No	MNI = 2 (1 adult, 1 infant)
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT16F	MNAAHP (Caja 90, T4C)	Yes	Yes	Yes	Nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT17	MNAAHP (Caja 82, T4B)	Fragments	No	No	Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT18	No skeleton present in MNAAHP collection for Entierro 18.	NA	NA	NA	NA
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT19	MNAAHP (Caja 87, T4C)	No	No	No	MNI = 4 (1 adult, 1 juvenile, 2 infants) --Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT20	MNAAHP (Caja 89, T4C)	Yes, 1 adult	Yes, 1 adult maxilla	NA	MNI = 3 (2 adults, 1 juvenile)
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT21	MNAAHP (Caja 98, 99, 100, 101)	Yes, 1 adult & 1 juvenile	Yes, both crania	Yes, both	MNI = 2 (1 adult, 1 juvenile), Nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT22	No skeleton present in MNAAHP collection for Entierro 22.	NA	NA	NA	NA
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT23	MNAAHP (Caja 172, T6B)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT24B.1	MNAAHP (Caja 105, T5A)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT24B.2	MNAAHP (Caja 105, T5A)	No	No	No	Yes, very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT25	MNAAHP (Caja 188, T6D)	Yes	Yes	Yes	No
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT26.1	MNAAHP (Caja 104, T5E)	Yes	Yes	Yes	Yes, incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT26.2	MNAAHP (Caja 104, T5E)	Very fragmented	Few dental crowns only	No	Yes, very fragmented
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT27	*Not present in MNAAHP Caja 172, T6B as listed.	NA	NA	NA	NA
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT27.1	MNAAHP (Caja 103, T4E)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT27.2	MNAAHP (Caja 103, T4E)	No	No	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT28	MNAAHP (Caja 87, T4C)	Yes, incomplete	Yes, but left maxilla absent.	No	Nearly complete, well-preserved
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT29.1	MNAAHP (Caja 82, T4B)	No	No	No	Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT29.2	MNAAHP (Caja 165, T6A)	Yes	Yes	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT30	MNAAHP (Caja 111, T5B)	No	No	No	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT31.1	MNAAHP (Caja 102, T4E)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT31.2	MNAAHP (Caja 102, T4E)	No	Yes, left mandible	No	Yes, very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT32.1	MNAAHP (Caja 106, 107, 108; T5A)	Crania present, but poorly preserved and do not appear to correspond to the two adults analyzed here.	Yes, mandible only	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT32.2	MNAAHP (Caja 106, 107, 108; T5A)	See ENT32.1.	No	No	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT33	MNAAHP (Caja 188, T6D)	Yes, fragmented	Yes	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT34	MNAAHP (Caja 109, T5A)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT35	MNAAHP (Caja 110, T5B)	Yes	Yes	Yes	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT36	No skeleton present in MNAAHP collection for Entierro 36.	NA	NA	NA	NA
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT37	MNAAHP (Caja 166, T6A)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT37A	MNAAHP (Caja 111, T5B)	Few small fragments only	3 teeth	No	Yes, mostly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT38	MNAAHP (Caja 84, T4B)	No	No	No	MNI = 5 (2 adults, 1 juvenile, 1 infant, 1 neonate), very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT39	MNAAHP (Caja 112, T5B)	Yes	Yes	Small amount	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT40	MNAAHP (Caja 113, T5B)	No	Yes, mandible only	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT40A.1	MNAAHP (Caja 113, T5B)	Fragments (cannot be securely associated with either infant)	No	Small amount (cannot be securely associated with either infant)	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT40A.2	MNAAHP (Caja 113, T5B)	See ENT40A.2.	No	See ENT40A.2.	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT41	MNAAHP (Caja 114, T5B)	No	Yes, mandible only	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT42	MNAAHP (Caja 115, T5B)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT43	MNAAHP (Caja 116, T5C)	Yes	Yes	Yes	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT43A	MNAAHP (Caja 117, T5C)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT44	MNAAHP (Caja 86, T4C)	No	No	No	Yes, incomplete and damaged
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT45	MNAAHP (Caja 118, T5C)	Yes	Yes	No	Yes, nearly complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT45A	MNAAHP (Caja 118, T5C)	Yes, very fragmented	Yes, damaged postmortem	Very little	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT46	MNAAHP (Caja 119, T5C)	Yes	Yes	Yes	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT47	MNAAHP (Caja 88, T4C)	No	No	No	Nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT47A	MNAAHP (Caja 88, T4C)	Yes	Yes	Yes	Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT48	MNAAHP (Caja 120, T5C)	No	Yes, mandible only	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT49	MNAAHP (Caja 94, T4D)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT49A	MNAAHP (Caja 94, T4D)	Yes, very fragmented	Yes (not complete)	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT50	MNAAHP (Caja 80, T4B)	Yes	Yes	Yes	Complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT51	MNAAHP (Caja 75, T4A)	No	No	No	Incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT52	MNAAHP (Caja 87, T4C)	No	Yes, mandible only	No	Nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT53	MNAAHP (Caja 76, T4A)	No	Yes, mandible only	No	Nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT54	MNAAHP (Caja 202, T6D)	No	No	No	MNI = 2 (1 adult, 1 juvenile), extremely incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT55	MNAAHP (Caja 87, T4C)	No	No	No	Incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT55A	MNAAHP (Caja 87, T4C)	Yes	Yes	No	Incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT56	MNAAHP (Caja 121, T5C)	No	Yes, mandible only	No	Yes, well-preserved
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT57	MNAAHP (Caja 164, T64)	Yes	Yes	Yes	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT58	MNAAHP (Caja 87, T4C)	No	No	No	Incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT59	MNAAHP (Caja 85, T4B)	No	No	No	MNI = 3 (2 adults, 1 infant) -- Nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT59B	MNAAHP (Caja 78, T4A)	No	No	No	Nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT60	MNAAHP (Caja 128, T5E)	Yes	Yes	Yes	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT61	MNAAHP (Caja 129, T5E)	Yes, fragmented	Yes	No	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT62	MNAAHP (Caja 122, T5D)	No	No	No	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT63	MNAAHP (Caja 123, T5D)	Yes, fragmented	No	Yes	Yes, very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT64	MNAAHP (Caja 124, T5D)	No	3 teeth	No	Yes, very incomplete and poorly preserved
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT65	MNAAHP (Caja 125, T5D)	Yes	Yes	Yes	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT66	MNAAHP (Caja 87, T4C)	No	No	No	Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT67	MNAAHP (Caja 126, T5D)	No	No	No	Yes, incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT68	MNAAHP (Caja 127, T5D)	Yes	Yes	Yes	Yes, complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT69	MNAAHP (Caja 79, T4A)	Yes	Yes	Yes	Yes, postmortem damage
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT70	MNAAHP (Caja 130, T5E)	No	No	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT71	MNAAHP (Caja 131, T5E)	No	Mandible present, teeth lost	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT72	MNAAHP (Caja 87, T4C)	No	No	No	Very incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT73	MNAAHP (Caja 132, T5E)	No	No	No	Yes, incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT74	MNAAHP (Caja 133, T5E)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT75A	MNAAHP (Caja 170, T6B)	Yes, fragmented	Yes	No	Yes, nearly complete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT75B	MNAAHP (Caja 170, T6B)	No	No	No	Yes, extremely incomplete
Armatambo, Heroes del Pacifico	ARMA-PER97-ENT75C	MNAAHP (Caja 171, T6B)	No	No	No	Yes, very incomplete
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Armatambo, Sector I	ARMA-D04.I-CF01	MNAAHP (Caja 68, T8B - #554, #567)	Yes	Yes (somewhat visible; loose teeth stored separately as #567)	No	Yes, mummified
Armatambo, Sector I	ARMA-D04.I-CF02.1	MNAAHP (Caja 72, T7A - #434)	No	No	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF02.2	MNAAHP (Caja 126, T8E - #1715)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF03.1	MNAAHP (Caja 69, T8B - #701)	No	Yes, mandible only	No	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF03.2	MNAAHP (Caja 124, T5D - #1709)	Yes	Yes	No	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF03.3	MNAAHP (Caja 124, T8D - #1709)	Incomplete	Yes, mandible only	No	Yes, extremely incomplete
Armatambo, Sector I	ARMA-D04.I-CF04	No skeleton present in MNAAHP collection for Contexto Funerario 04.	NA	NA	NA	NA
Armatambo, Sector I	ARMA-D04.I-CF05	MNAAHP (Caja 69, T8B - #551)	Yes	Yes	Yes	Yes, very incomplete
Armatambo, Sector I	ARMA-D04.I-CF06.1	MNAAHP (Caja 67, T9D - #535-1)	Yes	Yes	Yes	Yes, incomplete.
Armatambo, Sector I	ARMA-D04.I-CF06.2	MNAAHP (Caja 67, T9D - #535-2)	Yes	Yes	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF06.3	MNAAHP (Caja 67, T9D - #535-3)	No	No	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF06.4	MNAAHP (Caja 66, T8B- #535-4)	Yes, fragmented	Yes, maxillary	No	Yes, mostly complete but poorly preserved
Armatambo, Sector I	ARMA-D04.I-CF06.5	MNAAHP (Caja 66, T8B - #535-5)	No	No	No	Yes, poorly preserved
Armatambo, Sector I	ARMA-D04.I-CF06.6	MNAAHP (Caja 66, T8B - #535-6)	No	No	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF06.7	MNAAHP (Caja 66, T8B - #535-7)	No	No	No	Yes, fairly complete but poorly preserved
Armatambo, Sector I	ARMA-D04.I-CF06.8	MNAAHP (Caja 66, T8B - #535-8)	NA	NA	NA	Adult left femur (likely belongs to CF6.5)
Armatambo, Sector I	ARMA-D04.I-CF07	MNAAHP (Caja 70, T8B - #762, #875, #704; Caja 168, T7C - #2127[faunal]	Yes	No	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF08	MNAAHP (Caja 70, T8B - #703)	No	No	No	Yes, incomplete and very fragmented.
Armatambo, Sector I	ARMA-D04.I-CF09	MNAAHP (Caja 65, T7B - #702)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF10	MNAAHP (Caja 70, T8B - #705)	Yes	Yes	Yes	Yes, very complete
Armatambo, Sector I	ARMA-D04.I-CF11	MNAAHP (Caja 158, T9B - #1614; Caja 110, T8A - #1617)	UO	UO	UO	UO
Armatambo, Sector I	ARMA-D04.I-CF12.1	MNAAHP (Caja 170, T8D - #1772)	No	Yes (no maxillary alveolar bone, but anterior teeth present)	No	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF12.2	MNAAHP (Caja 170, T8D - #1772)	Yes	Yes, maxillary	No	No
Armatambo, Sector I	ARMA-D04.I-CF13.1	MNAAHP (Caja 123, T7D - #1700; Caja 187, T7C - #2142)	No	No	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF13.2	MNAAHP (Caja 122, T8C - #1692)	Occipital only	No	No	Yes, incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector I	ARMA-D04.I-CF14	MNAAHP (Caja 121, T7C - #1685 (postcrania); Caja 185, T8C - #2069 (cranium))	Yes	Yes, no mandible	Yes	Yes, very incomplete, more than one individual represented (#1685)
Armatambo, Sector I	ARMA-D04.I-CF15	MNAAHP (Caja 187, T7C - #2059)	NA	NA	NA	MNI = 2 adults, 6 subadults
Armatambo, Sector I	ARMA-D04.I-CF16	MNAAHP (Caja 185, T8C - #2067)	Yes	Yes	Yes	No
Armatambo, Sector I	ARMA-D04.I-CF17	MNAAHP (Caja 172, T9A - #1783; Caja 175, T8A - #2036)	No	No	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF18.1	MNAAHP (Caja 172, T9A - #1786)	No	No	No	Yes, incomplete and partially mummified
Armatambo, Sector I	ARMA-D04.I-CF18.2	MNAAHP (Caja 172, T9A - #1786)	Yes, incomplete	Yes, mandible only	No	Some ribs
Armatambo, Sector I	ARMA-D04.I-CF18.3	MNAAHP (Caja 187, T7C - #2061)	No	No	No	Yes, very incomplete
Armatambo, Sector I	ARMA-D04.I-CF18.4	MNAAHP (Caja 185, T8C - #2065)	Yes	Yes	Yes	No (CF18.3 and 18.4 may be same individual)
Armatambo, Sector I	ARMA-D04.I-CF18.5/18.6	MNAAHP (Caja 171, T8E - #1777)	No	No	No	Yes, incomplete remains of at least 2 adults and 2 subadults.
Armatambo, Sector I	ARMA-D04.I-CF19A	MNAAHP (Caja 121, T7C - #1686 [cranium]; Caja 124, T8D - #1703 [postcrania])	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF19B	MNAAHP (Caja 122, T8C - #1694 [cranium]; Caja 124, T8D - #1707 [postcrania])	Yes	Yes	Yes	Yes, incomplete (MNI=2)
Armatambo, Sector I	ARMA-D04.I-CF20.1	MNAAHP (Caja 173, T7A - #1792)	Yes (subadult #1)	Yes, no mandible	Yes	Incomplete (cannot be securely associated)
Armatambo, Sector I	ARMA-D04.I-CF20.2	MNAAHP (Caja 173, T7A - #1792)	No	No	No	1 femur
Armatambo, Sector I	ARMA-D04.I-CF21A	MNAAHP (Caja 172, T9A - #1784)	No	No	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF21B	MNAAHP (Caja 185, T8C - #2072)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF22	No skeleton present in MNAAHP collection for Contexto Funerario 22.	NA	NA	NA	NA
Armatambo, Sector I	ARMA-D04.I-CF23	MNAAHP (Caja 222, T8A - #1428)	Yes (UO in fardo)	Yes	Yes, small amount visible	Yes, in fardo
Armatambo, Sector I	ARMA-D04.I-CF24A	MNAAHP (Caja 120, U7D/T7A - #1610)	UO (fardo)	UO (fardo)	UO (fardo)	UO (fardo)
Armatambo, Sector I	ARMA-D04.I-CF24B.1	MNAAHP (Caja 170, T8D - #1771)	No	No	No	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF24B.2	MNAAHP (Caja 170, T8D - #1771; Caja 171, T8E - #1782 [cranium])	Probably, #1782	Probably, #1782	Probably, #1782	Yes, very incomplete
Armatambo, Sector I	ARMA-D04.I-CF24B.3	MNAAHP (Caja 170, T8D - #1771)	No	No	No	Yes, one left femur
Armatambo, Sector I	ARMA-D04.I-CF24C	MNAAHP (Caja 173, T7A - #1561)	No	No	No	Yes, mummified and articulated.
Armatambo, Sector I	ARMA-D04.I-CF24D	MNAAHP (Caja 123, T7D - #1701)	Yes, very fragmented	Yes, maxillary	Yes, small amount	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF25A	No skeleton present in MNAAHP collection for Contexto Funerario 22.	NA	NA	NA	NA
Armatambo, Sector I	ARMA-D04.I-CF25B	MNAAHP (Caja 123, T7D - #1702 [subadult postcrania, Part I]; Caja 122, T8C - #1691 [subadult postcrania, Part II]; Caja 185, T8C - #2071 [subadult cranium, mandible and C1, C2 vertebrae])	Yes	Yes	Yes	Yes, fairly complete
Armatambo, Sector I	ARMA-D04.I-CF25C	MNAAHP (Caja 171, T8E - #1778)	No	Yes, mandible only	No	Yes, incomplete
Armatambo, Sector I	ARMA-D04.I-CF26	MNAAHP (T7-6-B: Does not exist)	NA	NA	NA	NA
Armatambo, Sector I	ARMA-D04.I-CF27.1	MNAAHP (Caja 125, T7E - #1712)	No	No	No	Yes, incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector I	ARMA-D04.I-CF28.1	MNAAHP (Caja 124, T8D - #1708 [adult cranium])	Yes	Yes, no mandible	Yes	No
Armatambo, Sector I	ARMA-D04.I-CF28.2	MNAAHP (Caja 124, T8D - #1708 [vertebrae, fibula, sacrum, hand/foot bones]; Caja 123, T7D - #1697 [foot bones and epiphyses])	No	No	No	Yes, very incomplete
Armatambo, Sector I	ARMA-D04.I-CF29	MNAAHP (Caja 121, T7C - #1682)	Yes	Yes, some	Yes	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF30	MNAAHP (Caja 125, T9C - #1713)	No	No	No	Yes, nearly complete
Armatambo, Sector I	ARMA-D04.I-CF31	MNAAHP (Caja 248, T7A - #2582, #2653)	No	No	No	Yes, very incomplete
Armatambo, Sector I	ARMA-D04.I-CF32	MNAAHP (Caja 248, T7A - #2553, #2554, #2559)	Few fragments.	4 mandibles with some teeth	No	Yes, very incomplete (MNI = 04 adult individuals (#2553, #2554); 01 infant in deteriorated textile bundle (#2559))
Armatambo, Sector II	ARMA-D04.II-CF01	Deposito La Victoria, Caja 109, #2839 and Caja 137, #3119 (foot bones)	No	No	No	Yes, incomplete and damaged (02 adults)
Armatambo, Sector II	ARMA-D04.II-CF02	Deposito La Victoria (Caja 156, #2950)	Yes	Yes, maxillary deciduous molars only	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF03	Deposito La Victoria (Caja 109, #2846 [postcrania]; Caja 131, #2916 [cranium])	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF04	Deposito La Victoria, Caja 160, #3426	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF05A	Deposito La Victoria, Caja 109, #2848	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF05B	Deposito La Victoria, Caja 131, #2924	Yes, 1 fragmented cranium	Yes, 2 maxillae and mandibles	Yes, for 1 individual	Yes, incomplete (05 infants)
Armatambo, Sector II	ARMA-D04.II-CF06	MNAAHP (Bulto s/ caja, #3977)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF07A	Deposito La Victoria, Caja 109, #2941	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF07B	Deposito La Victoria	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF08	Deposito La Victoria, Caja 131, #2919	Yes	Yes	Yes	Yes, loose and visible within fardo
Armatambo, Sector II	ARMA-D04.II-CF09A	Deposito La Victoria, Caja 131, #2924	No	No	No	Yes, very incomplete
Armatambo, Sector II	ARMA-D04.II-CF09B	Deposito La Victoria, Caja 156, #2930	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF09C	Deposito La Victoria, Caja 159, #2978	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF10A	Deposito La Victoria, Caja 131, #2851	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF10B	No skeleton present in MNAAHP collection for Contexto Funerario 10B.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF11A	Deposito La Victoria, Caja 151, #2845	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF11B	Deposito La Victoria, Caja 152, #3056	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF12	MNAAHP (Caja 111, #2850)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF13	Deposito La Victoria (Caja 118, #2946)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF14	Deposito La Victoria, Caja 146, #2939	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF15	Deposito La Victoria (Caja 159, #2934)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF16	No skeleton present in MNAAHP collection for Contexto Funerario 16.	NA	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF17	MNAAHP (Caja 111, #2945)	Yes, partially observable	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF18	Deposito La Victoria (Caja 149, #3438)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF19A	MNAAHP (Bulto s/ caja, #3569)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF19B	Deposito La Victoria, Caja 152, #2987	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF20	Deposito La Victoria (Caja 122, #2995)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF21A	Deposito La Victoria, Caja 159, #2986	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF21B	Deposito La Victoria, Caja 159, #2988	UO	Yes, right mandible and maxilla	UO	Yes, right femur
Armatambo, Sector II	ARMA-D04.II-CF21C	Deposito La Victoria (Caja 158, #2994)	Yes (fragments observable)	Yes, partially observable	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF22A	Deposito La Victoria (Caja 144, #3539)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF22B	Deposito La Victoria (Caja 149, #2976)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF23	No skeleton present in MNAAHP collection for Contexto Funerario 23.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF24.1	Deposito La Victoria, Caja 159, #2980	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF24.2	Deposito La Victoria (Caja 145, #3427)	Yes (unobservable)	UO	Yes, partially observable	Yes, mostly observable
Armatambo, Sector II	ARMA-D04.II-CF25	No skeleton present in MNAAHP collection for Contexto Funerario 25.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF26A	Deposito La Victoria, Caja 159, #2984	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF26B	Deposito La Victoria, Caja 173, #2824	*No skeletal remains present.	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF26C	No skeleton present in MNAAHP collection for Contexto Funerario 26C.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF26D	Deposito La Victoria, Caja 164, #3435	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF27	Deposito La Victoria (Caja 139, #2989)	Yes	Yes	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF28	Deposito La Victoria, Caja 156, #2847	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF29	No skeleton present in MNAAHP collection for Contexto Funerario 29.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF30	Deposito La Victoria, Caja 109, #2947	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF31A	Deposito La Victoria (Caja 138, #3453)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF32	No skeleton present in MNAAHP collection for Contexto Funerario 32.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF33A	Deposito La Victoria, Caja 159, #2938	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF33B	MNAAHP (Caja 113, #2933)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF34A	Deposito La Victoria (Caja 144, #2828)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF34B	MNAAHP (Caja 111, #2830)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF35	Deposito La Victoria (Caja 122, #2996)	Yes, but damaged	Yes, four teeth	Yes, small amount	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF36A	MNAAHP (Caja 113, #2831)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF36B	Deposito La Victoria (Caja 149, #2835)	Yes, partially observable	No	Yes, partially observable	UO
Armatambo, Sector II	ARMA-D04.II-CF37	No skeleton present in MNAAHP collection for Contexto Funerario 37.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF38	Deposito La Victoria (Caja 145, #2907)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF39	Deposito La Victoria (Caja 128, #3917)	Yes, partially observable	No	Yes, partially observable	No
Armatambo, Sector II	ARMA-D04.II-CF40A	Deposito La Victoria (Caja 162, #3548)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF41	Deposito La Victoria, Caja 156, #2834	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF42	MNAAHP (Bulto s/ caja, #3433)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF43	MNAAHP (Caja 154, #3544)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF44	MNAAHP (Caja 112, #2841)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF45A	MNAAHP (Caja 153, #3429)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF45B	Deposito La Victoria, Caja 151, #2832	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF46	Deposito La Victoria, Caja 159, #2985	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF47	Deposito La Victoria (Caja 161, #3545)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF48	MNAAHP (Caja 112, #2842)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF49	MNAAHP (Caja 111, #2840)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF50	MNAAHP (Bulto s/ caja, #3441)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF51	Deposito La Victoria, Caja 151, #2833	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF52	Deposito La Victoria (Caja 120, #2940)	Yes	Yes	Yes, large quantity	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF53	MNAAHP (Caja 113, #2836)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF54	MNAAHP (Caja 111, #2932)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF55 (#2931)	Deposito La Victoria (Caja 119, #2931)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF55 (#2910)	MNAAHP (Bulto s/ caja, #2910)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF55 (#2949)	MNAAHP (Caja 111, #2949)	UO	Yes, partially observable	Yes, partially observable	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF56.1	Deposito La Victoria, Caja 156, #2944	Yes, partially bundled	Yes, canine, premolars and M1 visible	Yes, partially bundled	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF56.2	Deposito La Victoria (Caja 122, #3437)	Yes, but damaged	Yes, incomplete	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF57	Deposito La Victoria (Caja 144, #2948)	Yes	Yes	Yes, large quantity	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF58	No skeleton present in MNAAHP collection for Contexto Funerario 58.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF59	Deposito La Victoria (Caja 157, #2909)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF60A	MNAAHP (Bulto s/ caja, #3442)	UO	UO	UO	UO

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF60B	MNAAHP (Caja 113, #2937)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF61	No skeleton present in MNAAHP collection for Contexto Funerario 61.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF62	Deposito La Victoria (Caja 125, #3444)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF63	MNAAHP (Bulto s/ caja, #3431)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF64A	Deposito La Victoria, Caja 146, #3428	Yes, top exposed	UO	Yes, partially exposed	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF64B	MNAAHP (Caja 112, #2935)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF65A	No skeleton present in MNAAHP collection for Contexto Funerario 65A.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF65B	Deposito La Victoria (Caja 149, #3575)	Yes	No	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF65C	Deposito La Victoria (Caja 144, #2942)	UO	UO	Yes, partially observable	UO
Armatambo, Sector II	ARMA-D04.II-CF66	Deposito La Victoria (Caja 150, #3434)	Yes, partially observable	UO	Yes, partially observable	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF67	Deposito La Victoria (Caja 150, #3573)	Yes	Yes, some	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF68	MNAAHP (CAJA 112, #2908)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF69	No skeleton present in MNAAHP collection for Contexto Funerario 69.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF70	MNAAHP (Bulto s/ caja, #3430)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF71A	Deposito La Victoria, Caja 152, #2975	UO	UO	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF71B	Deposito La Victoria, Caja 159, #2979	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF72	MNAAHP (Bulto s/ caja, #3565)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF73A	Deposito La Victoria (Caja 126, #3443)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF73B	Deposito La Victoria (Caja 119, #3445)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF74	No skeleton present in MNAAHP collection for Contexto Funerario 74.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF75	Deposito La Victoria (Caja 163, #2981)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF76	Deposito La Victoria (Caja 119, #2993)	Yes	Yes	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF77	No skeleton present in MNAAHP collection for Contexto Funerario 77.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF78	MNAAHP (Bulto s/ caja, #3549)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF79	Deposito La Victoria, Caja 155, #3425	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF80	Deposito La Victoria (Caja 120, #3659)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF81	MNAAHP (Bulto s/ caja, #3578)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF82A	Deposito La Victoria (Caja 115, #3436)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF82B	Deposito La Victoria (Caja 122, #3019)	Yes, few fragments	No	Yes, small amount	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF83	No skeleton present in MNAAHP collection for Contexto Funerario 83.	NA	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF84	Deposito La Victoria (Caja 126, #3541)	Yes	No	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF085A	Deposito La Victoria (Caja 140, #3869)	Yes	Yes, some	Yes, small amount	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF085 (#3538)	Deposito La Victoria, Caja 152, #3538	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF085B.1	Deposito La Victoria (Caja 133, #3674, older infant)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF085B.2	Deposito La Victoria (Caja 133, #3674, younger infant)	Yes, fragments	No	No	Yes, very incomplete
Armatambo, Sector II	ARMA-D04.II-CF86	Deposito La Victoria (Caja 126, #3351)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF87	Deposito La Victoria (Caja 138, #3778)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF88	Deposito La Victoria (Caja 138, #3063)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF89	MNAAHP (Bulto s/ caja, #3440)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF90	Deposito La Victoria (Caja 158, #3780)	Yes (occipital observable)	UO	UO	Yes (femur observable)
Armatambo, Sector II	ARMA-D04.II-CF91	Deposito La Victoria (Caja 158, #3779)	UO	UO	UO	Yes, femur observable
Armatambo, Sector II	ARMA-D04.II-CF92	Deposito La Victoria (Caja 132, #3454)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF93A	MNAAHP (Bulto s/ caja, #3554)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF93B	Deposito La Victoria (Caja 123, #3658)	Yes	Yes (few teeth only)	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF93C	*Possibly the fardo without a codigo number at MNAAHP, in bundle with no Caja number.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF93D	No skeleton present in MNAAHP collection for Contexto Funerario 93D.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF94	Deposito La Victoria (Caja 128, #3918)	Yes, partially observable	No	No	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF95	Deposito La Victoria (Caja 124, #3455)	Yes	No	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF96	Deposito La Victoria (Caja 157, #3055)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF97	Deposito La Victoria (Caja 139, #3320)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF98	Deposito La Victoria (Caja 133, #3327)	Yes	Yes	Yes, large quantity	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF99	Deposito La Victoria (Caja 157, #3060)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF100.1	Deposito La Victoria (Caja 139, #3073, older infant)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF100.2	Deposito La Victoria (Caja 139, #3073, younger infant)	Yes, fragments	Yes, mandibular	Yes	No
Armatambo, Sector II	ARMA-D04.II-CF101A	No skeleton present in MNAAHP collection for Contexto Funerario 101A.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF101B	Deposito La Victoria (Caja 106, #3684)	Yes, incomplete	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF102	Deposito La Victoria (Caja 120, #3219)	No	No	No	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF103	Deposito La Victoria (Caja 123, #3555)	Yes	Yes	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF104	Deposito La Victoria, Caja 152, #3214	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF105	Deposito La Victoria (Caja 139, #3322)	Yes	Yes	Yes, very short	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF106	Deposito La Victoria (Caja 115, #3553)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF107	No skeleton present in MNAAHP collection for Contexto Funerario 107.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF108	Deposito La Victoria (Caja 128, #3318)	Yes	Yes	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF109	Deposito La Victoria (Caja 140, #3216)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF110	Deposito La Victoria (Caja 141, #3211)	Yes	Yes	Yes, small amount	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF111A	Deposito La Victoria (Caja 134, #3319)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF111B	Deposito La Victoria (Caja 106, #3694)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF111C.1	Deposito La Victoria (Caja 165, #3695, older infant)	Yes, fragments	Yes (some mandibular)	Yes	Yes, very incomplete
Armatambo, Sector II	ARMA-D04.II-CF111C.2	Deposito La Victoria (Caja 165, #3695, younger infant)	Yes, fragments	No	Yes	Yes, very incomplete
Armatambo, Sector II	ARMA-D04.II-CF112	Deposito La Victoria (Caja 118, #3452)	Yes	Yes (most teeth lost postmortem)	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF113.1	Deposito La Victoria (Caja 140, #3212, nearly complete adult)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF113.2	Deposito La Victoria (Caja 140, #3212, very incomplete adult cranium)	Yes, heavily damaged	One tooth	Yes, small amount	Yes, C1 and C2 vertebrae only
Armatambo, Sector II	ARMA-D04.II-CF114	Deposito La Victoria (Caja 138, #3317)	Yes	Yes	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF115	Deposito La Victoria (Caja 142, #3213)	Yes	Yes	Yes, small amount	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF116	No skeleton present in MNAAHP collection for Contexto Funerario 116.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF117	Deposito La Victoria (Caja 120, #3218)	Yes	Yes	Yes, short	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF118	Deposito La Victoria (Caja 141, #3206)	Yes	Yes	Yes, tiny amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF119A	Deposito La Victoria (Caja 142, #3210)	Yes	Yes	Yes, tiny amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF119B	Deposito La Victoria (Caja 106, #3689)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF120	Deposito La Victoria (Caja 142, #3208)	Yes	Yes (one tooth)	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF121	Deposito La Victoria, Caja 146, #3217	Yes	Yes	Yes, some	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF122	Deposito La Victoria (Caja 141, #3209)	Yes	Yes	Yes, tiny amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF123	Deposito La Victoria (Caja 134, #3350)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF124	Deposito La Victoria (Caja 139, #3344)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF125	Deposito La Victoria (Caja 138, #3220)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF126	Deposito La Victoria (Caja 120, #3655)	Yes, damaged	Yes (mandible only)	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF127	Deposito La Victoria (Caja 134, #3204)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF128A	Deposito La Victoria (Caja 127, #3352)	Yes	Yes	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF128B	Deposito La Victoria, Caja 137, #3207	Yes	Yes	Yes	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF129	Deposito La Victoria (Caja 115, #3677)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF130	No skeleton present in MNAAHP collection for Contexto Funerario 130.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF131	Deposito La Victoria (Caja 119, #3447)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF132	Deposito La Victoria, Caja 137, #3705	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF133	Deposito La Victoria (Caja 124, #3450)	Yes	Yes (some)	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF134	Deposito La Victoria (Caja 140, #3868)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF135	Deposito La Victoria (Caja 119, #3451)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF136	Deposito La Victoria (Caja 124, #3525)	Yes	Yes (few teeth only)	No	Yes, extremely incomplete
Armatambo, Sector II	ARMA-D04.II-CF137	Deposito La Victoria (Caja 125, #3456)	No	No	No	No
Armatambo, Sector II	ARMA-D04.II-CF138	Deposito La Victoria (Caja 133, #3540)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF139	Deposito La Victoria (Caja 139, #3449)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF140	Deposito La Victoria (Caja 126, #3534)	Yes, damaged	Yes	Yes, large quantity	Yes, very incomplete
Armatambo, Sector II	ARMA-D04.II-CF141	Deposito La Victoria (Caja 115, #3446)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF142	Deposito La Victoria (Caja 125, #3448)	Yes	Yes	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF143	Deposito La Victoria (Caja 134, #3704)	Yes	Yes	Yes, tiny amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF144A	Deposito La Victoria (Caja 135, #3656)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF144B	Deposito La Victoria (Caja 135, #3648)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF145	Deposito La Victoria (Caja 127, #3781)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF146	Deposito La Victoria (Caja 135, #3639)	Yes, wrapped in textiles	Yes, partially observable	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF147.1	Deposito La Victoria (Caja 139, #3702, adult)	Yes	Yes	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF147.2	Deposito La Victoria (Caja 139, #3702, juvenile)	No	No	No	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF148	Deposito La Victoria (Caja 124, #3644)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF149	Deposito La Victoria (Caja 119, #3784)	Yes	Yes	Yes, tiny amount	Yes, complete but damaged
Armatambo, Sector II	ARMA-D04.II-CF150	Deposito La Victoria (Caja 139, #3642)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF151	Deposito La Victoria (Caja 136, #3661)	Yes	Yes	Yes, short and separated	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF152	No skeleton present in MNAAHP collection for Contexto Funerario 152.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF153 (#3634)	Deposito La Victoria (Caja 133, #3634)	Yes	Yes, some	Yes, fragments	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF153 (#3636)	Deposito La Victoria (Caja 126, #3636)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF153 (#3532)	Deposito La Victoria (Caja 133, #3532)	No	No	No	Yes, 1 incomplete infant, 1 incomplete juvenile, 1 very incomplete adult

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF153D (#3637)	Deposito La Victoria (Caja 123, #3637)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF153E.1 (#3641)	Deposito La Victoria (Caja 123, #3641, younger subadult)	No	Yes	No	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF153E.2 (#3641)	Deposito La Victoria (Caja 123, #3641, older subadult)	Yes, fragmented	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF154	Deposito La Victoria (Caja 132, 3679)	Yes	Yes	No	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF155 (#3638)	Deposito La Victoria (Caja 133, #3638)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF155.1 (#3649)	Deposito La Victoria (Caja 123, #3649, older individual)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF155.2 (#3649)	Deposito La Victoria (Caja 123, #3649, younger individual)	Yes, some bones	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF156A	Deposito La Victoria (Caja 122, sin codigo)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF156B	Deposito La Victoria (Caja 133, $3635)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF157 (#3706)	Deposito La Victoria (Caja 118, #3706)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF157 (#3528)	Deposito La Victoria (Caja 133, #3528)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF157 (#3536)	No skeleton present in MNAAHP collection for Contexto Funerario 156 (#3536).	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF158	No skeleton present in MNAAHP collection for Contexto Funerario 158.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF159	Deposito La Victoria, Caja 152 #3537	UO	UO	Yes	UO
Armatambo, Sector II	ARMA-D04.II-CF160	Deposito La Victoria (Caja 118, #3680)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF161	Deposito La Victoria, Caja 137, #3678	Yes	Yes	No	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF162A	Deposito La Victoria (Caja 126, sin codigo "CF162A")	Yes	NA	NA	Yes, appears complete
Armatambo, Sector II	ARMA-D04.II-CF162B	Deposito La Victoria (Caja 106, #3611)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF162C	Deposito La Victoria (Caja 106, #3601)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF162D	Deposito La Victoria (Caja 106, #3610)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF162E	Deposito La Victoria (Caja 140, #3870)	Yes	Yes	No	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF162F	Deposito La Victoria (Caja 106, #3606)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF162H	Deposito La Victoria (Caja 106, #3605)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF162K.1	Deposito La Victoria (Caja 135, #3543, adult)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF162K.2	Deposito La Victoria (Caja 135, #3543, subadult)	Yes, damaged	Yes (only left maxilla)	No	No
Armatambo, Sector II	ARMA-D04.II-CF162G	Deposito La Victoria (Caja 132, #3783)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF162L	Deposito La Victoria (Caja 124, #3668)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF162M	Deposito La Victoria (Caja 127, #3671)	Yes	Yes	No	Yes, very incomplete
Armatambo, Sector II	ARMA-D04.II-CF162N	Deposito La Victoria (Caja 136, #3524)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF162O	Deposito La Victoria (Caja 135, #3550)	NA	NA	NA	MNI = 02 infants

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF162P	Deposito La Victoria (Caja 124, #3522)	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF162Q	Deposito La Victoria (Caja 124, #3530 [postcrania], Caja 126, #3529 [cranium])	Yes	Not recorded	Not recorded	Yes, fairly complete
Armatambo, Sector II	ARMA-D04.II-CF163	Deposito La Victoria (Caja 123, #3633)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF164	Deposito La Victoria (Caja 120, #3647)	Yes	Yes	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF165	Deposito La Victoria (Caja 133, #3640)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF166	Deposito La Victoria (Caja 136, #3526)	Yes	Yes	Yes, short and separated	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF167	Deposito La Victoria (Caja 135, #3527)	Yes	Yes	Yes, short	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF168	Deposito La Victoria (Caja 125, #3535)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF169	Deposito La Victoria (Caja 114, #3788)	Yes	No	Yes, small amount	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF170	Deposito La Victoria (Caja 114, #3789)	Yes	Yes	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF171 (#3840)	Deposito La Victoria (Caja 144, #3840)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF171C	MNAAHP (Bulto s/ caja, #3552)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF172A	Deposito La Victoria (Caja 123, #3836)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF172B	Deposito La Victoria (Caja 114, #3852)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF173	Deposito La Victoria (Caja 163, #3849)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF174	Deposito La Victoria (Caja 127, #3845)	Yes	Yes	Yes	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF175A	Deposito La Victoria (Caja 121, #3835)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF175B	No skeleton present in MNAAHP collection for Contexto Funerario 175B.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF176	No skeleton present in MNAAHP collection for Contexto Funerario 176.	NA	NA	NA	NA
Armatambo, Sector II	ARMA-D04.II-CF177	MNAAHP (Bulto s/ caja, #3864)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF178	Deposito La Victoria (Caja 121, #3863)	UO	UO	UO	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF179	Deposito La Victoria (Caja 127, #3843)	Yes	Yes	Yes	Yes, incomplete
Armatambo, Sector II	ARMA-D04.II-CF180	Deposito La Victoria (Caja 158, #3865)	Yes, partially observable	Yes, partially observable	UO	Yes, one rib observable
Armatambo, Sector II	ARMA-D04.II-CF181	MNAAHP (Bulto s/ caja, #3834)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF182	Deposito La Victoria (Caja 114, #3846)	Yes	Yes	Yes, short	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF183	Deposito La Victoria (Caja 128, #3842)	UO	UO	UO	UO
Armatambo, Sector II	ARMA-D04.II-CF184	Deposito La Victoria (Caja 114, #3850)	No	No	No	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF185	Deposito La Victoria (Caja 124, #3837)	No	No	No	Yes, nearly complete
Armatambo, Sector II	ARMA-D04.II-CF186	Deposito La Victoria (Caja 137, #3851)	Yes	Yes	Yes	Yes, partially observable
Armatambo, Sector II	ARMA-D04.II-CF187	Deposito La Victoria (Caja 133, #3856)	Yes	Yes (some maxillary)	Yes	Yes, incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Armatambo, Sector II	ARMA-D04.II-CF188	Deposito La Victoria (Caja 115, #3861; Caja 158, #3861 = textiles belonging to fardo)	Yes	Yes	Yes	Yes, complete
Armatambo, Sector II	ARMA-D04.II-CF189	Deposito La Victoria (Caja 115, #3857)	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector I	RINC-G9698.I-0001-ENT001	MNAAHP Caja 01, 12.1.A - #0001	No	No	No	Yes, incomplete
Rinconada Alta, Sector I	RINC-G9698.I-0110-ENT001	MNAAHP Caja s/n, 12.2.C - #110	No	No	No	Yes, very incomplete
Rinconada Alta, Sector I	RINC-G9698.I-0137-2	MNAAHP Caja 09, 12.1.C - #137.2	Yes	Yes	No	Yes, incomplete
Rinconada Alta, Sector I	RINC-G9698.I-0582-ENT126	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector I	RINC-G9698.I-0665	MNAAHP Caja II, 12.1.C - #665	No	No	No	Yes, incomplete
Rinconada Alta, Sector I	RINC-G9698.I-1135-1A	MNAAHP Caja 14, 12.1.B - #1135-1A	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector I	RINC-G9698.I-1135-1B	MNAAHP Caja 15, 12.1.B - #1135-1B	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector I	RINC-G9698.I-1135-1C	MNAAHP Caja 14, 12.1.B - #1135-1C	Yes, fragmented	Yes, mandible only	No	Yes, nearly complete
Rinconada Alta, Sector I	RINC-G9698.I-1135-2A	MNAAHP Caja 16, 12.1.B - #1135-2A	Yes, fragmented	Yes	No	Yes, complete
Rinconada Alta, Sector I	RINC-G9698.I-1135-2B	MNAAHP Caja 17, 12.1.B - #1135-2B	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector I	RINC-G9698.I-1135-2C	MNAAHP Caja 18, 12.1.B - #1135-2C	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector I	RINC-G9698.I-1137	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector I	RINC-G9698.I-1177	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector I	RINC-G9698.I-1178	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector I	RINC-G9698.I-0661.1	MNAAHP (Caja 10, 12.2.E)	Yes	Yes	Yes, small amount	Yes, nearly complete
Rinconada Alta, Sector I	RINC-G9698.I-0661.2	MNAAHP (Caja 10, 12.2.E)	No	No	No	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0062	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0062.1	MNAAHP Caja 06, 12.3.B - #62, juvenile	Yes	Yes (maxillary molars)	No	Yes, very incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0062.2	MNAAHP Caja 06, 12.3.B - #62, infant	No	No	No	Yes, extremely incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0090A	MNAAHP Caja 07, 12.3.B - #90A	No	No	No	Yes, very incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0217	MNAAHP Caja 10, 12.1.C - #217	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0219-ENT003 (Cuad: 15)	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0232	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0242	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0268-ENT005	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0302 (PERRO)	MNAAHP 12.1.A	See MNAAHP inventory.	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector II	RINC-G9698.II-0332.1-ENT008	MNAAHP Caja 19, 12.1.B - #332, Cranium 1	Yes	Yes, only maxillary M1s	No	Postcrania present in Codigo 332 may belong to either 332.1 or 332.2.
Rinconada Alta, Sector II	RINC-G9698.II-0332.2-ENT008	MNAAHP Caja 19, 12.1.B - #332, Cranium 2	Yes	Yes, maxillary only	No	See 332.1
Rinconada Alta, Sector II	RINC-G9698.II-0338	MNAAHP Caja 20, 12.1.D - #338	Yes	Yes, maxilla only	No	Yes, nearly complete and partially mummified
Rinconada Alta, Sector II	RINC-G9698.II-0359	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0390-ENT019	MNAAHP Caja 22, 12.1.B - #390	No	No	Yes, tiny amount	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0392-ENT020	MNAAHP Caja 23, 12.1.C - #392	No	Yes, three teeth only	No	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0394 (Fardo No. 29)	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0395	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0405	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0406-ENT024	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0411	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0415.1-ENT028	MNAAHP Caja 24, 12.1.B - #415 (Adult)	Yes	Yes	Yes	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0415.2-ENT028	MNAAHP Caja 24, 12.1.B - #415 (Infant)	Yes	Yes	No	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0415.3-ENT028	MNAAHP Caja 24, 12.1.B - #415 (Adult cranium)	Yes	No	No	No
Rinconada Alta, Sector II	RINC-G9698.II-0434-ENT033	MNAAHP Caja 25, 12.1.B - #434	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0439.1-ENT037	MNAAHP Caja 27, 12.1.B - #439, Adult	No	No	No	Yes, very incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0439.2-ENT037	MNAAHP Caja 27, 12.1.B - #439, Subadult 1	No	No	No	Left femur
Rinconada Alta, Sector II	RINC-G9698.II-0439.3-ENT037	MNAAHP Caja 27, 12.1.B - #439, Subadult 2	No	No	No	Left femur and right humerus
Rinconada Alta, Sector II	RINC-G9698.II-0442	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0463-ENT040	MNAAHP Caja 29, 12.1.E - #463	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0468-ENT041	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0477-ENT44	MNAAHP (Caja 31, 12.2.D - #477)	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector II	RINC-G9698.II-0486-ENT050	MNAAHP Caja 34, 12.1.C - #486	Yes	Yes	No	Yes, very incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector II	RINC-G9698.II-0546.1-ENT101	MNAAHP Caja 38, 12.1.C - #546 (adult)	No	Yes, mandible only	No	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0546.2-ENT101	MNAAHP Caja 38, 12.1.C - #546 (juvenile)	No	No	No	Yes, very incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0555	MNAAHP Caja M.O. 20, 12.1.D - #555	02 adults	No	No	Yes, multiple incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0555	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0555-I	MNAAHP Caja 39, 12.1.D - #555 I	No	Two maxillary teeth	No	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0555-II	MNAAHP Caja 39, 12.1.D - #555-II	No	No	No	Right os coxa
Rinconada Alta, Sector II	RINC-G9698.II-0555-III	MNAAHP Caja 39, 12.1.D - #555 III	No	No	No	MNI = 03 (02 adults, 01 subadult)
Rinconada Alta, Sector II	RINC-G9698.II-0555-III.2	MNAAHP Caja 39, 12.1.D - #555-III Bebe	Yes, few bones	Yes, incomplete	No	Yes, nearly complete
Rinconada Alta, Sector II	RINC-G9698.II-0556	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0558-ENT108	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0563-ENT53	MNAAHP Caja 44, 12.1.E - #0563	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0565	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0567-ENT116	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0570-ENT119	MNAAHP Caja 41, 12.1.C - #570	Yes	Yes	Yes, small amount	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0575	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0579 - ENT124	MNAAHP Caja 52, 12.1.B - #579	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0580-ENT125	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0583	MNAAHP Caja 53, 12.1.D - #583	Yes	Yes (no right mandible)	No	Yes, very incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0604-FAR81	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0612-FAR125	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0614-FAR93	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0614-IV	MNAAHP Caja 24, 12.3.C - #614-IV	No	No	No	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0620-ENT019	MNAAHP Caja 61, 12.1.D - #620	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector II	RINC-G9698.II-0633.I	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0633.II-FAR109	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0735	MNAAHP Caja 01, 12.2.B - #735	No	No	No	Yes, incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector II	RINC-G9698.II-0219-ENT003 [?]	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0227	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0250	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0266-ENT003 [?]	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0267-ENT004	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0279	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0282-ENT008	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0409-ENT027	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0425	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0429-ENT032	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0435-ENT036	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0444-ENT077	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0446-ENT040	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0469-ENT042	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0481.II (E:47?)	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0546	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0548-ENT103	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0550-ENT104	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0559-ENT109	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0560-ENT110	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0569-ENT118	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0601-ENT001	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0602-ENT002	FARDO	See MNAAHP inventory.	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector II	RINC-G9698.II-0605-ENT004	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0606-ENT005	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0607-ENT007	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0608-ENT006	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0609-ENT008	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0611-ENT010	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0613-ENT012	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0616-ENT015	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0618-ENT017	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0619	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0625-ENT024	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0626-ENT025	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0629-ENT027	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-090B (C.F. M, Disturbado)	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-ENT.DIST07	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector II	RINC-G9698.II-0495.1-ENT53	MNAAHP (Caja s/n, Ubic? - #495; Caja 35, 12.1.B - #495, adult)	Yes	Yes	Yes	Yes, complete and mummified
Rinconada Alta, Sector II	RINC-G9698.II-0495.2-ENT53	MNAAHP (Caja 35, 12.1.B - 495, subadult)	No	No	No	Yes, incomplete
Rinconada Alta, Sector II	RINC-G9698.II-0566-ENT115	MNAAHP (Caja 45, 12.2.E)	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector II	RINC-G9698.II-0574-ENT122	MNAAHP (Caja 50 y 51, 12.2.E)	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0735	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0747	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0610-FAR108	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0641-FAR134	FARDO	See MNAAHP inventory.	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0714	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0719B-ENT002	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0720-ENT003	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0722-FAR083	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0724	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0730-FAR086	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0736-FAR185	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0742	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0744	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0749-FAR130	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0852	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0862	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-G9698.IIA-0862-ENT117	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0104	MNAAHP (Caja 'Craneos 1', 12.1.E - #104)	Yes	Yes	Yes	No
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0873	MNAAHP Caja 02, 12.1.E - #873	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0888	MNAAHP Caja M.O. 10 and Caja 05, 12.2.C - #888	No	Yes, mandible only	No	Yes, apparently complete (partially mummified)
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0893	MNAAHP Caja 06, 12.2.C - #893	No	No	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0896	MNAAHP Caja s/n, 12.3.B - #896	Yes, but largely fragmented	Yes, some	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0956	MNAAHP Caja 08, 12.2.B - #956	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0960A	MNAAHP Caja 09, 12.2.B - #960A	Yes	Yes	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0960B	MNAAHP Caja 09, 12.2.B - #960B	No	No	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0976A	MNAAHP Caja 14 (primera), 12.3.B - #976A	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0976B	MNAAHP Caja 14 (segunda), 12.1.E - #976, Individuo B	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0994	MNAAHP (Caja 17, 12.2.D - #994)	Yes, fragmented	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1002	MNAAHP (Caja 'Craneos 1', 12.1.E - #1002)	Yes	Maxilla and mandible present; all teeth lost	No	No
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1003	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1004	MNAAHP Caja 12.3.B - #1004	Yes	Yes	No	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1005	MNAAHP Caja 21, 12.1.E - #1005	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1006	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1008-1	MNAAHP Caja Craneos II, 12.2.C - #1008-1	Yes	Yes	Yes	No
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1008-2	MNAAHP Caja Craneos II, 12.2.C - #1008-2	Yes	Yes, maxillary only	Yes	No
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1010	MNAAHP Caja 22, 12.2.B - #1010	No	No	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1011	MNAAHP Caja 23 and Caja Material Oseo 37, 12.1.E - #1011	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1012	MNAAHP Caja 24, 12.2.C - #1012, #1012M.O.	Yes	No, mandible absent and maxillary teeth lost	Yes	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1012	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1013	MNAAHP Caja 38, 12.1.E - #1013	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1014	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1016	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1016	MNAAHP Caja 38, 12.3.E - #1016	Yes, fragmented and incomplete	Two teeth.	Yes, tiny amount	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1019	MNAAHP Caja 26, 12.2.B - #1019	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1023	MNAAHP (Caja 'Craneos 1', 12.1.E - #1023)	Yes	Yes	No	No
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1024	MNAAHP Caja 27, 12.2.B - #1024	Yes, fragmented	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1025	MNAAHP Caja 28, 12.2.B - #1025	Yes, fragmented	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1026-1	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1026-2	MNAAHP Caja 29, 12.1.E - #1026-2	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1026.1	MNAAHP (Caja M.O.39, 12.2.E - #1026)	No	No	No	Yes, very incomplete and fragmented
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1026.2	MNAAHP (Caja M.O.39, 12.2.E - #1026)	Yes, fragmented	Yes (no right maxilla)	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1031.9/1031A	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1032	MNAAHP Caja 31, 12.2.B - #1032	No	Yes, only five loose teeth	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1034B	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1041A	MNAAHP Caja 32, 12.2.C - #1041A	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1041B	MNAAHP Caja 32, 12.2.C - #1041B	Yes	Yes	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1042.1	MNAAHP Caja 33 and Craneo III, 12.2.B - #1042 (Adult)	Yes	Yes	No	Yes, complete but damaged
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1042.2	MNAAHP Caja 33 and Craneo III, 12.2.B - #1042 (Infant)	No	Yes, only a few teeth	No	Yes, extremely incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1042.3	MNAAHP Caja 33 and Craneo III, 12.2.B - #1042 (Adult cranium)	Yes, extremely fragmented	Yes, only a few teeth	No	No

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1044	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1045	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1046	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1046	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1048.1	MNAAHP Caja 34, 12.2.C - #1048, adult	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1048.2	MNAAHP Caja 34, 12.2.C - #1048, infant	Yes, but fragmented	Yes	No	Yes, complete but damaged
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1051.II	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1056	MNAAHP Caja 35, 12.1.E - #1056	No	No	No	Yes, nearly complete (missing C1 and C2)
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1058	MNAAHP Caja M.O. 47 and Caja 36, 12.2.C - #1058	Yes	Yes (3 teeth)	No	Yes, complete but damaged
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1069	Not analyzed. MNI = 09 individuals	NA	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1072	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1085B	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1085C	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1091	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1103	MNAAHP Caja 41, 12.1.E	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1115-1	MNAAHP Caja M.O. 60, 12.1.C - #1115-1	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1115-2	MNAAHP Caja 42, 12.1.D - #1115.2	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1115-2B	MNAAHP Caja M.O. 60, 12.1.C - #1115-2B	Yes, fragmented	Yes	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1117	MNAAHP Caja 43, 12.1.E - #1117	Yes, fragmented	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1118	MNAAHP Caja 44, 12.1.C - #1118	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1119A	MNAAHP Caja 45, 12.1.C - #1119A	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1119B	MNAAHP Caja M.O. 61, 12.1.D - #1119B	Yes, incomplete	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1119C	MNAAHP Caja 46, 12.1.D - #1119C	No	Yes, mandible only	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1127	MNAAHP Caja 47, 12.1.D - #1127	No	No	No	Yes, heavily damaged but nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1128	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1130	MNAAHP Caja 48, 12.1.D - #1130	Yes	Yes	No	Yes, very fragmented but nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1133	MNAAHP Caja 49, 12.1.C - #1133	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1138	MNAAHP Caja 50, 12.1.B - #1138	Yes	Yes	No	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1143	MNAAHP Caja 51, 12.1.C - #1143	Yes	Yes	Yes, tiny amount	Yes, nearly complete but very damaged
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1145-1	MNAAHP Caja 52, 12.1.D - #1145-1	No	Yes, mandible only	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1145-2	MNAAHP Caja 53, 12.1.D - #1145-2	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1154	MNAAHP Caja 54, 12.1.E - #1154	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1156	MNAAHP Caja 55, 12.1.D - #1156	No	No	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1159A	MNAAHP Caja 56, 12.1.E - #1159, Adult (A)	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1159B	MNAAHP Caja 56, 12.1.E - #1159, Adolescent (B)	No	Yes, mandible only	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1160	MNAAHP Caja 57, 12.1.E - #1160	No	No	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1164	MNAAHP Caja 58, 12.1.E - #1164	Yes, fragmented	Yes	No	Yes, nearly complete but very fragmented
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1165	MNAAHP Caja 59, 12.1.E - #1165	No	Three teeth (not analyzed)	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1167	MNAAHP Caja 60, 12.1.E - #1167	Yes, extremely fragmented	Yes, maxillary bone not observable	No	Yes, incomplete and fragmented
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1168	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1169	MNAAHP Caja 62, 12.1.B - #1169	Yes, damaged inferiorly	Yes	Yes, small amount	Yes, nearly complete but damaged
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1176	MNAAHP Caja 63, 12.1.E - #1176	No	No	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1179.1	MNAAHP Caja M.O. 75, 12.1.B - #1179.1	Yes	Yes (most lost AM or PM)	Yes	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1179.2	MNAAHP Caja M.O. 75, 12.1.B - #1179.2	Few fragments only	2 teeth	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1179.3	MNAAHP Caja M.O. 75, 12.1.B - #1179.3	Yes, extremely fragmented	No	No	Yes, very incomplete and fragmented
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1183	MNAAHP Caja 65, 12.1.B - #1183	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1198	MNAAHP Caja 67, 12.1.D (#1198)	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1199	MNAAHP Caja 68, 12.1.B - #1199	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1305	MNAAHP Caja 45, 12.2.B - #1305	No	No	No	Yes, incomplete and heavily damaged
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1308.1	MNAAHP Caja 70, 12.1.B - #1308 (Adult)	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1308.2	MNAAHP Caja 70, 12.1.B - #1308 (Subadult)	Yes, but fragmented	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1311	MNAAHP Caja 70, 12.1.C - #1311	No	Yes, maxilla only	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1320	MNAAHP Caja 71, 12.1.C - #1320	Yes, but fragmented	Yes, some loose teeth	No	Yes, nearly complete but fragmented
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1333	MNAAHP Caja 72, 12.1.C - #1333	No	No	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1336	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1337.2	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1340	MNAAHP Caja 73, 12.1.C - #1340	Yes	Yes	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1341	MNAAHP Caja 74, 12.1.B - #1341	Yes	Yes	Yes	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1353	MNAAHP Caja 75, 12.1.D - #1353	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1358	MNAAHP Caja 76, 12.1.C 0 #1358	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1379	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1383	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1386	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1387	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1388	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1389	MNAAHP Caja 79, 12.1.B - #1389	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1391	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1393	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1395	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1396	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1400	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1406	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1415A	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1415B	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1420	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1438	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1439	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1440	MNAAHP Caja 80, 12.1.B - #1440	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1442	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1443	MNAAHP Caja 81, 12.1.D - #1443	No	Yes, incomplete	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1450	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0865	FARDO	See MNAAHP inventory.	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0875	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0877	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0880	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0881-FAR80	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0883	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0889	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0891	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0893-ENT113	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0955	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0958	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0961.1	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0961.2	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0961.3	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0961.4	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0964	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0971	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0973	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0975	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0976	MNAAHP Caja 33, 12.1.D - #976	Yes, few fragments	Yes, few loose teeth	No	Yes, MNI = 2
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0976C	MNAAHP Caja 14 (segunda), 12.1.E - #976, Individuo C	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0976D	MNAAHP Caja 14 (primera), 12.3.B - #976D	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0978	MNAAHP Caja 15, 12.2.B - #978	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0984	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0987	FARDO	See MNAAHP inventory.	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0988A	MNAAHP Caja 16, 12.2.B - #988A y B	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0988B	MNAAHP Caja 16,12.2.B - #988B	No	Yes, mandible only	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0995	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0999	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0970	MNAAHP (Caja 12, 12.2.D)	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0973A	MNAAHP (Caja 13, 12.2.D)	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0973B	MNAAHP (Caja 13, 12.2.D)	Yes	Yes	Yes	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-0973C	MNAAHP (Caja 13, 12.2.D)	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1028	MNAAHP (Caja 30, 12.2.D)	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1095	MNAAHP (Caja 40, 12.2.D)	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1095-1(MO)	MNAAHP (Caja 40, 12.2.D)	Yes	Yes	No	Yes, very fragmented
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1095-3(MO)	MNAAHP (Caja 40, 12.2.D)	Yes	No	No	Yes, very fragmented
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1185.1	MNAAHP (Caja 66, 12.2.D - #1185)	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1185.2	MNAAHP (Caja 66, 12.2.D - #1185 M.O.)	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIAE	RINC-G9698.IIAE-1185.3	MNAAHP (Caja 66, 12.2.D - #1185 M.O.)	One zygomatic only	No	No	Yes, very incomplete
Rinconada Alta, Sector IV	RINC-G9698.IV-0226	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0496-ENT054	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0499-ENT057	MNAAHP Caja 03, 12.3.C - #499	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector V	RINC-G9698.V-0500-ENT058	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0501-ENT59	MNAAHP Caja 04, 12.1.D - #501	No	No	No	Yes, extremely incomplete
Rinconada Alta, Sector V	RINC-G9698.V-0502-ENT60	MNAAHP Caja05, 12.1.B - #502	No	Yes, mandible only	No	Yes, nearly complete
Rinconada Alta, Sector V	RINC-G9698.V-0504-ENT062	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0505-ENT63	MNAAHP Caja 06, 12.1.C	Yes, but incomplete and damaged	Yes, only left mandibular molars	Yes	Yes, complete
Rinconada Alta, Sector V	RINC-G9698.V-0508-ENT066	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0509-ENT67	MNAAHP Caja 08, 12.1.C - #509	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector V	RINC-G9698.V-0510-ENT068	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0511-ENT069	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0512-ENT70	MNAAHP Caja 09, 12.1.B - #512	No	Yes, mandible only	No	Yes, nearly complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector V	RINC-G9698.V-0513-ENT071	MNAAHP Caja 10, 12.1.D - #513	Yes, fragmented	Yes (lots of postmortem loss)	No	Yes, incomplete
Rinconada Alta, Sector V	RINC-G9698.V-0517-ENT075	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0519-ENT077	MNAAHP Caja 11, 12.1.C - #519	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector V	RINC-G9698.V-0520.1-ENT078	MNAAHP Caja 12, 12.1.B - #520 (Adult)	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector V	RINC-G9698.V-0520.2-ENT078	MNAAHP Caja 12, 12.1.B - #520 (Juvenile)	Yes	Yes	Yes, tiny amount	Yes, complete
Rinconada Alta, Sector V	RINC-G9698.V-0521-ENT079	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0527-ENT083	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0528-ENT084	MNAAHP Caja 13, 12.1.C - #528	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector V	RINC-G9698.V-0529-ENT085	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0533-ENT089	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0536-ENT092	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0540-ENT096	MNAAHP Caja 15, 12.1.B - #540	No	No	No	Yes, very incomplete
Rinconada Alta, Sector V	RINC-G9698.V-0541-ENT097	MNAAHP Caja s/n, 12.1.A - #541	No	No	No	Yes, nearly complete
Rinconada Alta, Sector V	RINC-G9698.V-0542-ENT098	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0543-ENT099	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0561-ENT111	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V-0562	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector V	RINC-G9698.V.0551-ENT104.1	MNAAHP (Caja s/n, 12.2.D)	Yes	Yes, maxilla only	No	No
Rinconada Alta, Sector V	RINC-G9698.V.0551-ENT104.2	MNAAHP (Caja s/n, 12.2.D)	No	Yes, mandible only	No	Yes, very incomplete
Rinconada Alta, Sector VI	RINC-G9698.VI-0803	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0804.I-ENT106	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0804.II	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0805	FARDO	See MNAAHP inventory.	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector VI	RINC-G9698.VI-0806	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0807-I	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0807-II	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0807-III	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0809-III	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0809-IV	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0809-VI	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0809.II	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0811	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0818-I	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0818-II	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0819	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0820	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0821	MNAAHP Caja 09, 12.1.D - #821	Yes	Yes (most teeth lost PM)	Yes	Yes, incomplete and partially mummified
Rinconada Alta, Sector VI	RINC-G9698.VI-0823-III	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0823-IV	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0823.II	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0824	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0826	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0832	MNAAHP Caja 12, 12.1.D - #832	Yes, fragmented	Yes	Yes, tiny amount	Yes, complete
Rinconada Alta, Sector VI	RINC-G9698.VI-0840-II	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0840.I	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-0905	MNAAHP Caja 14, 12.1.C - #905	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector VI	RINC-G9698.VI-0942	FARDO	See MNAAHP inventory.	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector VI	RINC-G9698.VI-1537	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-1540	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-1542	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-1549	FARDO	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector VI	RINC-G9698.VI-1570	MNAAHP Caja s/n, 12.3.B - #1570	Yes, fragmented	Yes (most lost PM)	No	Yes, nearly complete but very fragmented
Rinconada Alta, Sector I	RINC-D02.I-CF01	MNAAHP Caja 10A, 12.3.D - #760	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector I	RINC-D02.I-CF02	FARDO MNAAHP 13.4.A #794 (Inventario: Fardo removido- subadulto; Informe: Restos de fardo disturbado)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector I	RINC-D02.I-CF03	Not listed in Diaz inventory. No skeleton present at MNAAHP for Contexto Funerario 03.	NA	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF01	FARDO MNAAHP s/ubic no. #71 (not in Diaz inventory)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF02	MNAAHP Caja 56, 13.2.D - #10 (Inventario 2009)	Yes, incomplete	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF03	MNAAHP Caja 68, 12.4.C - #38	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF04	MNAAHP Caja 56, 11.2.O- #11 (Inventario 2009)	Yes, incomplete	No	Yes, small amount	Yes, left femur only
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF05	FARDO MNAAHP 14.1.B #27 (F.R- subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF06	MNAAHP Caja 56, 11.2.D - #28 (Inventario 2009)	Yes	Yes, left mandible and maxilla only	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF07	MNAAHP Caja 28, 12.4.C - #30	Still in fardo? Basilar and lateral occipital parts visible.	Still in fardo? Two loose teeth present.	Still in fardo?	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF08	FARDO MNAAHP, sin ubic. #30	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF09	FARDO MNAAHP 13.4.A #34 (F.R. -Int.)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF10	MNAAHP Caja 67, 11.3.D - #35	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF11	MNAAHP Caja 09, 11.3.D - #12	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF12	FARDO MNAAHP back of deposito #51 (fardo)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF13	MNAAHP Caja 02, 12.3.D - #137 (Inventario 2008)	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF14	MNAAHP Caja 18B, 11.3.D - #150	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF15	FARDO MNAAHP s/u (fardo en deposito)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF16	MNAAHP Caja 75, 12.4.C - #186	No	No	No	Yes, incomplete and partially mummified
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF17	MNAAHP Caja 05A, 12.3.D - #228 (Inventario 2008)	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF18	MNAAHP Caja 56, 11.2.D - #259	Yes, incomplete (vault bones absent)	Yes	No	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF19	FARDO MNAAHP 13.4.A #344 (FR- Int)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF20	MNAAHP Caja 56, 11.2.D - #324	Yes, incomplete and fragmented	No	Yes, small amount	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF21	MNAAHP Caja 56, 11.2.D - #345	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF22	FARDO MNAAHP back of deposito #330 (fardo)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF23	MNAAHP Caja 19B, 11.3.D - #348	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF24	MNAAHP Caja 56, 11.2.D - #486	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF25	MNAAHP Caja 59, 11.2.D - #507	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF26	MNAAHP Caja 09, 11.3.D - #512	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF27	MNAAHP Caja 14, 11.1.D - #525	No	One premolar	No	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF28A	MNAAHP Caja 19A, 11.1.D - #503, Individual A	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF28B	MNAAHP Caja 19A, 11.1.D - #503, Individual B	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF28C	MNAAHP Caja 19A, 11.1.D - #503, Individual C	Only basilar part	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF29	MNAAHP Caja 19A, 11.1.D - #532	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF30	MNAAHP Caja 09, 11.3.D - #540	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF31	MNAAHP Caja 57, 11.3.D - #541	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF32	MNAAHP Caja 57, 11.3.D - #542	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF33	MNAAHP Caja 56, 11.2.D - #495	Yes	Yes, except left mandible	Yes	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF34	MNAAHP Caja 56, 11.2.D - #499	Yes	Yes	Yes	Yes, fairly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF35	FARDO MNAAHP 14.1.B #500 (F.R. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF36	MNAAHP Caja 01B 12.3.D #545 (Inventario 2008)	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF37	MNAAHP Caja 08, 11.1.D - #162	Yes (unobservable-wrapped in textiles)	Yes (unobservable-in articulation, wrapped in textiles)	Yes, wrapped in textiles	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF38A	MNAAHP Caja 56, 11.2.D - #175, Individual A	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF38B	MNAAHP Caja 56, 11.2.D - #175, Individual B	No	Left mandible only	No	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF39	FARDO MNAAHP 14.1.B #176 (F.I. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF40	MNAAHP Caja 57, 11.3.D - #563	Yes	Yes	Yes, tiny amount	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF41	MNAAHP Caja 57, 11.3.D - #565	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF42	MNAAHP Caja 16B, 11.1.D - #581	No	No	No	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF43	MNAAHP Caja 57, 11.2.D - #592	No	No	No	Only atlas
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF44	MNAAHP Caja 57, 11.3.D - #596	Yes	Yes	Yes, small amount	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF45	MNAAHP Caja 57, 11.2.D - #599	Yes	Yes	Yes	Yes, complete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF46	No skeleton present at MNAAHP for Contexto Funerario 46.	NA	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF47	MNAAHP Caja 64, 11.3.D - #641	Yes	Yes	Yes, small amount	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF48	FARDO MNAAHP back of deposito #600 (fardo)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF49	FARDO MNAAHP back of deposito #601 (fardo)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF50	MNAAHP Caja 57, 11.3.D - #567	Yes	Yes	No	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF51	MNAAHP Caja 19A, 11.1.D - #656	Yes	Yes	Yes	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF52	MNAAHP Caja 57, 11.2.D - #657	Extremely incomplete	Mandible only	No	Yes, fairly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF53	MNAAHP Caja 19B, 11.1.D - #662	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF54	FARDO MNAAHP 13.4.A #419 (FR - Adulto mayor F)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF55	FARDOS MNAAHP back of deposit #422,423,424 (fardos)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF56	FARDO MNAAHP 13.4.A #435 (F.R. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF57	MNAAHP Caja 70, 11.2.D - #442	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF58	FARDO MNAAHP 13.4.A #447 (F.I. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF59	MNAAHP Caja 03, 11.2.D - #371 (Inventario 2008)	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF60A	FARDO MNAAHP 14.1.C #377 (F.I. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF60B	FARDO MNAAHP 14.1.B #378 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF61	MNAAHP Caja 15, 11.1.D - #386	No	No	No	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF62	No skeleton present at MNAAHP for Contexto Funerario 62.	NA	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF63	FARDO MNAAHP 14.2.B #683 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF64	MNAAHP Caja 19A, 11.1.D - #388	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF65	MNAAHP Caja 16A, 11.1.D - #689	No	No	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF66	MNAAHP Caja 56, 11.2.D - #401	Yes, fragmented	Yes	Yes, small amount	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF67.1	MNAAHP Caja 67, Ubic s/n - #695	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF67.2	MNAAHP Caja 67, Ubic s/n - #695	No	No	No	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF68	FARDO MNAAHP 14.2.B #696 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF69	FARDO MNAAHP 14.2.B #702 (F.I. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF70.1	MNAAHP Caja 57, 11.2.D - #703	No	Mandible only	No	Yes, incomplete

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF70.2	MNAAHP Caja 57, 11.2.D - #703	Yes	Yes	Yes, small amount	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF71	FARDO MNAAHP s/u #481 (F.I. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF72	FARDO MNAAHP 14.1.C #482 (F.I. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF73	MNAAHP Caja 57, 11.3.D - #571	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF74	FARDO MNAAHP 13.4.C #648 (F.R. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF75	FARDO MNAAHP 13.2.B #602 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF76	FARDO MNAAHP 13.4.A #615 (F.R. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF77	MNAAHP Caja 57, 11.2.D - #709	Yes	Yes	Yes, small amount	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF78	FARDO MNAHHP 13.4.A #483 (F.I. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF79	MNAAHP Caja 75, 12.4.C - #714	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF80	Does not exist (=CF82)	NA	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF81	MNAAHP Caja 75, 11.2.D #717	Yes	Yes	No	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF82A	MNAAHP Caja 10B, 12.3.D #720 (Inventario 2008)	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF82B	FARDO MNAAHP 14.2.B #721 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF83.1	MNAAHP Caja 4A, 11.2.D - #886	Yes	Yes	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF83.2	MNAAHP Caja 4A, 11.2.D - #886	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF84	FARDO MNAAHP s/u #746 (fardo in deposito)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF85	FARDO MNAAHP 13.4.A #995 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF86	FARDO MNAAHP sin ubic. #1002	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF87	FARDO MNAAHP 13.4.A #1003 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF88	MNAAHP Caja 16A, 11.1.D - #838	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF89A	MNAAHP Caja 8A, 11.3.D - #846	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF89B.1	MNAAHP Caja 8A, 11.3.D - #846	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF89B.2	MNAAHP Caja 8A, 11.3.D - #846	Yes	Yes, posterior maxillary teeth only	Yes, small amount	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF90	No skeleton present at MNAAHP for Contexto Funerario 90.	NA	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF91	MNAAHP Caja 02, 12.3.D - #1028 (Inventario 2008)	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF92	No skeleton present at MNAAHP for Contexto Funerario 92.	NA	NA	NA	NA

Provenience, Sector	Individual No.	Collection location	Cranium present?	Dentition present?	Hair present?	Postcrania present?
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF93	FARDO MNAAHP 13.4.A #1027 (F.R. -subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF94	FARDO MNAAHP 13.4.A #949 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF95	MNAAHP Caja 18A, 11.3.D - #s/c	Yes	Yes	Yes, some	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF96	#1037 (fardo falso)	NA	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF97	MNAAHP Caja 03 12.3.E - #888 (Inventario 2008)	Yes	Yes	Yes	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF98.1	MNAAHP Caja 01A, 11.1.D - #1026, Ind.1)	Yes	Yes	Yes, some	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF98.2	MNAAHP Caja 09, 11.1.D - #1026, Individuo 2	No	No	No	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF98.3	MNAAHP Caja 09, 11.1.D - #1026, Individuo subadulto	Yes, very incomplete	No	No	Yes, very incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF99	No skeleton present at MNAAHP for Contexto Funerario 99.	NA	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF102	MNAAHP Caja 123, 11.2.D - #1050	Yes	Yes	Yes, small amount	Yes, complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF103	MNAAHP Caja 14, Ubic. s/n - #1054	Yes	Yes	Yes	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF104	MNAAHP Caja 16B, 11.3.D - #1058	Yes	Yes	Yes, small amount	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-CF105	FARDO MNAAHP #1060 (F.R. - subadulto)	See MNAAHP inventory.	NA	NA	NA
Rinconada Alta, Sector IIA	RINC-D02.IIA-1046	MNAAHP Caja 123, Ubic. s/n - #1046	Yes	Yes	Yes	Yes, incomplete
Rinconada Alta, Sector IIA	RINC-D02.IIA-1048	MNAAHP Caja 122, Ubic s/n - #1048	Yes	Yes	Yes, small amount	Yes, nearly complete
Rinconada Alta, Sector IIA	RINC-D02.IIA-0506	MNAAHP Caja 59, 11.2.D - #506	Yes, fragmented	Yes, maxillary	No	No
Rinconada Alta, Sector IIA	RINC-D02.IIA-0732	MNAAHP Caja 59, 11.2.D - #732	Yes	No	No	No

APPENDIX B

OSTEOLOGICAL AGE AT DEATH AND SEX ESTIMATES FOR ALL INDIVIDUALS INCLUDED IN THE CURRENT STUDY

Site, Excavation Report (Sector)	Individual Number	Age Estimate	Sex Estimate
Armatambo, Díaz 2004a (Sector I)	ARMA-D04.I-CF09	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004a (Sector I)	ARMA-D04.I-CF10	Adolescent (15-19 years)	Female
Armatambo, Díaz 2004a (Sector I)	ARMA-D04.I-CF23	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004a (Sector I)	ARMA-D04.I-CF25B	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004a (Sector I)	ARMA-D04.I-CF29	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF003	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF005A	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF007A	Young Adult (20-34 years)	Probable Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF007B	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF008	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF010A	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF013	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF018	Adult	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF020	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF021B	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF021C	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF024.2	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF026D	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF027	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF028	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF030	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF031A	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF035	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF038	Adult	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF040A	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF044	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF051	Fetal (In utero)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF052	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF055B (#2931)	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF055A (#2949)	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF056.1	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF056.2	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF057	Middle Adult (35-49 years)	Female

Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF062	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF064A	Adult	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF065B	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF067	Adult	Probable Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF073A	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF073B	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF076	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF079	Middle Adult (35-49 years)	Probable Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF080	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF082A	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF082B	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF084	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF085A	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF085B.1	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF086	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF087	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF088	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF090	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF091	Fetal (In utero)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF092	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF093B	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF094	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF095	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF097	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF098	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF101B	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF103	Old Adult (50+ years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF105	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF106	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF108	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF109	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF110	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF111A	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF111B	Infant (Birth to 3.9 years)	Undetermined

Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF111C.1	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF111C.2	Fetal (In utero)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF112	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF113.1	Middle Adult (35-49 years)	Probable Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF114	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF115	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF117	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF118	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF119A	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF120	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF121	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF122	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF123	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF124	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF125	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF126	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF127	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF128A	Adolescent (15-19 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF128B	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF129	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF131	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF132	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF133	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF134	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF135	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF138	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF139	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF141	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF142	Adolescent (15-19 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF143	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF144A	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF144B	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF145	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF146	Young Adult (20-34 years)	Female

Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF147.1	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF147.2	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF148	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF149	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF150	Adolescent (15-19 years)	Probable Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF151	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF153 (#3634)	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF154	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF155 (#3638)	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF155.1 (#3649)	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF155.2 (#3649)	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF156A	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF156B	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF157 (#3528)	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF157 (#3706)	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF160	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF161	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF163	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF164	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF165	Young Adult (20-34 years)	Probable Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF166	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF167	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF168	Middle Adult (35-49 years)	Probable Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF169	Middle Adult (35-49 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF170	Old Adult (50+ years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF172A	Young Adult (20-34 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF172B	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF174	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF178	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF182	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF186	Middle Adult (35-49 years)	Female
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF187	Child (4-14 years)	Undetermined
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF188	Young Adult (20-34 years)	Male
Armatambo, Díaz 2004b (Sector II)	ARMA-D04.II-CF189	Middle Adult (35-49 years)	Female

Armatambo, Pérez 1997	ARMA-PER97-ENT08	Child (4-14 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT12	Child (4-14 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT24B.1	Young Adult (20-34 years)	Probable Male
Armatambo, Pérez 1997	ARMA-PER97-ENT27.1	Old Adult (50+ years)	Female
Armatambo, Pérez 1997	ARMA-PER97-ENT27.2	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT31.1	Middle Adult (35-49 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT33	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT34	Young Adult (20-34 years)	Female
Armatambo, Pérez 1997	ARMA-PER97-ENT35	Middle Adult (35-49 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT37	Young Adult (20-34 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT37A	Child (4-14 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT39	Middle Adult (35-49 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT40	Middle Adult (35-49 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT40A.1	Fetal (In utero)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT40A.2	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT42	Middle Adult (35-49 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT43	Middle Adult (35-49 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT43A	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT45	Old Adult (50+ years)	Female
Armatambo, Pérez 1997	ARMA-PER97-ENT45A	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT46	Young Adult (20-34 years)	Probable Female
Armatambo, Pérez 1997	ARMA-PER97-ENT47	Old Adult (50+ years)	Female
Armatambo, Pérez 1997	ARMA-PER97-ENT47A	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT49	Old Adult (50+ years)	Probable Female
Armatambo, Pérez 1997	ARMA-PER97-ENT49A	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT50	Middle Adult (35-49 years)	Female
Armatambo, Pérez 1997	ARMA-PER97-ENT55	Child (4-14 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT55A	Infant (Birth to 3.9 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT57	Child (4-14 years)	Undetermined
Armatambo, Pérez 1997	ARMA-PER97-ENT65	Young Adult (20-34 years)	Male
Armatambo, Pérez 1997	ARMA-PER97-ENT68	Middle Adult (35-49 years)	Female
Armatambo, Pérez 1997	ARMA-PER97-ENT74	Middle Adult (35-49 years)	Female
Armatambo, Pérez 1997	ARMA-PER97-ENT75A	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector I)	RINC-D02.I-CF01	Young Adult (20-34 years)	Male

Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF02	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF03	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF05	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF07	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF10	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF16	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF18	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF23	Child (4-14 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF25	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF26	Old Adult (50+ years)	Female
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF29	Middle Adult (35-49 years)	Female
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF31	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF32	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF33	Fetal (In utero)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF34	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF35	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF36	Adult	Male
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF37	Middle Adult (35-49 years)	Male
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF38A	Fetal (In utero)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF38B	Fetal (In utero)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF39	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF40	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF41	Fetal (In utero)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF42	Old Adult (50+ years)	Female
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF43	Adult	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF44	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF45	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF56	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF57	Middle Adult (35-49 years)	Probable Male
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF59	Middle Adult (35-49 years)	Male
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF63	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF64	Young Adult (20-34 years)	Male
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF65	Old Adult (50+ years)	Female
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF68	Infant (Birth to 3.9 years)	Undetermined

Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF72	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF73	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF75	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF76	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF77	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF79	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF81	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF82A	Young Adult (20-34 years)	Female
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF82B	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF83.1	Adult	Ambiguous
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF83.2	Adult	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF85	Fetal (In utero)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF87	Fetal (In utero)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF91	Old Adult (50+ years)	Female
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF93	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF95	Old Adult (50+ years)	Female
Rinconada Alta, Díaz 2002 (Sector IIA)	RINC-D02.IIA-CF97	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector I)	RINC-G9698.I-1135-1A	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector I)	RINC-G9698.I-1135-1B	Middle Adult (35-49 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector I)	RINC-G9698.I-1135-1C	Child (4-14 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector I)	RINC-G9698.I-1177	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector I)	RINC-G9698.I-1178	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0405	Fetal (In utero)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0434-ENT033	Child (4-14 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0442	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0446-ENT040	Child (4-14 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0463-ENT040	Middle Adult (35-49 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0477-ENT044	Child (4-14 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0560-ENT110	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0563-ENT053	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0565-ENT114	Adult	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0567-ENT116	Adult	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0569-ENT118	Middle Adult (35-49 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector II)	RINC-G9698.II-0580-ENT125	Middle Adult (35-49 years)	Probable Female

Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIA)	RINC-G9698.IIA-641-FAR134	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIA)	RINC-G9698.IIA-744	Adult	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1025	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1026-1	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1026-2	Middle Adult (35-49 years)	Probable Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1032	Middle Adult (35-49 years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1115-1	Child (4-14 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1119A	Young Adult (20-34 years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1119B	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1154	Middle Adult (35-49 years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1164	Old Adult (50+ years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1169	Adolescent (15-19 years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1176	Young Adult (20-34 years)	Probable Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1183	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1199	Old Adult (50+ years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1336	Child (4-14 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1337.2	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1387	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1388	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IIAE)	RINC-G9698.IIAE-1393	Middle Adult (35-49 years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector IV)	RINC-G9698.IV-0226	Adolescent (15-19 years)	Probable Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0496-ENT054	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0499-ENT057	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0504-ENT062	Adult	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0505-ENT063	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0508-ENT066	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0509-ENT067	Child (4-14 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0511-ENT069	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0512-ENT070	Young Adult (20-34 years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0517-ENT075	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0519-ENT077	Young Adult (20-34 years)	Male
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0520.1-ENT078	Old Adult (50+ years)	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0520.2-ENT078	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0521-ENT079	Middle Adult (35-49 years)	Female

Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0527-ENT083	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0533-ENT089	Infant (Birth to 3.9 years)	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0536-ENT092	Adult	Undetermined
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0542-ENT098	Adult	Female
Rinconada Alta, Guerrero et al. 1999, nd. (Sector V)	RINC-G9698.V-0543-ENT099	Infant (Birth to 3.9 years)	Undetermined

APPENDIX C

STABLE CARBON AND NITROGEN ISOTOPE DATA FOR ALL ARCHAEOLOGICAL HUMAN TISSUE SAMPLES

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4474	RIMAC-ARMA.M047	ARMA-D04.I-CF09	Tooth	First permanent molar	NA	NA	-3.6	NA	NA	NA
ACL-4475	RIMAC-ARMA.M048	ARMA-D04.I-CF09	Tooth	Third permanent molar	NA	NA	-3.3	NA	NA	NA
ACL-4476	RIMAC-ARMA.M049	ARMA-D04.I-CF09	Bone	Rib fragment	-10.4	16.6	-6.1	-4.3	NA	NA
ACL-4477	RIMAC-ARMA.M050	ARMA-D04.I-CF09	Hair	Bulk	NA	NA	NA	NA	-12.8	15.2
ACL-4478	RIMAC-ARMA.M051	ARMA-D04.I-CF25B	Tooth	First permanent molar	NA	NA	-5.3	NA	NA	NA
ACL-4479	RIMAC-ARMA.M052	ARMA-D04.I-CF25B	Tooth	Second permanent molar	NA	NA	-6.0	NA	NA	NA
ACL-4480	RIMAC-ARMA.M053	ARMA-D04.I-CF25B	Bone	Rib fragment	-13.2	14.9	-7.8	-5.4	NA	NA
ACL-4481	RIMAC-ARMA.M054	ARMA-D04.I-CF25B	Hair	Bulk	NA	NA	NA	NA	-16.6	14.5
ACL-4482	RIMAC-ARMA.M055	ARMA-D04.II-CF005A	Tooth	First permanent molar	NA	NA	-4.7	NA	NA	NA
ACL-4483	RIMAC-ARMA.M056	ARMA-D04.II-CF005A	Tooth	Third permanent molar	NA	NA	-5.1	NA	NA	NA
ACL-4484	RIMAC-ARMA.M057	ARMA-D04.II-CF005A	Bone	Rib fragment	-11.3	16.0	-6.8	-4.5	NA	NA
ACL-4485	RIMAC-ARMA.M058	ARMA-D04.II-CF005A	Hair	Bulk	NA	NA	NA	NA	-13.8	17.2
ACL-4486	RIMAC-ARMA.M059	ARMA-D04.II-CF007A	Tooth	First permanent molar	NA	NA	-6.5	NA	NA	NA
ACL-4487	RIMAC-ARMA.M060	ARMA-D04.II-CF007A	Tooth	Third permanent molar	NA	NA	-4.6	NA	NA	NA
ACL-4488	RIMAC-ARMA.M061	ARMA-D04.II-CF007A	Bone	Rib fragment	-11.1	11.6	-6.4	-4.8	NA	NA
ACL-4489	RIMAC-ARMA.M062	ARMA-D04.II-CF007A	Hair	Bulk	NA	NA	NA	NA	-12.2	12.9
ACL-4490	RIMAC-ARMA.M063	ARMA-D04.II-CF007B	Bone	Rib fragment	-13.1	14.8	-10.8	-2.3	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4491	RIMAC-ARMA.M064	ARMA-D04.II-CF007B	Hair	Bulk	NA	NA	NA	NA	-12.7	16.6
ACL-4492	RIMAC-ARMA.M065	ARMA-D04.II-CF013	Tooth	First permanent molar	NA	NA	-3.9	NA	NA	NA
ACL-4493	RIMAC-ARMA.M066	ARMA-D04.II-CF013	Tooth	Third permanent molar	NA	NA	-4.1	NA	NA	NA
ACL-4494	RIMAC-ARMA.M067	ARMA-D04.II-CF013	Bone	Rib fragment	-11.3	15.7	-8.2	-3.2	NA	NA
ACL-4495	RIMAC-ARMA.M068	ARMA-D04.II-CF013	Hair	Bulk	NA	NA	NA	NA	-14.5	16.6
ACL-4496	RIMAC-ARMA.M069	ARMA-D04.II-CF026D	Bone	Rib fragment	-9.8	16.4	-5.2	-4.6	NA	NA
ACL-4497	RIMAC-ARMA.M070	ARMA-D04.II-CF030	Tooth	First permanent molar	NA	NA	-3.6	NA	NA	NA
ACL-4498	RIMAC-ARMA.M071	ARMA-D04.II-CF030	Tooth	Third permanent molar	NA	NA	-4.6	NA	NA	NA
ACL-4499	RIMAC-ARMA.M072	ARMA-D04.II-CF030	Bone	Rib fragment	-9.4	14.8	-5.1	-4.3	NA	NA
ACL-4500	RIMAC-ARMA.M073	ARMA-D04.II-CF030	Hair	Bulk	NA	NA	NA	NA	-11.3	14.4
ACL-4501	RIMAC-ARMA.M074	ARMA-D04.II-CF031A	Tooth	First permanent molar	NA	NA	-5.6	NA	NA	NA
ACL-4502	RIMAC-ARMA.M075	ARMA-D04.II-CF031A	Tooth	Third permanent molar	NA	NA	-3.6	NA	NA	NA
ACL-4503	RIMAC-ARMA.M076	ARMA-D04.II-CF031A	Bone	Rib fragment	-10.2	15.7	-6.3	-3.9	NA	NA
ACL-4504	RIMAC-ARMA.M077	ARMA-D04.II-CF031A	Hair	Bulk	NA	NA	NA	NA	-12.9	16.6
ACL-4505	RIMAC-ARMA.M078	ARMA-D04.II-CF038	Bone	Rib fragment	-10.7	21.3	-6.8	-3.9	NA	NA
ACL-4506	RIMAC-ARMA.M079	ARMA-D04.II-CF040A	Bone	Rib fragment	-10.0	16.8	-5.5	-4.6	NA	NA
ACL-4507	RIMAC-ARMA.M080	ARMA-D04.II-CF052	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4508	RIMAC-ARMA.M081	ARMA-D04.II-CF052	Tooth	Second deciduous molar	NA	NA	-6.9	NA	NA	NA
ACL-4509	RIMAC-ARMA.M082	ARMA-D04.II-CF052	Tooth	First permanent molar	NA	NA	-6.5	NA	NA	NA
ACL-4510	RIMAC-ARMA.M083	ARMA-D04.II-CF052	Bone	Rib fragment	-11.6	14.1	-8.0	-3.6	NA	NA
ACL-4511	RIMAC-ARMA.M084	ARMA-D04.II-CF052	Hair	Bulk	NA	NA	NA	NA	-11.7	14.7
ACL-4512	RIMAC-ARMA.M085	ARMA-D04.II-CF055 (#2931)	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4513	RIMAC-ARMA.M086	ARMA-D04.II-CF055 (#2931)	Tooth	First deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4514	RIMAC-ARMA.M087	ARMA-D04.II-CF055 (#2931)	Bone	Rib fragment	-7.9	19.4	-7.0	-0.8	NA	NA
ACL-4515	RIMAC-ARMA.M088	ARMA-D04.II-CF055 (#2931)	Hair	Bulk	NA	NA	NA	NA	-9.4	17.3
ACL-4516	RIMAC-ARMA.M089	ARMA-D04.II-CF057	Tooth	First permanent molar	NA	NA	-5.6	NA	NA	NA
ACL-4517	RIMAC-ARMA.M090	ARMA-D04.II-CF057	Tooth	Third permanent molar	NA	NA	-4.0	NA	NA	NA
ACL-4518	RIMAC-ARMA.M091	ARMA-D04.II-CF057	Bone	Rib fragment	-11.1	16.0	-8.0	-3.1	NA	NA
ACL-4519	RIMAC-ARMA.M092	ARMA-D04.II-CF057	Hair	Bulk	NA	NA	NA	NA	-12.2	17.6
ACL-4520	RIMAC-ARMA.M093	ARMA-D04.II-CF062	Tooth	First permanent incisor	NA	NA	-6.5	NA	NA	NA
ACL-4521	RIMAC-ARMA.M094	ARMA-D04.II-CF062	Tooth	Second permanent premolar	NA	NA	-6.5	NA	NA	NA
ACL-4522	RIMAC-ARMA.M095	ARMA-D04.II-CF062	Bone	Rib fragment	-11.6	15.4	-8.2	-3.5	NA	NA
ACL-4523	RIMAC-ARMA.M096	ARMA-D04.II-CF062	Hair	Bulk	NA	NA	NA	NA	-11.7	15.1
ACL-4524	RIMAC-ARMA.M097	ARMA-D04.II-CF073B	Tooth	First permanent molar	NA	NA	-5.4	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4525	RIMAC-ARMA.M098	ARMA-D04.II-CF073B	Tooth	Third permanent molar	NA	NA	-6.1	NA	NA	NA
ACL-4526	RIMAC-ARMA.M099	ARMA-D04.II-CF073B	Bone	Rib fragment	-11.3	13.5	-7.8	-3.5	NA	NA
ACL-4527	RIMAC-ARMA.M100	ARMA-D04.II-CF073B	Hair	Bulk	NA	NA	NA	NA	-13.3	13.1
ACL-4528	RIMAC-ARMA.M101	ARMA-D04.II-CF080	Tooth	Second permanent incisor	NA	NA	-5.0	NA	NA	NA
ACL-4529	RIMAC-ARMA.M102	ARMA-D04.II-CF080	Tooth	Third permanent molar	NA	NA	-4.7	NA	NA	NA
ACL-4530	RIMAC-ARMA.M103	ARMA-D04.II-CF080	Bone	Rib fragment	-10.9	16.5	-7.3	-3.6	NA	NA
ACL-4531	RIMAC-ARMA.M104	ARMA-D04.II-CF080	Hair	Bulk	NA	NA	NA	NA	-13.3	15.6
ACL-4532	RIMAC-ARMA.M105	ARMA-D04.II-CF082B	Bone	Rib fragment	-10.9	18.6	-8.4	-2.5	NA	NA
ACL-4533	RIMAC-ARMA.M106	ARMA-D04.II-CF082B	Hair	Bulk	NA	NA	NA	NA	-12.3	18.8
ACL-4534	RIMAC-ARMA.M107	ARMA-D04.II-CF084	Tooth	Second deciduous molar	NA	NA	-7.1	NA	NA	NA
ACL-4535	RIMAC-ARMA.M108	ARMA-D04.II-CF084	Tooth	First permanent molar	NA	NA	-5.2	NA	NA	NA
ACL-4536	RIMAC-ARMA.M109	ARMA-D04.II-CF084	Bone	Rib fragment	-9.1	16.7	-5.1	-4.0	NA	NA
ACL-4537	RIMAC-ARMA.M110	ARMA-D04.II-CF084	Hair	Bulk	NA	NA	NA	NA	-12.5	15.1
ACL-4538	RIMAC-ARMA.M111	ARMA-D04.II-CF085A	Tooth	First permanent molar	NA	NA	-6.6	NA	NA	NA
ACL-4539	RIMAC-ARMA.M112	ARMA-D04.II-CF085A	Tooth	Third permanent molar	NA	NA	-5.1	NA	NA	NA
ACL-4540	RIMAC-ARMA.M113	ARMA-D04.II-CF085A	Bone	Rib fragment	-10.5	16.5	-7.6	-2.9	NA	NA
ACL-4541	RIMAC-ARMA.M114	ARMA-D04.II-CF085A	Hair	Bulk	NA	NA	NA	NA	-13.4	17.2

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4542	RIMAC-ARMA.M115	ARMA-D04.II-CF093B	Tooth	First permanent molar	NA	NA	-5.1	NA	NA	NA
ACL-4543	RIMAC-ARMA.M116	ARMA-D04.II-CF093B	Tooth	Second permanent premolar	NA	NA	-4.0	NA	NA	NA
ACL-4544	RIMAC-ARMA.M117	ARMA-D04.II-CF093B	Bone	Rib fragment	-11.2	13.7	-7.6	-3.5	NA	NA
ACL-4545	RIMAC-ARMA.M118	ARMA-D04.II-CF093B	Hair	Bulk	NA	NA	NA	NA	-12.1	12.9
ACL-4546	RIMAC-ARMA.M119	ARMA-D04.II-CF101B	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4547	RIMAC-ARMA.M120	ARMA-D04.II-CF101B	Tooth	First deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4548	RIMAC-ARMA.M121	ARMA-D04.II-CF101B	Bone	Rib fragment	-8.8	20.8	-6.5	-2.3	NA	NA
ACL-4549	RIMAC-ARMA.M122	ARMA-D04.II-CF101B	Hair	Bulk	NA	NA	NA	NA	-10.3	20.2
ACL-4550	RIMAC-ARMA.M123	ARMA-D04.II-CF103	Tooth	First permanent molar	NA	NA	-5.7	NA	NA	NA
ACL-4551	RIMAC-ARMA.M124	ARMA-D04.II-CF103	Tooth	Third permanent molar	NA	NA	-4.0	NA	NA	NA
ACL-4552	RIMAC-ARMA.M125	ARMA-D04.II-CF103	Bone	Rib fragment	-10.4	16.5	-7.3	-3.1	NA	NA
ACL-4553	RIMAC-ARMA.M126	ARMA-D04.II-CF103	Hair	Bulk	NA	NA	NA	NA	-14.9	18.7
ACL-4554	RIMAC-ARMA.M127	ARMA-D04.II-CF105	Tooth	First permanent molar	NA	NA	-5.7	NA	NA	NA
ACL-4555	RIMAC-ARMA.M128	ARMA-D04.II-CF105	Tooth	Second permanent molar	NA	NA	-4.2	NA	NA	NA
ACL-4556	RIMAC-ARMA.M129	ARMA-D04.II-CF105	Bone	Rib fragment	-10.4	17.5	-6.7	-3.7	NA	NA
ACL-4557	RIMAC-ARMA.M130	ARMA-D04.II-CF105	Hair	Bulk	NA	NA	NA	NA	-12.9	16.9
ACL-4558	RIMAC-ARMA.M131	ARMA-D04.II-CF110	Tooth	First permanent molar	NA	NA	-6.3	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4559	RIMAC-ARMA.M132	ARMA-D04.II-CF110	Tooth	Second deciduous molar	NA	NA	-6.2	NA	NA	NA
ACL-4560	RIMAC-ARMA.M133	ARMA-D04.II-CF110	Bone	Rib fragment	-11.2	16.7	-7.0	-4.3	NA	NA
ACL-4561	RIMAC-ARMA.M134	ARMA-D04.II-CF110	Hair	Bulk	NA	NA	NA	NA	-11.1	16.7
ACL-4562	RIMAC-ARMA.M135	ARMA-D04.II-CF111A	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4563	RIMAC-ARMA.M136	ARMA-D04.II-CF111A	Tooth	Second deciduous molar	NA	NA	-2.8	NA	NA	NA
ACL-4564	RIMAC-ARMA.M137	ARMA-D04.II-CF111A	Bone	Rib fragment	-9.0	18.8	-5.5	-3.5	NA	NA
ACL-4565	RIMAC-ARMA.M138	ARMA-D04.II-CF111A	Hair	Bulk	NA	NA	NA	NA	-11.2	18.4
ACL-4566	RIMAC-ARMA.M139	ARMA-D04.II-CF111B	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4567	RIMAC-ARMA.M140	ARMA-D04.II-CF111B	Bone	Rib fragment	-8.7	17.3	-5.5	-3.2	NA	NA
ACL-4568	RIMAC-ARMA.M141	ARMA-D04.II-CF111B	Hair	Bulk	NA	NA	NA	NA	-11.1	16.9
ACL-4569	RIMAC-ARMA.M142	ARMA-D04.II-CF111C.1	Tooth	First deciduous molar	NA	NA	-7.1	NA	NA	NA
ACL-4570	RIMAC-ARMA.M143	ARMA-D04.II-CF111C.1	Bone	Rib fragment	-9.6	21.0	-9.4	-0.2	NA	NA
ACL-4571	RIMAC-ARMA.M144	ARMA-D04.II-CF111C.1	Hair	Bulk	NA	NA	NA	NA	-12.7	20.2
ACL-4572	RIMAC-ARMA.M145	ARMA-D04.II-CF111C.2	Bone	Rib fragment	-9.1	18.7	-6.3	-2.7	NA	NA
ACL-4573	RIMAC-ARMA.M146	ARMA-D04.II-CF111C.2	Hair	Bulk	NA	NA	NA	NA	-12.5	20.1
ACL-4574	RIMAC-ARMA.M147	ARMA-D04.II-CF114	Tooth	Second permanent incisor	NA	NA	NA	NA	NA	NA
ACL-4575	RIMAC-ARMA.M148	ARMA-D04.II-CF114	Tooth	Second permanent premolar	NA	NA	-5.8	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4576	RIMAC-ARMA.M149	ARMA-D04.II-CF114	Bone	Rib fragment	-10.3	16.9	-6.3	-4.0	NA	NA
ACL-4577	RIMAC-ARMA.M150	ARMA-D04.II-CF114	Hair	Bulk	NA	NA	NA	NA	-12.7	16.7
ACL-4578	RIMAC-ARMA.M151	ARMA-D04.II-CF118	Tooth	First permanent molar	NA	NA	-5.6	NA	NA	NA
ACL-4579	RIMAC-ARMA.M152	ARMA-D04.II-CF118	Tooth	Third permanent molar	NA	NA	-5.2	NA	NA	NA
ACL-4580	RIMAC-ARMA.M153	ARMA-D04.II-CF118	Bone	Rib fragment	-10.6	15.5	-6.7	-4.0	NA	NA
ACL-4581	RIMAC-ARMA.M154	ARMA-D04.II-CF118	Hair	Bulk	NA	NA	NA	NA	-11.4	17.6
ACL-4582	RIMAC-ARMA.M155	ARMA-D04.II-CF119A	Tooth	First permanent molar	NA	NA	-5.2	NA	NA	NA
ACL-4583	RIMAC-ARMA.M156	ARMA-D04.II-CF119A	Tooth	Third permanent molar	NA	NA	-5.0	NA	NA	NA
ACL-4584	RIMAC-ARMA.M157	ARMA-D04.II-CF119A	Bone	Rib fragment	-11.5	15.8	-8.0	-3.5	NA	NA
ACL-4585	RIMAC-ARMA.M158	ARMA-D04.II-CF121	Tooth	First permanent molar	NA	NA	-6.7	NA	NA	NA
ACL-4586	RIMAC-ARMA.M159	ARMA-D04.II-CF121	Tooth	Third permanent molar	NA	NA	-6.2	NA	NA	NA
ACL-4587	RIMAC-ARMA.M160	ARMA-D04.II-CF121	Bone	Rib fragment	-10.6	16.8	-7.3	-3.3	NA	NA
ACL-4588	RIMAC-ARMA.M161	ARMA-D04.II-CF121	Hair	Bulk	NA	NA	NA	NA	-12.7	14.2
ACL-4589	RIMAC-ARMA.M162	ARMA-D04.II-CF122	Tooth	First permanent molar	NA	NA	-7.7	NA	NA	NA
ACL-4590	RIMAC-ARMA.M163	ARMA-D04.II-CF122	Tooth	Third permanent molar	NA	NA	-5.9	NA	NA	NA
ACL-4591	RIMAC-ARMA.M164	ARMA-D04.II-CF122	Bone	Rib fragment	-11.3	15.9	-8.2	-3.1	NA	NA
ACL-4592	RIMAC-ARMA.M165	ARMA-D04.II-CF122	Hair	Bulk	NA	NA	NA	NA	-12.2	17.9

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4593	RIMAC-ARMA.M166	ARMA-D04.II-CF125	Tooth	First permanent molar	NA	NA	-4.7	NA	NA	NA
ACL-4594	RIMAC-ARMA.M167	ARMA-D04.II-CF125	Tooth	Second permanent molar	NA	NA	-4.8	NA	NA	NA
ACL-4595	RIMAC-ARMA.M168	ARMA-D04.II-CF125	Bone	Rib fragment	-10.7	15.9	-7.5	-3.2	NA	NA
ACL-4596	RIMAC-ARMA.M169	ARMA-D04.II-CF125	Hair	Bulk	NA	NA	NA	NA	-12.2	16.7
ACL-4597	RIMAC-ARMA.M170	ARMA-D04.II-CF127	Tooth	First permanent molar	NA	NA	-4.9	NA	NA	NA
ACL-4598	RIMAC-ARMA.M171	ARMA-D04.II-CF127	Tooth	Third permanent molar	NA	NA	-5.4	NA	NA	NA
ACL-4599	RIMAC-ARMA.M172	ARMA-D04.II-CF127	Bone	Rib fragment	-10.2	16.3	-6.5	-3.7	NA	NA
ACL-4600	RIMAC-ARMA.M173	ARMA-D04.II-CF127	Hair	Bulk	NA	NA	NA	NA	-12.2	18.0
ACL-4601	RIMAC-ARMA.M174	ARMA-D04.II-CF129	Tooth	First permanent molar	NA	NA	-5.9	NA	NA	NA
ACL-4602	RIMAC-ARMA.M175	ARMA-D04.II-CF129	Tooth	Third permanent molar	NA	NA	-7.2	NA	NA	NA
ACL-4603	RIMAC-ARMA.M176	ARMA-D04.II-CF129	Bone	Rib fragment	-12.1	12.9	-8.6	-3.6	NA	NA
ACL-4604	RIMAC-ARMA.M177	ARMA-D04.II-CF129	Hair	Bulk	NA	NA	NA	NA	-13.3	15.5
ACL-4605	RIMAC-ARMA.M178	ARMA-D04.II-CF134	Tooth	Second permanent incisor	NA	NA	NA	NA	NA	NA
ACL-4606	RIMAC-ARMA.M179	ARMA-D04.II-CF134	Tooth	Third permanent molar	NA	NA	-5.7	NA	NA	NA
ACL-4607	RIMAC-ARMA.M180	ARMA-D04.II-CF134	Bone	Rib fragment	-11.1	15.3	-7.2	-3.9	NA	NA
ACL-4608	RIMAC-ARMA.M181	ARMA-D04.II-CF134	Hair	Bulk	NA	NA	NA	NA	-13.6	15.4
ACL-4609	RIMAC-ARMA.M182	ARMA-D04.II-CF135	Tooth	First permanent molar	NA	NA	-5.7	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4610	RIMAC-ARMA.M183	ARMA-D04.II-CF135	Tooth	Second permanent molar	NA	NA	-6.1	NA	NA	NA
ACL-4611	RIMAC-ARMA.M184	ARMA-D04.II-CF135	Bone	Rib fragment	-11.2	16.7	-7.3	-3.9	NA	NA
ACL-4612	RIMAC-ARMA.M185	ARMA-D04.II-CF135	Hair	Bulk	NA	NA	NA	NA	-12.2	15.7
ACL-4613	RIMAC-ARMA.M186	ARMA-D04.II-CF138	Tooth	Second deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4614	RIMAC-ARMA.M187	ARMA-D04.II-CF138	Tooth	Second deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4615	RIMAC-ARMA.M188	ARMA-D04.II-CF138	Bone	Rib fragment	-9.9	18.9	-7.8	-2.1	NA	NA
ACL-4616	RIMAC-ARMA.M189	ARMA-D04.II-CF138	Hair	Bulk	NA	NA	NA	NA	-11.2	18.0
ACL-4617	RIMAC-ARMA.M190	ARMA-D04.II-CF139	Tooth	First permanent molar	NA	NA	-8.0	NA	NA	NA
ACL-4618	RIMAC-ARMA.M191	ARMA-D04.II-CF139	Tooth	Second permanent molar	NA	NA	-4.1	NA	NA	NA
ACL-4619	RIMAC-ARMA.M192	ARMA-D04.II-CF139	Bone	Rib fragment	-11.2	15.5	-6.8	-4.4	NA	NA
ACL-4620	RIMAC-ARMA.M193	ARMA-D04.II-CF139	Hair	Bulk	NA	NA	NA	NA	-13.1	15.9
ACL-4621	RIMAC-ARMA.M194	ARMA-D04.II-CF141	Tooth	First permanent molar	NA	NA	-5.8	NA	NA	NA
ACL-4622	RIMAC-ARMA.M195	ARMA-D04.II-CF141	Tooth	Third permanent molar	NA	NA	-4.0	NA	NA	NA
ACL-4623	RIMAC-ARMA.M196	ARMA-D04.II-CF141	Bone	Rib fragment	-12.0	13.1	-7.9	-4.1	NA	NA
ACL-4624	RIMAC-ARMA.M197	ARMA-D04.II-CF141	Hair	Bulk	NA	NA	NA	NA	-12.8	16.5
ACL-4625	RIMAC-ARMA.M198	ARMA-D04.II-CF142	Tooth	First permanent molar	NA	NA	-6.3	NA	NA	NA
ACL-4626	RIMAC-ARMA.M199	ARMA-D04.II-CF142	Tooth	Third permanent molar	NA	NA	-5.8	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4627	RIMAC-ARMA.M200	ARMA-D04.II-CF142	Bone	Rib fragment	-11.2	15.7	-7.0	-4.2	NA	NA
ACL-4628	RIMAC-ARMA.M201	ARMA-D04.II-CF142	Hair	Bulk	NA	NA	NA	NA	-13.8	14.6
ACL-4629	RIMAC-ARMA.M202	ARMA-D04.II-CF144A	Tooth	First permanent molar	NA	NA	-6.0	NA	NA	NA
ACL-4630	RIMAC-ARMA.M203	ARMA-D04.II-CF144A	Tooth	Third permanent molar	NA	NA	-7.3	NA	NA	NA
ACL-4631	RIMAC-ARMA.M204	ARMA-D04.II-CF144A	Bone	Rib fragment	-12.1	16.0	-8.2	-3.9	NA	NA
ACL-4632	RIMAC-ARMA.M205	ARMA-D04.II-CF144B	Tooth	Second deciduous molar	NA	NA	-4.8	NA	NA	NA
ACL-4633	RIMAC-ARMA.M206	ARMA-D04.II-CF144B	Tooth	First permanent molar	NA	NA	-7.6	NA	NA	NA
ACL-4634	RIMAC-ARMA.M207	ARMA-D04.II-CF144B	Bone	Rib fragment	-10.3	16.2	-7.3	-3.0	NA	NA
ACL-4635	RIMAC-ARMA.M208	ARMA-D04.II-CF146	Tooth	First permanent molar	NA	NA	-6.3	NA	NA	NA
ACL-4636	RIMAC-ARMA.M209	ARMA-D04.II-CF146	Tooth	Third permanent molar	NA	NA	-4.5	NA	NA	NA
ACL-4637	RIMAC-ARMA.M210	ARMA-D04.II-CF146	Bone	Rib fragment	-10.5	12.6	-5.7	-4.8	NA	NA
ACL-4638	RIMAC-ARMA.M211	ARMA-D04.II-CF146	Hair	Bulk	NA	NA	NA	NA	-12.6	12.1
ACL-4639	RIMAC-ARMA.M212	ARMA-D04.II-CF150	Tooth	First permanent molar	NA	NA	-4.5	NA	NA	NA
ACL-4640	RIMAC-ARMA.M213	ARMA-D04.II-CF150	Tooth	Second permanent molar	NA	NA	-4.2	NA	NA	NA
ACL-4641	RIMAC-ARMA.M214	ARMA-D04.II-CF150	Bone	Rib fragment	-10.8	12.9	-6.1	-4.7	NA	NA
ACL-4642	RIMAC-ARMA.M215	ARMA-D04.II-CF150	Hair	Bulk	NA	NA	NA	NA	-11.6	12.4
ACL-4643	RIMAC-ARMA.M216	ARMA-D04.II-CF151	Tooth	First permanent molar	NA	NA	-5.1	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4644	RIMAC-ARMA.M217	ARMA-D04.II-CF151	Tooth	Third permanent molar	NA	NA	-5.6	NA	NA	NA
ACL-4645	RIMAC-ARMA.M218	ARMA-D04.II-CF151	Bone	Rib fragment	-11.5	14.3	-7.1	-4.4	NA	NA
ACL-4646	RIMAC-ARMA.M219	ARMA-D04.II-CF151	Hair	Bulk	NA	NA	NA	NA	-11.9	15.5
ACL-4647	RIMAC-ARMA.M220	ARMA-D04.II-CF154	Tooth	First permanent molar	NA	NA	-4.3	NA	NA	NA
ACL-4648	RIMAC-ARMA.M221	ARMA-D04.II-CF154	Tooth	Third permanent molar	NA	NA	-5.5	NA	NA	NA
ACL-4649	RIMAC-ARMA.M222	ARMA-D04.II-CF154	Bone	Rib fragment	-10.0	17.8	-6.0	-4.0	NA	NA
ACL-4650	RIMAC-ARMA.M223	ARMA-D04.II-CF157 (#3706)	Tooth	First permanent molar	NA	NA	-5.6	NA	NA	NA
ACL-4651	RIMAC-ARMA.M224	ARMA-D04.II-CF157 (#3706)	Tooth	Third permanent molar	NA	NA	-4.9	NA	NA	NA
ACL-4652	RIMAC-ARMA.M225	ARMA-D04.II-CF157 (#3706)	Bone	Rib fragment	-10.4	16.4	-6.1	-4.3	NA	NA
ACL-4653	RIMAC-ARMA.M226	ARMA-D04.II-CF157 (#3706)	Hair	Bulk	NA	NA	NA	NA	-12.6	17.3
ACL-4654	RIMAC-ARMA.M227	ARMA-D04.II-CF167	Tooth	First permanent molar	NA	NA	-5.7	NA	NA	NA
ACL-4655	RIMAC-ARMA.M228	ARMA-D04.II-CF167	Tooth	Third permanent molar	NA	NA	-4.2	NA	NA	NA
ACL-4656	RIMAC-ARMA.M229	ARMA-D04.II-CF167	Bone	Rib fragment	-10.3	14.1	-6.2	-4.1	NA	NA
ACL-4657	RIMAC-ARMA.M230	ARMA-D04.II-CF167	Hair	Bulk	NA	NA	NA	NA	-12.2	14.1
ACL-4658	RIMAC-ARMA.M231	ARMA-D04.II-CF172B	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4659	RIMAC-ARMA.M232	ARMA-D04.II-CF172B	Bone	Rib fragment	-12.2	16.1	-9.1	-3.0	NA	NA
ACL-4660	RIMAC-ARMA.M233	ARMA-D04.II-CF172B	Hair	Bulk	NA	NA	NA	NA	-13.7	16.0

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4661	RIMAC-ARMA.M234	ARMA-D04.II-CF182	Tooth	First permanent molar	NA	NA	-6.2	NA	NA	NA
ACL-4662	RIMAC-ARMA.M235	ARMA-D04.II-CF182	Tooth	Third permanent molar	NA	NA	-3.5	NA	NA	NA
ACL-4663	RIMAC-ARMA.M236	ARMA-D04.II-CF182	Bone	Rib fragment	-9.2	16.4	-4.4	-4.8	NA	NA
ACL-4664	RIMAC-ARMA.M237	ARMA-D04.II-CF182	Hair	Bulk	NA	NA	NA	NA	-11.6	14.5
ACL-4665	RIMAC-ARMA.M238	ARMA-D04.II-CF188	Tooth	First permanent molar	NA	NA	-6.0	NA	NA	NA
ACL-4666	RIMAC-ARMA.M239	ARMA-D04.II-CF188	Tooth	Third permanent molar	NA	NA	-4.1	NA	NA	NA
ACL-4667	RIMAC-ARMA.M240	ARMA-D04.II-CF188	Bone	Rib fragment	-10.0	13.3	-5.7	-4.4	NA	NA
ACL-4668	RIMAC-ARMA.M241	ARMA-D04.II-CF188	Hair	Bulk	NA	NA	NA	NA	-11.2	15.2
ACL-4428	RIMAC-ARMA.M001	ARMA-PER97-ENT12	Tooth	Second deciduous molar	NA	NA	-5.8	NA	NA	NA
ACL-4429	RIMAC-ARMA.M002	ARMA-PER97-ENT12	Tooth	First permanent molar	NA	NA	-5.2	NA	NA	NA
ACL-4430	RIMAC-ARMA.M003	ARMA-PER97-ENT12	Bone	Rib fragment	-12.2	13.5	-7.2	-4.9	NA	NA
ACL-4431	RIMAC-ARMA.M004	ARMA-PER97-ENT12	Hair	Bulk	NA	NA	NA	NA	-11.2	14.6
ACL-4432	RIMAC-ARMA.M005	ARMA-PER97-ENT33	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4433	RIMAC-ARMA.M006	ARMA-PER97-ENT33	Tooth	Second deciduous molar	NA	NA	-3.7	NA	NA	NA
ACL-4434	RIMAC-ARMA.M007	ARMA-PER97-ENT33	Bone	Rib fragment	-8.5	19.0	-5.9	-2.6	NA	NA
ACL-4435	RIMAC-ARMA.M008	ARMA-PER97-ENT35	Tooth	First permanent molar	NA	NA	-4.1	NA	NA	NA
ACL-4436	RIMAC-ARMA.M009	ARMA-PER97-ENT35	Tooth	Third permanent molar	NA	NA	-3.9	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4437	RIMAC-ARMA.M010	ARMA-PER97-ENT35	Bone	Rib fragment	-7.9	18.4	-3.8	-4.1	NA	NA
ACL-4438	RIMAC-ARMA.M011	ARMA-PER97-ENT35	Hair	Bulk	NA	NA	NA	NA	-9.2	17.2
ACL-4439	RIMAC-ARMA.M012	ARMA-PER97-ENT42	Tooth	Second permanent incisor	NA	NA	-4.3	NA	NA	NA
ACL-4440	RIMAC-ARMA.M013	ARMA-PER97-ENT42	Tooth	Third permanent molar	NA	NA	-3.8	NA	NA	NA
ACL-4441	RIMAC-ARMA.M014	ARMA-PER97-ENT42	Bone	Rib fragment	-10.0	17.2	-5.5	-4.4	NA	NA
ACL-4442	RIMAC-ARMA.M015	ARMA-PER97-ENT42	Hair	Bulk	NA	NA	NA	NA	-10.5	17.5
ACL-4443	RIMAC-ARMA.M016	ARMA-PER97-ENT43A	Tooth	First deciduous incisor	NA	NA	-5.5	NA	NA	NA
ACL-4444	RIMAC-ARMA.M017	ARMA-PER97-ENT43A	Tooth	Second deciduous molar	NA	NA	-4.5	NA	NA	NA
ACL-4445	RIMAC-ARMA.M018	ARMA-PER97-ENT43A	Bone	Rib fragment	-9.0	12.0	-5.1	-3.9	NA	NA
ACL-4446	RIMAC-ARMA.M019	ARMA-PER97-ENT43A	Hair	Bulk	NA	NA	NA	NA	-9.2	11.4
ACL-4447	RIMAC-ARMA.M020	ARMA-PER97-ENT45	Tooth	First permanent molar	NA	NA	-4.0	NA	NA	NA
ACL-4448	RIMAC-ARMA.M021	ARMA-PER97-ENT45	Tooth	Third permanent molar	NA	NA	-3.2	NA	NA	NA
ACL-4449	RIMAC-ARMA.M022	ARMA-PER97-ENT45	Bone	Rib fragment	-11.0	16.4	-7.4	-3.7	NA	NA
ACL-4450	RIMAC-ARMA.M023	ARMA-PER97-ENT45A	Tooth	Second deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4451	RIMAC-ARMA.M024	ARMA-PER97-ENT45A	Bone	Rib fragment	-9.6	18.6	-7.9	-1.7	NA	NA
ACL-4452	RIMAC-ARMA.M025	ARMA-PER97-ENT45A	Hair	Bulk	NA	NA	NA	NA	-11.2	18.0
ACL-4453	RIMAC-ARMA.M026	ARMA-PER97-ENT46	Tooth	First permanent molar	NA	NA	-5.5	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4454	RIMAC-ARMA.M027	ARMA-PER97-ENT46	Tooth	Third permanent molar	NA	NA	-5.5	NA	NA	NA
ACL-4455	RIMAC-ARMA.M028	ARMA-PER97-ENT46	Bone	Rib fragment	-10.1	16.9	-7.5	-2.6	NA	NA
ACL-4456	RIMAC-ARMA.M029	ARMA-PER97-ENT46	Hair	Bulk	NA	NA	NA	NA	-10.7	17.0
ACL-4457	RIMAC-ARMA.M030	ARMA-PER97-ENT49	Bone	Rib fragment	-10.4	18.0	-6.5	-3.9	NA	NA
ACL-4458	RIMAC-ARMA.M031	ARMA-PER97-ENT49	Hair	Bulk	NA	NA	NA	NA	-13.3	19.3
ACL-4459	RIMAC-ARMA.M032	ARMA-PER97-ENT57	Tooth	First permanent molar	NA	NA	-4.4	NA	NA	NA
ACL-4460	RIMAC-ARMA.M033	ARMA-PER97-ENT57	Tooth	Third permanent molar	NA	NA	-5.8	NA	NA	NA
ACL-4461	RIMAC-ARMA.M034	ARMA-PER97-ENT57	Bone	Rib fragment	-10.4	16.3	-7.4	-3.0	NA	NA
ACL-4462	RIMAC-ARMA.M035	ARMA-PER97-ENT57	Hair	Bulk	NA	NA	NA	NA	-12.0	16.5
ACL-4463	RIMAC-ARMA.M036	ARMA-PER97-ENT65	Tooth	First permanent molar	NA	NA	-5.8	NA	NA	NA
ACL-4464	RIMAC-ARMA.M037	ARMA-PER97-ENT65	Tooth	Third permanent molar	NA	NA	-4.8	NA	NA	NA
ACL-4465	RIMAC-ARMA.M038	ARMA-PER97-ENT65	Bone	Rib fragment	-11.8	12.4	-7.4	-4.5	NA	NA
ACL-4466	RIMAC-ARMA.M039	ARMA-PER97-ENT65	Hair	Bulk	NA	NA	NA	NA	-13.6	11.9
ACL-4467	RIMAC-ARMA.M040	ARMA-PER97-ENT68	Tooth	First permanent molar	NA	NA	-4.0	NA	NA	NA
ACL-4468	RIMAC-ARMA.M041	ARMA-PER97-ENT68	Tooth	Third permanent molar	NA	NA	-6.4	NA	NA	NA
ACL-4469	RIMAC-ARMA.M042	ARMA-PER97-ENT68	Bone	Rib fragment	-10.2	16.4	-7.2	-3.0	NA	NA
ACL-4470	RIMAC-ARMA.M043	ARMA-PER97-ENT68	Hair	Bulk	NA	NA	NA	NA	-14.3	15.5

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4471	RIMAC-ARMA.M044	ARMA-PER97-ENT75A	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4472	RIMAC-ARMA.M045	ARMA-PER97-ENT75A	Tooth	Second deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4473	RIMAC-ARMA.M046	ARMA-PER97-ENT75A	Bone	Rib fragment	-8.1	19.3	-5.5	-2.6	NA	NA
ACL-4669	RIMAC-RINC.M242	RINC-D02.I-CF01	Tooth	First permanent molar	NA	NA	-4.2	NA	NA	NA
ACL-4670	RIMAC-RINC.M243	RINC-D02.I-CF01	Tooth	Third permanent molar	NA	NA	-4.9	NA	NA	NA
ACL-4671	RIMAC-RINC.M244	RINC-D02.I-CF01	Bone	Rib fragment	-10.6	11.8	-6.3	-4.3	NA	NA
ACL-4672	RIMAC-RINC.M245	RINC-D02.I-CF01	Hair	Bulk	NA	NA	NA	NA	-12.2	11.8
ACL-4697	RIMAC-RINC.M270	RINC-D02.IIA-CF03	Tooth	Second deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4698	RIMAC-RINC.M271	RINC-D02.IIA-CF03	Tooth	First deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4699	RIMAC-RINC.M272	RINC-D02.IIA-CF03	Bone	Rib fragment	-12.1	14.3	-7.7	-4.3	NA	NA
ACL-4700	RIMAC-RINC.M273	RINC-D02.IIA-CF03	Hair	Bulk	NA	NA	NA	NA	-13.1	13.0
ACL-4701	RIMAC-RINC.M274	RINC-D02.IIA-CF05	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4702	RIMAC-RINC.M275	RINC-D02.IIA-CF05	Bone	Rib fragment	-8.4	14.6	-4.1	-4.4	NA	NA
ACL-4703	RIMAC-RINC.M276	RINC-D02.IIA-CF05	Hair	Bulk	NA	NA	NA	NA	-11.0	13.0
ACL-4704	RIMAC-RINC.M277	RINC-D02.IIA-CF07	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4705	RIMAC-RINC.M278	RINC-D02.IIA-CF07	Bone	Rib fragment	-7.2	17.7	-4.8	-2.4	NA	NA
ACL-4706	RIMAC-RINC.M279	RINC-D02.IIA-CF23	Tooth	First permanent molar	NA	NA	-4.4	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4707	RIMAC-RINC.M280	RINC-D02.IIA-CF23	Tooth	Second permanent molar	NA	NA	-3.0	NA	NA	NA
ACL-4708	RIMAC-RINC.M281	RINC-D02.IIA-CF23	Bone	Rib fragment	-10.3	13.4	-5.1	-5.2	NA	NA
ACL-4709	RIMAC-RINC.M282	RINC-D02.IIA-CF23	Hair	Bulk	NA	NA	NA	NA	-10.8	13.2
ACL-4710	RIMAC-RINC.M283	RINC-D02.IIA-CF25	Tooth	Second deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4711	RIMAC-RINC.M284	RINC-D02.IIA-CF25	Tooth	First deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4712	RIMAC-RINC.M285	RINC-D02.IIA-CF25	Bone	Rib fragment	-7.6	16.1	-4.4	-3.2	NA	NA
ACL-4713	RIMAC-RINC.M286	RINC-D02.IIA-CF25	Hair	Bulk	NA	NA	NA	NA	-8.9	15.5
ACL-4714	RIMAC-RINC.M287	RINC-D02.IIA-CF29	Tooth	First permanent molar	NA	NA	-5.3	NA	NA	NA
ACL-4715	RIMAC-RINC.M288	RINC-D02.IIA-CF29	Tooth	Second permanent molar	NA	NA	-5.8	NA	NA	NA
ACL-4716	RIMAC-RINC.M289	RINC-D02.IIA-CF29	Bone	Rib fragment	-10.6	12.2	-6.2	-4.4	NA	NA
ACL-4717	RIMAC-RINC.M290	RINC-D02.IIA-CF29	Hair	Bulk	NA	NA	NA	NA	-12.3	12.1
ACL-4718	RIMAC-RINC.M291	RINC-D02.IIA-CF31	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4719	RIMAC-RINC.M292	RINC-D02.IIA-CF31	Tooth	First deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4720	RIMAC-RINC.M293	RINC-D02.IIA-CF31	Bone	Rib fragment	-10.0	14.4	-8.4	-1.5	NA	NA
ACL-4721	RIMAC-RINC.M294	RINC-D02.IIA-CF31	Hair	Bulk	NA	NA	NA	NA	-11.1	13.8
ACL-4722	RIMAC-RINC.M295	RINC-D02.IIA-CF34	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4723	RIMAC-RINC.M296	RINC-D02.IIA-CF34	Tooth	First deciduous molar	NA	NA	-2.2	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4724	RIMAC-RINC.M297	RINC-D02.IIA-CF34	Bone	Rib fragment	-8.5	13.5	-5.3	-3.1	NA	NA
ACL-4725	RIMAC-RINC.M298	RINC-D02.IIA-CF34	Hair	Bulk	NA	NA	NA	NA	-9.8	12.7
ACL-4726	RIMAC-RINC.M299	RINC-D02.IIA-CF38A	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4727	RIMAC-RINC.M300	RINC-D02.IIA-CF38A	Bone	Rib fragment	-9.0	14.6	-4.7	-4.3	NA	NA
ACL-4728	RIMAC-RINC.M301	RINC-D02.IIA-CF38A	Hair	Bulk	NA	NA	NA	NA	-10.5	14.8
ACL-4729	RIMAC-RINC.M302	RINC-D02.IIA-CF41	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4730	RIMAC-RINC.M303	RINC-D02.IIA-CF41	Bone	Rib fragment	NA	NA	-8.6	NA	NA	NA
ACL-4731	RIMAC-RINC.M304	RINC-D02.IIA-CF45	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4732	RIMAC-RINC.M305	RINC-D02.IIA-CF45	Tooth	First deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4733	RIMAC-RINC.M306	RINC-D02.IIA-CF45	Bone	Rib fragment	-8.3	16.1	-5.6	-2.8	NA	NA
ACL-4734	RIMAC-RINC.M307	RINC-D02.IIA-CF45	Hair	Bulk	NA	NA	NA	NA	-8.5	15.8
ACL-4735	RIMAC-RINC.M308	RINC-D02.IIA-CF56	Bone	Rib fragment	-11.4	13.9	-6.8	-4.6	NA	NA
ACL-4736	RIMAC-RINC.M309	RINC-D02.IIA-CF57	Tooth	First permanent molar	NA	NA	-4.1	NA	NA	NA
ACL-4737	RIMAC-RINC.M310	RINC-D02.IIA-CF57	Tooth	Third permanent molar	NA	NA	-3.5	NA	NA	NA
ACL-4738	RIMAC-RINC.M311	RINC-D02.IIA-CF57	Bone	Rib fragment	-10.2	10.8	-5.4	-4.8	NA	NA
ACL-4739	RIMAC-RINC.M312	RINC-D02.IIA-CF57	Hair	Bulk	NA	NA	NA	NA	-13.7	10.0
ACL-4740	RIMAC-RINC.M313	RINC-D02.IIA-CF59	Tooth	First permanent molar	NA	NA	-5.2	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	**$\delta^{13}C_{col}$**	**$\delta^{15}N_{col}$**	**$\delta^{13}C_{ap}$**	$\Delta\delta^{13}C_{col\text{-}ap}$	**$\delta^{13}C_{ker}$**	**$\delta^{15}N_{ker}$**
ACL-4741	RIMAC-RINC.M314	RINC-D02.IIA-CF59	Tooth	Third permanent molar	NA	NA	-4.4	NA	NA	NA
ACL-4742	RIMAC-RINC.M315	RINC-D02.IIA-CF59	Bone	Rib fragment	-10.2	15.2	-6.6	-3.7	NA	NA
ACL-4743	RIMAC-RINC.M316	RINC-D02.IIA-CF59	Hair	Bulk	NA	NA	NA	NA	-12.3	12.2
ACL-4744	RIMAC-RINC.M317	RINC-D02.IIA-CF72	Bone	Rib fragment	-8.0	16.3	-5.9	-2.1	NA	NA
ACL-4745	RIMAC-RINC.M318	RINC-D02.IIA-CF76	Bone	Rib fragment	-11.9	15.6	-8.2	-3.7	NA	NA
ACL-4746	RIMAC-RINC.M319	RINC-D02.IIA-CF77	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4747	RIMAC-RINC.M320	RINC-D02.IIA-CF77	Tooth	Second deciduous molar	NA	NA	-5.8	NA	NA	NA
ACL-4748	RIMAC-RINC.M321	RINC-D02.IIA-CF77	Bone	Rib fragment	-9.7	14.9	-6.3	-3.4	NA	NA
ACL-4749	RIMAC-RINC.M322	RINC-D02.IIA-CF77	Hair	Bulk	NA	NA	NA	NA	-9.9	13.1
ACL-4750	RIMAC-RINC.M323	RINC-D02.IIA-CF79	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4751	RIMAC-RINC.M324	RINC-D02.IIA-CF79	Tooth	First deciduous molar	NA	NA	NA	NA	NA	NA
ACL-4752	RIMAC-RINC.M325	RINC-D02.IIA-CF79	Bone	Rib fragment	-9.7	16.6	-8.4	-1.4	NA	NA
ACL-4753	RIMAC-RINC.M326	RINC-D02.IIA-CF79	Hair	Bulk	NA	NA	NA	NA	-12.1	15.3
ACL-4754	RIMAC-RINC.M327	RINC-D02.IIA-CF82A	Tooth	First permanent molar	NA	NA	-3.3	NA	NA	NA
ACL-4755	RIMAC-RINC.M328	RINC-D02.IIA-CF82A	Tooth	Third permanent molar	NA	NA	-2.3	NA	NA	NA
ACL-4756	RIMAC-RINC.M329	RINC-D02.IIA-CF82A	Bone	Rib fragment	-8.3	13.2	-4.1	-4.2	NA	NA
ACL-4757	RIMAC-RINC.M330	RINC-D02.IIA-CF82A	Hair	Bulk	NA	NA	NA	NA	-10.0	12.4

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4758	RIMAC-RINC.M331	RINC-D02.IIA-CF87	Bone	Tibia fragment	-15.2	12.6	-12.6	-2.6	NA	NA
ACL-4759	RIMAC-RINC.M332	RINC-D02.IIA-CF91	Tooth	First permanent molar	NA	NA	-4.8	NA	NA	NA
ACL-4760	RIMAC-RINC.M333	RINC-D02.IIA-CF91	Tooth	Third permanent molar	NA	NA	-3.7	NA	NA	NA
ACL-4761	RIMAC-RINC.M334	RINC-D02.IIA-CF91	Bone	Rib fragment	-9.3	14.4	-5.5	-3.8	NA	NA
ACL-4762	RIMAC-RINC.M335	RINC-D02.IIA-CF91	Hair	Bulk	NA	NA	NA	NA	-10.6	13.1
ACL-4763	RIMAC-RINC.M336	RINC-D02.IIA-CF95	Tooth	First permanent molar	NA	NA	-4.4	NA	NA	NA
ACL-4764	RIMAC-RINC.M337	RINC-D02.IIA-CF95	Tooth	Second permanent molar	NA	NA	-5.0	NA	NA	NA
ACL-4765	RIMAC-RINC.M338	RINC-D02.IIA-CF95	Bone	Rib fragment	-11.8	13.8	-7.4	-4.4	NA	NA
ACL-4766	RIMAC-RINC.M339	RINC-D02.IIA-CF95	Hair	Bulk	NA	NA	NA	NA	-19.3	8.0
ACL-4767	RIMAC-RINC.M340	RINC-D02.IIA-CF97	Tooth	First permanent molar	NA	NA	-6.5	NA	NA	NA
ACL-4768	RIMAC-RINC.M341	RINC-D02.IIA-CF97	Tooth	Third permanent molar	NA	NA	-6.6	NA	NA	NA
ACL-4769	RIMAC-RINC.M342	RINC-D02.IIA-CF97	Bone	Rib fragment	-11.3	12.2	-6.9	-4.4	NA	NA
ACL-4770	RIMAC-RINC.M343	RINC-D02.IIA-CF97	Hair	Bulk	NA	NA	NA	NA	-13.7	11.9
ACL-4673	RIMAC-RINC.M246	RINC-G9698.I-1135-1A	Tooth	Second deciduous molar	NA	NA	-2.5	NA	NA	NA
ACL-4674	RIMAC-RINC.M247	RINC-G9698.I-1135-1A	Tooth	First permanent molar	NA	NA	-3.0	NA	NA	NA
ACL-4675	RIMAC-RINC.M248	RINC-G9698.I-1135-1A	Bone	Rib fragment	-8.7	14.4	-4.6	-4.1	NA	NA
ACL-4676	RIMAC-RINC.M249	RINC-G9698.I-1135-1A	Hair	Bulk	NA	NA	NA	NA	-9.8	13.1

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4677	RIMAC-RINC.M250	RINC-G9698.II-0434-ENT033	Tooth	First permanent molar	NA	NA	-3.4	NA	NA	NA
ACL-4678	RIMAC-RINC.M251	RINC-G9698.II-0434-ENT033	Tooth	Second permanent molar	NA	NA	-2.6	NA	NA	NA
ACL-4679	RIMAC-RINC.M252	RINC-G9698.II-0434-ENT033	Bone	Rib fragment	-8.4	11.8	-3.6	-4.8	NA	NA
ACL-4680	RIMAC-RINC.M253	RINC-G9698.II-0434-ENT033	Hair	Bulk	NA	NA	NA	NA	-9.4	11.3
ACL-4681	RIMAC-RINC.M254	RINC-G9698.II-0463-ENT040	Tooth	First permanent molar	NA	NA	-6.1	NA	NA	NA
ACL-4682	RIMAC-RINC.M255	RINC-G9698.II-0463-ENT040	Tooth	Third permanent molar	NA	NA	-7.4	NA	NA	NA
ACL-4683	RIMAC-RINC.M256	RINC-G9698.II-0463-ENT040	Bone	Rib fragment	-11.7	11.6	-6.8	-4.9	NA	NA
ACL-4684	RIMAC-RINC.M257	RINC-G9698.II-0463-ENT040	Hair	Bulk	NA	NA	NA	NA	-12.5	10.8
ACL-4685	RIMAC-RINC.M258	RINC-G9698.II-0560-ENT110	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4686	RIMAC-RINC.M259	RINC-G9698.II-0560-ENT110	Tooth	Second deciduous molar	NA	NA	-4.5	NA	NA	NA
ACL-4687	RIMAC-RINC.M260	RINC-G9698.II-0560-ENT110	Bone	Rib fragment	-10.0	13.5	-7.0	-3.1	NA	NA
ACL-4688	RIMAC-RINC.M261	RINC-G9698.II-0560-ENT110	Hair	Bulk	NA	NA	NA	NA	-12.9	10.3
ACL-4689	RIMAC-RINC.M262	RINC-G9698.II-0563-ENT53	Tooth	First permanent molar	NA	NA	-4.8	NA	NA	NA
ACL-4690	RIMAC-RINC.M263	RINC-G9698.II-0563-ENT53	Tooth	Third permanent molar	NA	NA	-5.4	NA	NA	NA
ACL-4691	RIMAC-RINC.M264	RINC-G9698.II-0563-ENT53	Bone	Rib fragment	-9.2	13.9	-5.3	-3.9	NA	NA
ACL-4692	RIMAC-RINC.M265	RINC-G9698.II-0563-ENT53	Hair	Bulk	NA	NA	NA	NA	-11.2	11.2
ACL-4693	RIMAC-RINC.M266	RINC-G9698.II-0567-ENT116	Tooth	First permanent molar	NA	NA	-6.0	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4694	RIMAC-RINC.M267	RINC-G9698.II-0567-ENT116	Tooth	Third permanent molar	NA	NA	-6.1	NA	NA	NA
ACL-4695	RIMAC-RINC.M268	RINC-G9698.II-0567-ENT116	Bone	Rib fragment	-11.6	11.6	-6.6	-5.0	NA	NA
ACL-4696	RIMAC-RINC.M269	RINC-G9698.II-0567-ENT116	Hair	Bulk	NA	NA	NA	NA	-11.2	11.5
ACL-4771	RIMAC-RINC.M344	RINC-G9698.IIAE-1026-2	Tooth	First permanent molar	NA	NA	-6.2	NA	NA	NA
ACL-4772	RIMAC-RINC.M345	RINC-G9698.IIAE-1026-2	Tooth	Third permanent molar	NA	NA	-4.6	NA	NA	NA
ACL-4773	RIMAC-RINC.M346	RINC-G9698.IIAE-1026-2	Bone	Rib fragment	-9.6	14.4	-5.7	-3.9	NA	NA
ACL-4774	RIMAC-RINC.M347	RINC-G9698.IIAE-1115-1	Tooth	First permanent molar	NA	NA	-6.1	NA	NA	NA
ACL-4775	RIMAC-RINC.M348	RINC-G9698.IIAE-1115-1	Tooth	Third permanent molar	NA	NA	-5.4	NA	NA	NA
ACL-4776	RIMAC-RINC.M349	RINC-G9698.IIAE-1115-1	Bone	Rib fragment	-11.7	10.8	-9.0	-2.6	NA	NA
ACL-4777	RIMAC-RINC.M350	RINC-G9698.IIAE-1119A	Tooth	First permanent molar	NA	NA	-4.7	NA	NA	NA
ACL-4778	RIMAC-RINC.M351	RINC-G9698.IIAE-1119A	Tooth	Third permanent molar	NA	NA	-3.7	NA	NA	NA
ACL-4779	RIMAC-RINC.M352	RINC-G9698.IIAE-1119A	Bone	Rib fragment	-11.0	16.3	-6.5	-4.5	NA	NA
ACL-4780	RIMAC-RINC.M353	RINC-G9698.IIAE-1119B	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4781	RIMAC-RINC.M354	RINC-G9698.IIAE-1119B	Bone	Rib fragment	-14.2	9.3	-12.6	-1.5	NA	NA
ACL-4782	RIMAC-RINC.M355	RINC-G9698.IIAE-1154	Tooth	First permanent molar	NA	NA	-6.3	NA	NA	NA
ACL-4783	RIMAC-RINC.M356	RINC-G9698.IIAE-1154	Tooth	Third permanent molar	NA	NA	-5.0	NA	NA	NA
ACL-4784	RIMAC-RINC.M357	RINC-G9698.IIAE-1154	Bone	Rib fragment	-10.7	14.0	-6.9	-3.9	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4785	RIMAC-RINC.M358	RINC-G9698.IIAE-1169	Tooth	First permanent molar	NA	NA	-6.8	NA	NA	NA
ACL-4786	RIMAC-RINC.M359	RINC-G9698.IIAE-1169	Tooth	Third permanent molar	NA	NA	-5.1	NA	NA	NA
ACL-4787	RIMAC-RINC.M360	RINC-G9698.IIAE-1169	Bone	Rib fragment	-11.1	12.4	-7.4	-3.7	NA	NA
ACL-4788	RIMAC-RINC.M361	RINC-G9698.IIAE-1169	Hair	Bulk	NA	NA	NA	NA	-13.4	10.4
ACL-4789	RIMAC-RINC.M362	RINC-G9698.IIAE-1183	Tooth	First permanent molar	NA	NA	-4.6	NA	NA	NA
ACL-4790	RIMAC-RINC.M363	RINC-G9698.IIAE-1183	Tooth	Third permanent molar	NA	NA	-2.7	NA	NA	NA
ACL-4791	RIMAC-RINC.M364	RINC-G9698.IIAE-1183	Bone	Rib fragment	-9.8	13.4	-6.3	-3.4	NA	NA
ACL-4792	RIMAC-RINC.M365	RINC-G9698.IIAE-1183	Hair	Bulk	NA	NA	NA	NA	-11.9	10.5
ACL-4793	RIMAC-RINC.M366	RINC-G9698.IIAE-1199	Tooth	First permanent premolar	NA	NA	-4.7	NA	NA	NA
ACL-4794	RIMAC-RINC.M367	RINC-G9698.IIAE-1199	Bone	Rib fragment	-11.8	13.4	-7.8	-4.1	NA	NA
ACL-4795	RIMAC-RINC.M368	RINC-G9698.IV-0226	Bone	Rib fragment	-12.2	11.6	-6.8	-5.4	NA	NA
ACL-4796	RIMAC-RINC.M369	RINC-G9698.IV-0226	Tooth	First permanent premolar	NA	NA	-7.4	NA	NA	NA
ACL-4797	RIMAC-RINC.M370	RINC-G9698.V-0496-ENT054	Bone	Rib fragment	-10.6	12.0	-5.6	-5.0	NA	NA
ACL-4798	RIMAC-RINC.M371	RINC-G9698.V-0496-ENT054	Hair	Bulk	NA	NA	NA	NA	-13.4	11.9
ACL-4799	RIMAC-RINC.M372	RINC-G9698.V-0499-ENT057	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4800	RIMAC-RINC.M373	RINC-G9698.V-0499-ENT057	Tooth	Second deciduous molar	NA	NA	-6.1	NA	NA	NA
ACL-4801	RIMAC-RINC.M374	RINC-G9698.V-0499-ENT057	Tooth	First permanent molar	NA	NA	-5.1	NA	NA	NA

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col\text{-}ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4802	RIMAC-RINC.M375	RINC-G9698.V-0499-ENT057	Bone	Rib fragment	-11.0	10.8	-6.5	-4.5	NA	NA
ACL-4803	RIMAC-RINC.M376	RINC-G9698.V-0499-ENT057	Hair	Bulk	NA	NA	NA	NA	-12.4	9.4
ACL-4804	RIMAC-RINC.M377	RINC-G9698.V-0509-ENT067	Tooth	First permanent molar	NA	NA	-5.5	NA	NA	NA
ACL-4805	RIMAC-RINC.M378	RINC-G9698.V-0509-ENT067	Tooth	Second permanent molar	NA	NA	-3.1	NA	NA	NA
ACL-4806	RIMAC-RINC.M379	RINC-G9698.V-0509-ENT067	Bone	Rib fragment	-9.0	12.9	-2.9	-6.0	NA	NA
ACL-4807	RIMAC-RINC.M380	RINC-G9698.V-0519-ENT077	Tooth	First permanent molar	NA	NA	-4.5	NA	NA	NA
ACL-4808	RIMAC-RINC.M381	RINC-G9698.V-0519-ENT077	Tooth	Third permanent molar	NA	NA	-4.7	NA	NA	NA
ACL-4809	RIMAC-RINC.M382	RINC-G9698.V-0519-ENT077	Bone	Rib fragment	-9.9	12.9	-6.0	-3.9	NA	NA
ACL-4810	RIMAC-RINC.M383	RINC-G9698.V-0519-ENT077	Hair	Bulk	NA	NA	NA	NA	-11.5	12.8
ACL-4811	RIMAC-RINC.M384	RINC-G9698.V-0520.1-ENT078	Tooth	First permanent molar	NA	NA	-3.2	NA	NA	NA
ACL-4812	RIMAC-RINC.M385	RINC-G9698.V-0520.1-ENT078	Tooth	Third permanent molar	NA	NA	-4.1	NA	NA	NA
ACL-4813	RIMAC-RINC.M386	RINC-G9698.V-0520.1-ENT078	Bone	Rib fragment	-9.2	15.6	-4.8	-4.4	NA	NA
ACL-4814	RIMAC-RINC.M387	RINC-G9698.V-0520.1-ENT078	Hair	Bulk	NA	NA	NA	NA	-11.1	16.8
ACL-4815	RIMAC-RINC.M388	RINC-G9698.V-0520.2-ENT078	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4816	RIMAC-RINC.M389	RINC-G9698.V-0520.2-ENT078	Tooth	Second deciduous molar	NA	NA	-3.1	NA	NA	NA
ACL-4817	RIMAC-RINC.M390	RINC-G9698.V-0520.2-ENT078	Bone	Rib fragment	-8.3	16.5	-5.4	-2.9	NA	NA
ACL-4818	RIMAC-RINC.M391	RINC-G9698.V-0520.2-ENT078	Hair	Bulk	NA	NA	NA	NA	-10.3	14.4

ACL Number	Specimen Number	Individual	Material	Sample	$\delta^{13}C_{col}$	$\delta^{15}N_{col}$	$\delta^{13}C_{ap}$	$\Delta\delta^{13}C_{col-ap}$	$\delta^{13}C_{ker}$	$\delta^{15}N_{ker}$
ACL-4819	RIMAC-RINC.M392	RINC-G9698.V-0521-ENT079	Bone	Rib fragment	-11.8	12.8	-7.8	-4.0	NA	NA
ACL-4820	RIMAC-RINC.M393	RINC-G9698.V-0543-ENT099	Tooth	First deciduous incisor	NA	NA	NA	NA	NA	NA
ACL-4821	RIMAC-RINC.M394	RINC-G9698.V-0543-ENT099	Tooth	First permanent molar	NA	NA	-4.3	NA	NA	NA
ACL-4822	RIMAC-RINC.M395	RINC-G9698.V-0543-ENT099	Bone	Rib fragment	-9.4	12.3	-4.9	-4.6	NA	NA
ACL-4823	RIMAC-RINC.M396	RINC-G9698.V-0543-ENT099	Hair	Bulk	NA	NA	NA	NA	-10.6	11.3

APPENDIX D

RADIOGENIC STRONTIUM ISOTOPE DATA FOR MODERN AGRICULTURAL SOILS AND *CAVIA PORCELLUS* BONE APATITE SAMPLES

Region (Site), Country	ACL Number	Specimen Number	Species	Material	$^{87}Sr/^{86}Sr$
Huarochirí (Huarochirí), Peru	ACL-2459	HUARO-HU003	NA	soil	0.70535
Huarochirí (San Jose de Chorrillos), Peru	ACL-2457	HUARO-CH003	NA	soil	0.70479
Huarochirí (San Jose de Chorrillos), Peru	ACL-2458	HUARO-CH004	NA	soil	0.70518
Huarochirí (San Lorenzo de Quinti), Peru	ACL-2460	HUARO-SL003	NA	soil	0.70576
Lurín Valley (Cieneguilla), Peru	ACL-2455	LURIN-CI004	NA	soil	0.70519
Lurín Valley (Cieneguilla), Peru	ACL-2456	LURIN-CI005	NA	soil	0.70653
Lurín Valley (Guayabo), Peru	ACL-3062	LURIN-GUA001	NA	soil	0.70594
Lurín Valley (Lurín), Peru	ACL-3054	LURIN-LUR001	NA	soil	0.70667
Lurín Valley (Lurín), Peru	ACL-3055	LURIN-LUR002	NA	soil	0.70607
Lurín Valley (Mamacona), Peru	ACL-3056	LURIN-MAM002	NA	soil	0.70716
Lurín Valley (Manchay Bajo), Peru	ACL-2452	LURIN-MA016	NA	soil	0.70542
Lurín Valley (Manchay Bajo), Peru	ACL-2454	LURIN-MA018	NA	soil	0.70591
Lurín Valley (Pachacamac), Peru	ACL-3057	LURIN-PAC001	NA	soil	0.70689
Lurín Valley (Playa Arica), Peru	ACL-3058	LURIN-ARI001	NA	soil	0.70802
Lurín Valley (Playa San Pedro), Peru	ACL-3059	LURIN-SNP001	NA	soil	0.70805
Lurín Valley (Playa San Pedro), Peru	ACL-3060	LURIN-SNP002	NA	soil	0.70782
Rimac Valley (Chaclacayo), Peru	ACL-3061	RIMAC-CHAC001	NA	soil	0.70712
Rimac Valley (Chaclacayo), Peru	ACL-3061	RIMAC-CHAC001	NA	soil	0.70706
Rimac Valley (Cupiche), Peru	ACL-3048	RIMAC-CUP002	NA	soil	0.70685
Rimac Valley (Cupiche), Peru	ACL-3049	RIMAC-CUP003	NA	soil	0.70707
Rimac Valley (Huachipa), Peru	ACL-3050	RIMAC-HUAC001	NA	soil	0.70696
Rimac Valley (Huachipa), Peru	ACL-3051	RIMAC-HUAC002	NA	soil	0.70705
Rimac Valley (Jicamarca), Peru	ACL-3052	RIMAC-JIC001	NA	soil	0.70687
Rimac Valley (San Mateo), Peru	ACL-3053	RIMAC-SNM002	NA	soil	0.70676
Huarochirí (San Lázaro de Escomarca), Peru	ACL-2450	HUARO-ES002	*Cavia porcellus*	bone	0.70481
Huarochirí (San Lázaro de Escomarca), Peru	ACL-2451	HUARO-ES003	*Cavia porcellus*	bone	0.70481

Region (Site), Country	ACL Number	Specimen Number	Species	Material	$^{87}Sr/^{86}Sr$
Huarochirí (San Lorenzo de Quinti), Peru	ACL-2448	HUARO-SL001	*Cavia porcellus*	bone	0.70626
Huarochirí (San Lorenzo de Quinti), Peru	ACL-2449	HUARO-SL002	*Cavia porcellus*	bone	0.70653
Lurín Valley (Antioquía), Peru	ACL-2446	LURIN-AN001	*Cavia porcellus*	bone	0.70516
Lurín Valley (Antioquía), Peru	ACL-2447	LURIN-AN002	*Cavia porcellus*	bone	0.70518
Lurín Valley (Cieneguilla), Peru	ACL-2444	LURIN-CI001	*Cavia porcellus*	bone	0.70592
Lurín Valley (Cieneguilla), Peru	ACL-2445	LURIN-CI002	*Cavia porcellus*	bone	0.70649
Lurín Valley (Manchay Bajo), Peru	ACL-2442	LURIN-MA007	*Cavia porcellus*	bone	0.70597
Lurín Valley (Manchay Bajo), Peru	ACL-2443	LURIN-MA008	*Cavia porcellus*	bone	0.70640
Rimac Valley (Cupiche), Peru	ACL-2974	RIMAC-CUP016	*Cavia porcellus*	bone	0.70662
Rimac Valley (Cupiche), Peru	ACL-2975	RIMAC-CUP017	*Cavia porcellus*	bone	0.70659
Rimac Valley (San Mateo), Peru	ACL-2976	RIMAC-SNM005	*Cavia porcellus*	bone	0.70667
Rimac Valley (San Mateo), Peru	ACL-2977	RIMAC-SNM006	*Cavia porcellus*	bone	0.70660
Rimac Valley (San Mateo), Peru	ACL-2978	RIMAC-SNM007	*Cavia porcellus*	bone	0.70658
Rimac Valley (San Mateo), Peru	ACL-2979	RIMAC-SNM008	*Cavia porcellus*	bone	0.70666

APPENDIX E

RADIOGENIC STRONTIUM AND STABLE OXYGEN ISOTOPE DATA FOR ARCHAEOLOGICAL HUMAN TOOTH ENAMEL AND BONE APATITE SAMPLES

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4428	RIMAC-ARMA.M001	ARMA-PER97-ENT12	Second deciduous molar	NA	-9.5	21.1
ACL-4429	RIMAC-ARMA.M002	ARMA-PER97-ENT12	First permanent molar	0.70774	-10.9	19.6
ACL-4430	RIMAC-ARMA.M003	ARMA-PER97-ENT12	Rib fragment	0.70737	-8.8	21.8
ACL-4432	RIMAC-ARMA.M005	ARMA-PER97-ENT33	First deciduous incisor	NA	NA	NA
ACL-4433	RIMAC-ARMA.M006	ARMA-PER97-ENT33	Second deciduous molar	NA	-8.5	22.1
ACL-4434	RIMAC-ARMA.M007	ARMA-PER97-ENT33	Rib fragment	0.70795	-8.0	22.7
ACL-4435	RIMAC-ARMA.M008	ARMA-PER97-ENT35	First permanent molar	0.70760	-8.8	21.9
ACL-4436	RIMAC-ARMA.M009	ARMA-PER97-ENT35	Third permanent molar	0.70754	-10.2	20.4
ACL-4437	RIMAC-ARMA.M010	ARMA-PER97-ENT35	Rib fragment	0.70735	-9.9	20.7
ACL-4439	RIMAC-ARMA.M012	ARMA-PER97-ENT42	Second permanent incisor	0.70796	-8.0	22.7
ACL-4440	RIMAC-ARMA.M013	ARMA-PER97-ENT42	Third permanent molar	0.70798	-8.5	22.2
ACL-4441	RIMAC-ARMA.M014	ARMA-PER97-ENT42	Rib fragment	0.70812	-7.8	22.9
ACL-4443	RIMAC-ARMA.M016	ARMA-PER97-ENT43A	First deciduous incisor	0.70764	-8.7	22.0
ACL-4444	RIMAC-ARMA.M017	ARMA-PER97-ENT43A	Second deciduous molar	0.70750	-8.2	22.4
ACL-4445	RIMAC-ARMA.M018	ARMA-PER97-ENT43A	Rib fragment	0.70777	-7.4	23.2
ACL-4447	RIMAC-ARMA.M020	ARMA-PER97-ENT45	First permanent molar	0.70727	-8.7	22.0
ACL-4448	RIMAC-ARMA.M021	ARMA-PER97-ENT45	Third permanent molar	0.70760	-9.5	21.1
ACL-4449	RIMAC-ARMA.M022	ARMA-PER97-ENT45	Rib fragment	0.70786	-8.9	21.7
ACL-4450	RIMAC-ARMA.M023	ARMA-PER97-ENT45A	Second deciduous molar	0.70790	NA	NA
ACL-4451	RIMAC-ARMA.M024	ARMA-PER97-ENT45A	Rib fragment	NA	-6.6	24.1
ACL-4453	RIMAC-ARMA.M026	ARMA-PER97-ENT46	First permanent molar	0.70790	-8.6	22.1
ACL-4454	RIMAC-ARMA.M027	ARMA-PER97-ENT46	Third permanent molar	0.70768	-9.3	21.3
ACL-4455	RIMAC-ARMA.M028	ARMA-PER97-ENT46	Rib fragment	0.70767	-8.9	21.7
ACL-4457	RIMAC-ARMA.M030	ARMA-PER97-ENT49	Rib fragment	0.70763	-8.5	22.1
ACL-4459	RIMAC-ARMA.M032	ARMA-PER97-ENT57	First permanent molar	0.70714	-8.7	21.9
ACL-4460	RIMAC-ARMA.M033	ARMA-PER97-ENT57	Third permanent molar	0.70742	-9.3	21.3
ACL-4461	RIMAC-ARMA.M034	ARMA-PER97-ENT57	Rib fragment	0.70820	-8.2	22.5
ACL-4463	RIMAC-ARMA.M036	ARMA-PER97-ENT65	First permanent molar	0.70739	-8.1	22.6
ACL-4464	RIMAC-ARMA.M037	ARMA-PER97-ENT65	Third permanent molar	0.70740	-9.0	21.6
ACL-4465	RIMAC-ARMA.M038	ARMA-PER97-ENT65	Rib fragment	0.70809	-8.7	21.9
ACL-4467	RIMAC-ARMA.M040	ARMA-PER97-ENT68	First permanent molar	0.70729	-8.8	21.9
ACL-4468	RIMAC-ARMA.M041	ARMA-PER97-ENT68	Third permanent molar	0.70734	-8.5	22.1

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4469	RIMAC-ARMA.M042	ARMA-PER97-ENT68	Rib fragment	0.70806	-9.2	21.4
ACL-4471	RIMAC-ARMA.M044	ARMA-PER97-ENT75A	First deciduous incisor	0.70730	NA	NA
ACL-4472	RIMAC-ARMA.M045	ARMA-PER97-ENT75A	Second deciduous molar	NA	NA	NA
ACL-4473	RIMAC-ARMA.M046	ARMA-PER97-ENT75A	Rib fragment	0.70755	-5.5	25.2
ACL-4474	RIMAC-ARMA.M047	ARMA-D04.I-CF09	First permanent molar	0.70776	-9.0	21.7
ACL-4475	RIMAC-ARMA.M048	ARMA-D04.I-CF09	Third permanent molar	NA	-9.4	21.3
ACL-4476	RIMAC-ARMA.M049	ARMA-D04.I-CF09	Rib fragment	0.70782	-8.6	22.0
ACL-4478	RIMAC-ARMA.M051	ARMA-D04.I-CF25B	First permanent molar	0.70770	-8.2	22.5
ACL-4479	RIMAC-ARMA.M052	ARMA-D04.I-CF25B	Second permanent molar	0.70758	-8.9	21.7
ACL-4480	RIMAC-ARMA.M053	ARMA-D04.I-CF25B	Rib fragment	0.70744	-8.4	22.3
ACL-4482	RIMAC-ARMA.M055	ARMA-D04.II-CF005A	First permanent molar	0.70731	-7.9	22.8
ACL-4483	RIMAC-ARMA.M056	ARMA-D04.II-CF005A	Third permanent molar	0.70700	-8.7	21.9
ACL-4484	RIMAC-ARMA.M057	ARMA-D04.II-CF005A	Rib fragment	0.70734	-9.4	21.2
ACL-4486	RIMAC-ARMA.M059	ARMA-D04.II-CF007A	First permanent molar	0.70721	-9.6	21.0
ACL-4487	RIMAC-ARMA.M060	ARMA-D04.II-CF007A	Third permanent molar	0.70732	-10.1	20.5
ACL-4488	RIMAC-ARMA.M061	ARMA-D04.II-CF007A	Rib fragment	0.70766	-8.7	21.9
ACL-4490	RIMAC-ARMA.M063	ARMA-D04.II-CF007B	Rib fragment	NA	-7.3	23.4
ACL-4492	RIMAC-ARMA.M065	ARMA-D04.II-CF013	First permanent molar	NA	-9.4	21.2
ACL-4493	RIMAC-ARMA.M066	ARMA-D04.II-CF013	Third permanent molar	NA	-10.2	20.4
ACL-4494	RIMAC-ARMA.M067	ARMA-D04.II-CF013	Rib fragment	0.70793	-9.0	21.6
ACL-4496	RIMAC-ARMA.M069	ARMA-D04.II-CF026D	Rib fragment	0.70781	-9.0	21.7
ACL-4497	RIMAC-ARMA.M070	ARMA-D04.II-CF030	First permanent molar	0.70719	-9.1	21.5
ACL-4498	RIMAC-ARMA.M071	ARMA-D04.II-CF030	Third permanent molar	0.70728	-9.3	21.4
ACL-4499	RIMAC-ARMA.M072	ARMA-D04.II-CF030	Rib fragment	0.70761	-9.1	21.5
ACL-4501	RIMAC-ARMA.M074	ARMA-D04.II-CF031A	First permanent molar	0.70694	-8.6	22.0
ACL-4502	RIMAC-ARMA.M075	ARMA-D04.II-CF031A	Third permanent molar	0.70745	-10.8	19.8
ACL-4503	RIMAC-ARMA.M076	ARMA-D04.II-CF031A	Rib fragment	0.70761	-9.0	21.6
ACL-4505	RIMAC-ARMA.M078	ARMA-D04.II-CF038	Rib fragment	0.70769	-9.8	20.8
ACL-4506	RIMAC-ARMA.M079	ARMA-D04.II-CF040A	Rib fragment	0.70749	-8.8	21.8
ACL-4507	RIMAC-ARMA.M080	ARMA-D04.II-CF052	First deciduous incisor	NA	NA	NA
ACL-4508	RIMAC-ARMA.M081	ARMA-D04.II-CF052	Second deciduous molar	NA	-7.8	22.9
ACL-4509	RIMAC-ARMA.M082	ARMA-D04.II-CF052	First permanent molar	0.70643	-8.7	21.9

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4510	RIMAC-ARMA.M083	ARMA-D04.II-CF052	Rib fragment	0.70691	-7.6	23.1
ACL-4512	RIMAC-ARMA.M085	ARMA-D04.II-CF055 (#2931)	First deciduous incisor	NA	NA	NA
ACL-4513	RIMAC-ARMA.M086	ARMA-D04.II-CF055 (#2931)	First deciduous molar	0.70780	NA	NA
ACL-4514	RIMAC-ARMA.M087	ARMA-D04.II-CF055 (#2931)	Rib fragment	0.70771	-7.7	23.0
ACL-4516	RIMAC-ARMA.M089	ARMA-D04.II-CF057	First permanent molar	0.70695	-7.7	22.9
ACL-4517	RIMAC-ARMA.M090	ARMA-D04.II-CF057	Third permanent molar	0.70748	-8.4	22.3
ACL-4518	RIMAC-ARMA.M091	ARMA-D04.II-CF057	Rib fragment	0.70753	-7.3	23.4
ACL-4520	RIMAC-ARMA.M093	ARMA-D04.II-CF062	First permanent incisor	0.70759	-8.5	22.2
ACL-4521	RIMAC-ARMA.M094	ARMA-D04.II-CF062	Second permanent premolar	0.70772	-9.4	21.3
ACL-4522	RIMAC-ARMA.M095	ARMA-D04.II-CF062	Rib fragment	0.70760	-8.3	22.3
ACL-4524	RIMAC-ARMA.M097	ARMA-D04.II-CF073B	First permanent molar	0.70722	-8.0	22.7
ACL-4525	RIMAC-ARMA.M098	ARMA-D04.II-CF073B	Third permanent molar	0.70764	-8.6	22.0
ACL-4526	RIMAC-ARMA.M099	ARMA-D04.II-CF073B	Rib fragment	0.70752	-8.8	21.8
ACL-4528	RIMAC-ARMA.M101	ARMA-D04.II-CF080	Second permanent incisor	0.70744	-8.7	22.0
ACL-4529	RIMAC-ARMA.M102	ARMA-D04.II-CF080	Third permanent molar	0.70732	-9.1	21.5
ACL-4530	RIMAC-ARMA.M103	ARMA-D04.II-CF080	Rib fragment	0.70760	-6.5	24.2
ACL-4532	RIMAC-ARMA.M105	ARMA-D04.II-CF082B	Rib fragment	0.70775	-6.9	23.8
ACL-4534	RIMAC-ARMA.M107	ARMA-D04.II-CF084	Second deciduous molar	0.70728	-7.9	22.8
ACL-4535	RIMAC-ARMA.M108	ARMA-D04.II-CF084	First permanent molar	0.70739	-8.2	22.5
ACL-4536	RIMAC-ARMA.M109	ARMA-D04.II-CF084	Rib fragment	0.70717	-6.7	24.0
ACL-4538	RIMAC-ARMA.M111	ARMA-D04.II-CF085A	First permanent molar	0.70713	-9.2	21.5
ACL-4539	RIMAC-ARMA.M112	ARMA-D04.II-CF085A	Third permanent molar	0.70737	-10.3	20.3
ACL-4540	RIMAC-ARMA.M113	ARMA-D04.II-CF085A	Rib fragment	0.70732	-9.4	21.2
ACL-4542	RIMAC-ARMA.M115	ARMA-D04.II-CF093B	First permanent molar	0.70736	-9.2	21.5
ACL-4543	RIMAC-ARMA.M116	ARMA-D04.II-CF093B	Second permanent premolar	0.70754	-9.6	21.1
ACL-4544	RIMAC-ARMA.M117	ARMA-D04.II-CF093B	Rib fragment	0.70759	-8.8	21.9
ACL-4546	RIMAC-ARMA.M119	ARMA-D04.II-CF101B	First deciduous incisor	NA	NA	NA
ACL-4547	RIMAC-ARMA.M120	ARMA-D04.II-CF101B	First deciduous molar	NA	NA	NA
ACL-4548	RIMAC-ARMA.M121	ARMA-D04.II-CF101B	Rib fragment	0.70780	-7.4	23.2
ACL-4550	RIMAC-ARMA.M123	ARMA-D04.II-CF103	First permanent molar	0.70750	-9.4	21.2
ACL-4551	RIMAC-ARMA.M124	ARMA-D04.II-CF103	Third permanent molar	0.70729	-9.6	21.0
ACL-4552	RIMAC-ARMA.M125	ARMA-D04.II-CF103	Rib fragment	0.70741	-9.8	20.8

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4554	RIMAC-ARMA.M127	ARMA-D04.II-CF105	First permanent molar	0.70705	-8.9	21.8
ACL-4555	RIMAC-ARMA.M128	ARMA-D04.II-CF105	Second permanent molar	0.70747	-10.0	20.6
ACL-4556	RIMAC-ARMA.M129	ARMA-D04.II-CF105	Rib fragment	0.70751	-8.5	22.2
ACL-4558	RIMAC-ARMA.M131	ARMA-D04.II-CF110	First permanent molar	0.70740	-9.7	20.9
ACL-4559	RIMAC-ARMA.M132	ARMA-D04.II-CF110	Second deciduous molar	0.70710	-8.7	22.0
ACL-4560	RIMAC-ARMA.M133	ARMA-D04.II-CF110	Rib fragment	0.70783	-9.1	21.5
ACL-4562	RIMAC-ARMA.M135	ARMA-D04.II-CF111A	First deciduous incisor	NA	NA	NA
ACL-4563	RIMAC-ARMA.M136	ARMA-D04.II-CF111A	Second deciduous molar	0.70794	-8.3	22.3
ACL-4564	RIMAC-ARMA.M137	ARMA-D04.II-CF111A	Rib fragment	0.70784	-6.8	23.9
ACL-4566	RIMAC-ARMA.M139	ARMA-D04.II-CF111B	First deciduous incisor	NA	NA	NA
ACL-4567	RIMAC-ARMA.M140	ARMA-D04.II-CF111B	Rib fragment	NA	-4.5	26.3
ACL-4569	RIMAC-ARMA.M142	ARMA-D04.II-CF111C.1	First deciduous molar	0.70746	-8.3	22.4
ACL-4570	RIMAC-ARMA.M143	ARMA-D04.II-CF111C.1	Rib fragment	0.70796	-5.8	24.9
ACL-4572	RIMAC-ARMA.M145	ARMA-D04.II-CF111C.2	Rib fragment	0.70810	-8.6	22.1
ACL-4574	RIMAC-ARMA.M147	ARMA-D04.II-CF114	Second permanent incisor	NA	NA	NA
ACL-4575	RIMAC-ARMA.M148	ARMA-D04.II-CF114	Second permanent premolar	0.70756	-9.5	21.2
ACL-4576	RIMAC-ARMA.M149	ARMA-D04.II-CF114	Rib fragment	0.70752	-8.5	22.1
ACL-4578	RIMAC-ARMA.M151	ARMA-D04.II-CF118	First permanent molar	0.70726	-8.8	21.8
ACL-4579	RIMAC-ARMA.M152	ARMA-D04.II-CF118	Third permanent molar	0.70767	-10.2	20.4
ACL-4580	RIMAC-ARMA.M153	ARMA-D04.II-CF118	Rib fragment	0.70788	-10.4	20.2
ACL-4582	RIMAC-ARMA.M155	ARMA-D04.II-CF119A	First permanent molar	0.70756	-9.6	21.0
ACL-4583	RIMAC-ARMA.M156	ARMA-D04.II-CF119A	Third permanent molar	0.70728	-9.4	21.2
ACL-4584	RIMAC-ARMA.M157	ARMA-D04.II-CF119A	Rib fragment	0.70807	-9.7	20.9
ACL-4585	RIMAC-ARMA.M158	ARMA-D04.II-CF121	First permanent molar	0.70689	-8.0	22.7
ACL-4586	RIMAC-ARMA.M159	ARMA-D04.II-CF121	Third permanent molar	0.70713	-9.8	20.8
ACL-4587	RIMAC-ARMA.M160	ARMA-D04.II-CF121	Rib fragment	0.70761	-10.0	20.6
ACL-4589	RIMAC-ARMA.M162	ARMA-D04.II-CF122	First permanent molar	0.70749	-9.5	21.1
ACL-4590	RIMAC-ARMA.M163	ARMA-D04.II-CF122	Third permanent molar	0.70745	-9.2	21.4
ACL-4591	RIMAC-ARMA.M164	ARMA-D04.II-CF122	Rib fragment	0.70740	-9.3	21.3
ACL-4593	RIMAC-ARMA.M166	ARMA-D04.II-CF125	First permanent molar	0.70826	-8.0	22.6
ACL-4594	RIMAC-ARMA.M167	ARMA-D04.II-CF125	Second permanent molar	0.70824	-9.6	21.0
ACL-4595	RIMAC-ARMA.M168	ARMA-D04.II-CF125	Rib fragment	0.70805	-10.8	19.7

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4597	RIMAC-ARMA.M170	ARMA-D04.II-CF127	First permanent molar	0.70753	-9.3	21.3
ACL-4598	RIMAC-ARMA.M171	ARMA-D04.II-CF127	Third permanent molar	0.70755	-10.2	20.4
ACL-4599	RIMAC-ARMA.M172	ARMA-D04.II-CF127	Rib fragment	0.70760	-9.9	20.7
ACL-4601	RIMAC-ARMA.M174	ARMA-D04.II-CF129	First permanent molar	0.70737	-9.1	21.6
ACL-4602	RIMAC-ARMA.M175	ARMA-D04.II-CF129	Third permanent molar	0.70764	-10.2	20.4
ACL-4603	RIMAC-ARMA.M176	ARMA-D04.II-CF129	Rib fragment	0.70764	-9.4	21.2
ACL-4605	RIMAC-ARMA.M178	ARMA-D04.II-CF134	Second permanent incisor	0.70732	NA	NA
ACL-4606	RIMAC-ARMA.M179	ARMA-D04.II-CF134	Third permanent molar	0.70731	-10.2	20.4
ACL-4607	RIMAC-ARMA.M180	ARMA-D04.II-CF134	Rib fragment	0.70732	-10.8	19.7
ACL-4609	RIMAC-ARMA.M182	ARMA-D04.II-CF135	First permanent molar	0.70718	-8.9	21.8
ACL-4610	RIMAC-ARMA.M183	ARMA-D04.II-CF135	Second permanent molar	0.70762	-9.2	21.4
ACL-4611	RIMAC-ARMA.M184	ARMA-D04.II-CF135	Rib fragment	0.70733	-7.9	22.8
ACL-4613	RIMAC-ARMA.M186	ARMA-D04.II-CF138	Second deciduous incisor	NA	NA	NA
ACL-4614	RIMAC-ARMA.M187	ARMA-D04.II-CF138	Second deciduous molar	0.70741	NA	NA
ACL-4615	RIMAC-ARMA.M188	ARMA-D04.II-CF138	Rib fragment	0.70804	-7.6	23.1
ACL-4617	RIMAC-ARMA.M190	ARMA-D04.II-CF139	First permanent molar	0.70742	-9.2	21.4
ACL-4618	RIMAC-ARMA.M191	ARMA-D04.II-CF139	Second permanent molar	0.70728	-9.0	21.6
ACL-4619	RIMAC-ARMA.M192	ARMA-D04.II-CF139	Rib fragment	0.70750	-8.1	22.6
ACL-4621	RIMAC-ARMA.M194	ARMA-D04.II-CF141	First permanent molar	0.70742	-9.4	21.2
ACL-4622	RIMAC-ARMA.M195	ARMA-D04.II-CF141	Third permanent molar	0.70752	-10.4	20.2
ACL-4623	RIMAC-ARMA.M196	ARMA-D04.II-CF141	Rib fragment	0.70744	-6.7	24.1
ACL-4625	RIMAC-ARMA.M198	ARMA-D04.II-CF142	First permanent molar	0.70740	-9.6	21.0
ACL-4626	RIMAC-ARMA.M199	ARMA-D04.II-CF142	Third permanent molar	0.70755	-10.0	20.6
ACL-4627	RIMAC-ARMA.M200	ARMA-D04.II-CF142	Rib fragment	0.70804	-9.0	21.6
ACL-4629	RIMAC-ARMA.M202	ARMA-D04.II-CF144A	First permanent molar	0.70741	-9.5	21.1
ACL-4630	RIMAC-ARMA.M203	ARMA-D04.II-CF144A	Third permanent molar	0.70735	-9.1	21.5
ACL-4631	RIMAC-ARMA.M204	ARMA-D04.II-CF144A	Rib fragment	0.70735	-9.0	21.6
ACL-4632	RIMAC-ARMA.M205	ARMA-D04.II-CF144B	Second deciduous molar	0.70728	-8.7	22.0
ACL-4633	RIMAC-ARMA.M206	ARMA-D04.II-CF144B	First permanent molar	0.70720	-9.2	21.5
ACL-4634	RIMAC-ARMA.M207	ARMA-D04.II-CF144B	Rib fragment	0.70756	-5.7	25.0
ACL-4635	RIMAC-ARMA.M208	ARMA-D04.II-CF146	First permanent molar	0.70740	-9.5	21.1
ACL-4636	RIMAC-ARMA.M209	ARMA-D04.II-CF146	Third permanent molar	0.70723	-10.2	20.4

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4637	RIMAC-ARMA.M210	ARMA-D04.II-CF146	Rib fragment	0.70803	-7.9	22.7
ACL-4639	RIMAC-ARMA.M212	ARMA-D04.II-CF150	First permanent molar	0.70741	-10.0	20.6
ACL-4640	RIMAC-ARMA.M213	ARMA-D04.II-CF150	Second permanent molar	0.70744	-10.1	20.5
ACL-4641	RIMAC-ARMA.M214	ARMA-D04.II-CF150	Rib fragment	0.70781	-6.9	23.8
ACL-4643	RIMAC-ARMA.M216	ARMA-D04.II-CF151	First permanent molar	0.70768	-9.3	21.3
ACL-4644	RIMAC-ARMA.M217	ARMA-D04.II-CF151	Third permanent molar	0.70738	-10.1	20.5
ACL-4645	RIMAC-ARMA.M218	ARMA-D04.II-CF151	Rib fragment	0.70762	-7.8	22.9
ACL-4647	RIMAC-ARMA.M220	ARMA-D04.II-CF154	First permanent molar	0.70768	-9.0	21.6
ACL-4648	RIMAC-ARMA.M221	ARMA-D04.II-CF154	Third permanent molar	0.70726	-10.6	20.0
ACL-4649	RIMAC-ARMA.M222	ARMA-D04.II-CF154	Rib fragment	0.70792	-8.0	22.7
ACL-4650	RIMAC-ARMA.M223	ARMA-D04.II-CF157 (#3706)	First permanent molar	0.70760	-10.0	20.6
ACL-4651	RIMAC-ARMA.M224	ARMA-D04.II-CF157 (#3706)	Third permanent molar	0.70754	-10.3	20.3
ACL-4652	RIMAC-ARMA.M225	ARMA-D04.II-CF157 (#3706)	Rib fragment	0.70765	-9.2	21.4
ACL-4654	RIMAC-ARMA.M227	ARMA-D04.II-CF167	First permanent molar	0.70714	-9.4	21.2
ACL-4655	RIMAC-ARMA.M228	ARMA-D04.II-CF167	Third permanent molar	0.70740	-8.8	21.9
ACL-4656	RIMAC-ARMA.M229	ARMA-D04.II-CF167	Rib fragment	0.70779	-7.2	23.4
ACL-4658	RIMAC-ARMA.M231	ARMA-D04.II-CF172B	First deciduous incisor	NA	NA	NA
ACL-4659	RIMAC-ARMA.M232	ARMA-D04.II-CF172B	Rib fragment	0.70813	-5.4	25.3
ACL-4661	RIMAC-ARMA.M234	ARMA-D04.II-CF182	First permanent molar	0.70747	-9.0	21.6
ACL-4662	RIMAC-ARMA.M235	ARMA-D04.II-CF182	Third permanent molar	0.70776	-9.6	21.0
ACL-4663	RIMAC-ARMA.M236	ARMA-D04.II-CF182	Rib fragment	0.70771	-6.3	24.4
ACL-4665	RIMAC-ARMA.M238	ARMA-D04.II-CF188	First permanent molar	0.70745	-8.8	21.9
ACL-4666	RIMAC-ARMA.M239	ARMA-D04.II-CF188	Third permanent molar	0.70750	-9.9	20.7
ACL-4667	RIMAC-ARMA.M240	ARMA-D04.II-CF188	Rib fragment	0.70735	-8.0	22.7
ACL-4669	RIMAC-RINC.M242	RINC-D02.I-CF01	First permanent molar	0.70728	-8.8	21.9
ACL-4670	RIMAC-RINC.M243	RINC-D02.I-CF01	Third permanent molar	0.70703	-9.5	21.2
ACL-4671	RIMAC-RINC.M244	RINC-D02.I-CF01	Rib fragment	0.70709	-9.1	21.5
ACL-4673	RIMAC-RINC.M246	RINC-G9698.I-1135-1A	Second deciduous molar	0.70704	-8.9	21.8
ACL-4674	RIMAC-RINC.M247	RINC-G9698.I-1135-1A	First permanent molar	0.70728	-9.3	21.3
ACL-4675	RIMAC-RINC.M248	RINC-G9698.I-1135-1A	Rib fragment	0.70708	-8.6	22.0
ACL-4677	RIMAC-RINC.M250	RINC-G9698.II-0434-ENT033	First permanent molar	0.70783	-8.7	22.0
ACL-4678	RIMAC-RINC.M251	RINC-G9698.II-0434-ENT033	Second permanent molar	0.70805	-9.4	21.3

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4679	RIMAC-RINC.M252	RINC-G9698.II-0434-ENT033	Rib fragment	0.70729	-6.9	23.8
ACL-4681	RIMAC-RINC.M254	RINC-G9698.II-0463-ENT040	First permanent molar	0.70713	-9.7	20.9
ACL-4682	RIMAC-RINC.M255	RINC-G9698.II-0463-ENT040	Third permanent molar	0.70716	-9.9	20.7
ACL-4683	RIMAC-RINC.M256	RINC-G9698.II-0463-ENT040	Rib fragment	0.70724	-9.1	21.6
ACL-4685	RIMAC-RINC.M258	RINC-G9698.II-0560-ENT110	First deciduous incisor	NA	NA	NA
ACL-4686	RIMAC-RINC.M259	RINC-G9698.II-0560-ENT110	Second deciduous molar	0.70713	-8.6	22.0
ACL-4687	RIMAC-RINC.M260	RINC-G9698.II-0560-ENT110	Rib fragment	0.70704	-6.2	24.5
ACL-4689	RIMAC-RINC.M262	RINC-G9698.II-0563-ENT53	First permanent molar	0.70715	-9.0	21.6
ACL-4690	RIMAC-RINC.M263	RINC-G9698.II-0563-ENT53	Third permanent molar	0.70759	-8.7	21.9
ACL-4691	RIMAC-RINC.M264	RINC-G9698.II-0563-ENT53	Rib fragment	0.70758	-8.7	21.9
ACL-4693	RIMAC-RINC.M266	RINC-G9698.II-0567-ENT116	First permanent molar	0.70727	-9.5	21.1
ACL-4694	RIMAC-RINC.M267	RINC-G9698.II-0567-ENT116	Third permanent molar	0.71314	-9.8	20.8
ACL-4695	RIMAC-RINC.M268	RINC-G9698.II-0567-ENT116	Rib fragment	0.70728	-5.5	25.2
ACL-4697	RIMAC-RINC.M270	RINC-D02.IIA-CF03	Second deciduous incisor	NA	NA	NA
ACL-4698	RIMAC-RINC.M271	RINC-D02.IIA-CF03	First deciduous molar	0.70744	NA	NA
ACL-4699	RIMAC-RINC.M272	RINC-D02.IIA-CF03	Rib fragment	0.70705	-5.7	25.0
ACL-4701	RIMAC-RINC.M274	RINC-D02.IIA-CF05	First deciduous incisor	NA	NA	NA
ACL-4702	RIMAC-RINC.M275	RINC-D02.IIA-CF05	Rib fragment	0.70746	-7.3	23.3
ACL-4704	RIMAC-RINC.M277	RINC-D02.IIA-CF07	First deciduous incisor	0.70744	NA	NA
ACL-4705	RIMAC-RINC.M278	RINC-D02.IIA-CF07	Rib fragment	0.70730	-7.3	23.3
ACL-4706	RIMAC-RINC.M279	RINC-D02.IIA-CF23	First permanent molar	0.70736	-9.7	20.9
ACL-4707	RIMAC-RINC.M280	RINC-D02.IIA-CF23	Second permanent molar	0.70735	-10.0	20.6
ACL-4708	RIMAC-RINC.M281	RINC-D02.IIA-CF23	Rib fragment	0.70747	-7.9	22.8
ACL-4710	RIMAC-RINC.M283	RINC-D02.IIA-CF25	Second deciduous incisor	NA	NA	NA
ACL-4711	RIMAC-RINC.M284	RINC-D02.IIA-CF25	First deciduous molar	NA	NA	NA
ACL-4712	RIMAC-RINC.M285	RINC-D02.IIA-CF25	Rib fragment	0.70728	-6.8	23.9
ACL-4714	RIMAC-RINC.M287	RINC-D02.IIA-CF29	First permanent molar	0.70710	-9.7	20.9
ACL-4715	RIMAC-RINC.M288	RINC-D02.IIA-CF29	Second permanent molar	0.70705	-10.0	20.6
ACL-4716	RIMAC-RINC.M289	RINC-D02.IIA-CF29	Rib fragment	0.70736	-9.4	21.2
ACL-4718	RIMAC-RINC.M291	RINC-D02.IIA-CF31	First deciduous incisor	NA	NA	NA
ACL-4719	RIMAC-RINC.M292	RINC-D02.IIA-CF31	First deciduous molar	NA	NA	NA
ACL-4720	RIMAC-RINC.M293	RINC-D02.IIA-CF31	Rib fragment	0.70747	-8.4	22.3

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4722	RIMAC-RINC.M295	RINC-D02.IIA-CF34	First deciduous incisor	0.70733	NA	NA
ACL-4723	RIMAC-RINC.M296	RINC-D02.IIA-CF34	First deciduous molar	0.70731	-8.9	21.7
ACL-4724	RIMAC-RINC.M297	RINC-D02.IIA-CF34	Rib fragment	0.70733	-5.7	25.0
ACL-4726	RIMAC-RINC.M299	RINC-D02.IIA-CF38A	First deciduous incisor	NA	NA	NA
ACL-4727	RIMAC-RINC.M300	RINC-D02.IIA-CF38A	Rib fragment	0.70766	-9.1	21.5
ACL-4729	RIMAC-RINC.M302	RINC-D02.IIA-CF41	First deciduous incisor	NA	NA	NA
ACL-4730	RIMAC-RINC.M303	RINC-D02.IIA-CF41	Rib fragment	NA	-10.5	20.1
ACL-4731	RIMAC-RINC.M304	RINC-D02.IIA-CF45	First deciduous incisor	0.70751	NA	NA
ACL-4732	RIMAC-RINC.M305	RINC-D02.IIA-CF45	First deciduous molar	0.70749	NA	NA
ACL-4733	RIMAC-RINC.M306	RINC-D02.IIA-CF45	Rib fragment	0.70722	-5.2	25.5
ACL-4735	RIMAC-RINC.M308	RINC-D02.IIA-CF56	Rib fragment	0.70736	-7.2	23.5
ACL-4736	RIMAC-RINC.M309	RINC-D02.IIA-CF57	First permanent molar	0.70719	-9.7	21.0
ACL-4737	RIMAC-RINC.M310	RINC-D02.IIA-CF57	Third permanent molar	0.70733	-10.7	19.9
ACL-4738	RIMAC-RINC.M311	RINC-D02.IIA-CF57	Rib fragment	0.70722	-9.2	21.4
ACL-4740	RIMAC-RINC.M313	RINC-D02.IIA-CF59	First permanent molar	0.70719	-9.9	20.7
ACL-4741	RIMAC-RINC.M314	RINC-D02.IIA-CF59	Third permanent molar	0.70737	-10.0	20.6
ACL-4742	RIMAC-RINC.M315	RINC-D02.IIA-CF59	Rib fragment	0.70739	-9.1	21.5
ACL-4744	RIMAC-RINC.M317	RINC-D02.IIA-CF72	Rib fragment	0.70777	-6.8	23.9
ACL-4745	RIMAC-RINC.M318	RINC-D02.IIA-CF76	Rib fragment	0.70767	-8.0	22.7
ACL-4746	RIMAC-RINC.M319	RINC-D02.IIA-CF77	First deciduous incisor	0.70718	NA	NA
ACL-4747	RIMAC-RINC.M320	RINC-D02.IIA-CF77	Second deciduous molar	0.70713	-8.4	22.2
ACL-4748	RIMAC-RINC.M321	RINC-D02.IIA-CF77	Rib fragment	0.70721	-4.9	25.8
ACL-4750	RIMAC-RINC.M323	RINC-D02.IIA-CF79	First deciduous incisor	0.70752	NA	NA
ACL-4751	RIMAC-RINC.M324	RINC-D02.IIA-CF79	First deciduous molar	0.70752	NA	NA
ACL-4752	RIMAC-RINC.M325	RINC-D02.IIA-CF79	Rib fragment	0.70751	-6.9	23.8
ACL-4754	RIMAC-RINC.M327	RINC-D02.IIA-CF82A	First permanent molar	0.70763	-9.0	21.6
ACL-4755	RIMAC-RINC.M328	RINC-D02.IIA-CF82A	Third permanent molar	0.70781	-11.0	19.6
ACL-4756	RIMAC-RINC.M329	RINC-D02.IIA-CF82A	Rib fragment	0.70744	-8.3	22.3
ACL-4758	RIMAC-RINC.M331	RINC-D02.IIA-CF87	Tibia fragment	0.70738	-8.5	22.2
ACL-4759	RIMAC-RINC.M332	RINC-D02.IIA-CF91	First permanent molar	0.70741	-9.7	20.9
ACL-4760	RIMAC-RINC.M333	RINC-D02.IIA-CF91	Third permanent molar	0.70739	-10.2	20.4
ACL-4761	RIMAC-RINC.M334	RINC-D02.IIA-CF91	Rib fragment	0.70750	-9.7	20.9

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4763	RIMAC-RINC.M336	RINC-D02.IIA-CF95	First permanent molar	0.70758	-11.0	19.6
ACL-4764	RIMAC-RINC.M337	RINC-D02.IIA-CF95	Second permanent molar	0.70758	-10.6	20.0
ACL-4765	RIMAC-RINC.M338	RINC-D02.IIA-CF95	Rib fragment	0.70741	-8.9	21.8
ACL-4767	RIMAC-RINC.M340	RINC-D02.IIA-CF97	First permanent molar	0.70715	-8.5	22.2
ACL-4768	RIMAC-RINC.M341	RINC-D02.IIA-CF97	Third permanent molar	0.70705	-9.5	21.2
ACL-4769	RIMAC-RINC.M342	RINC-D02.IIA-CF97	Rib fragment	0.70715	-9.7	20.9
ACL-4771	RIMAC-RINC.M344	RINC-G9698.IIAE-1026-2	First permanent molar	0.70726	-10.8	19.8
ACL-4772	RIMAC-RINC.M345	RINC-G9698.IIAE-1026-2	Third permanent molar	0.70732	-10.3	20.3
ACL-4773	RIMAC-RINC.M346	RINC-G9698.IIAE-1026-2	Rib fragment	0.70719	-8.3	22.3
ACL-4774	RIMAC-RINC.M347	RINC-G9698.IIAE-1115-1	First permanent molar	0.70902	-4.9	25.9
ACL-4775	RIMAC-RINC.M348	RINC-G9698.IIAE-1115-1	Third permanent molar	0.70901	-4.9	25.9
ACL-4776	RIMAC-RINC.M349	RINC-G9698.IIAE-1115-1	Rib fragment	0.70758	-5.3	25.4
ACL-4777	RIMAC-RINC.M350	RINC-G9698.IIAE-1119A	First permanent molar	0.70753	-9.9	20.7
ACL-4778	RIMAC-RINC.M351	RINC-G9698.IIAE-1119A	Third permanent molar	0.70791	-9.7	20.9
ACL-4779	RIMAC-RINC.M352	RINC-G9698.IIAE-1119A	Rib fragment	0.70751	-9.5	21.1
ACL-4780	RIMAC-RINC.M353	RINC-G9698.IIAE-1119B	First deciduous incisor	NA	NA	NA
ACL-4781	RIMAC-RINC.M354	RINC-G9698.IIAE-1119B	Rib fragment	0.70731	-7.1	23.5
ACL-4782	RIMAC-RINC.M355	RINC-G9698.IIAE-1154	First permanent molar	0.70771	-9.0	21.6
ACL-4783	RIMAC-RINC.M356	RINC-G9698.IIAE-1154	Third permanent molar	0.70758	-9.1	21.5
ACL-4784	RIMAC-RINC.M357	RINC-G9698.IIAE-1154	Rib fragment	0.70731	-10.0	20.6
ACL-4785	RIMAC-RINC.M358	RINC-G9698.IIAE-1169	First permanent molar	0.70719	-8.8	21.8
ACL-4786	RIMAC-RINC.M359	RINC-G9698.IIAE-1169	Third permanent molar	0.70737	-9.4	21.2
ACL-4787	RIMAC-RINC.M360	RINC-G9698.IIAE-1169	Rib fragment	0.70730	-9.9	20.7
ACL-4789	RIMAC-RINC.M362	RINC-G9698.IIAE-1183	First permanent molar	0.70751	-8.8	21.8
ACL-4790	RIMAC-RINC.M363	RINC-G9698.IIAE-1183	Third permanent molar	0.70729	-10.5	20.1
ACL-4791	RIMAC-RINC.M364	RINC-G9698.IIAE-1183	Rib fragment	0.70731	-9.4	21.2
ACL-4793	RIMAC-RINC.M366	RINC-G9698.IIAE-1199	First permanent premolar	0.70742	-11.6	19.0
ACL-4794	RIMAC-RINC.M367	RINC-G9698.IIAE-1199	Rib fragment	0.70755	-10.6	20.0
ACL-4795	RIMAC-RINC.M368	RINC-G9698.IV-0226	Rib fragment	0.70719	-8.9	21.8
ACL-4796	RIMAC-RINC.M369	RINC-G9698.IV-0226	First permanent premolar	0.70666	-9.9	20.7
ACL-4797	RIMAC-RINC.M370	RINC-G9698.V-0496-ENT054	Rib fragment	0.70717	-9.4	21.2
ACL-4799	RIMAC-RINC.M372	RINC-G9698.V-0499-ENT057	First deciduous incisor	0.70725	NA	NA

ACL	Specimen Number	Individual	Sample	$^{87}Sr/^{86}Sr$	$\delta^{18}O_c$ (VDPB)	$\delta^{18}O_c$ (V-SMOW)
ACL-4800	RIMAC-RINC.M373	RINC-G9698.V-0499-ENT057	Second deciduous molar	0.70718	-8.8	21.9
ACL-4801	RIMAC-RINC.M374	RINC-G9698.V-0499-ENT057	First permanent molar	0.70724	-9.2	21.4
ACL-4802	RIMAC-RINC.M375	RINC-G9698.V-0499-ENT057	Rib fragment	0.70732	-6.6	24.1
ACL-4804	RIMAC-RINC.M377	RINC-G9698.V-0509-ENT067	First permanent molar	0.70726	-9.7	20.9
ACL-4805	RIMAC-RINC.M378	RINC-G9698.V-0509-ENT067	Second permanent molar	0.70725	-9.9	20.7
ACL-4806	RIMAC-RINC.M379	RINC-G9698.V-0509-ENT067	Rib fragment	0.70742	-7.5	23.2
ACL-4807	RIMAC-RINC.M380	RINC-G9698.V-0519-ENT077	First permanent molar	0.70740	-10.1	20.5
ACL-4808	RIMAC-RINC.M381	RINC-G9698.V-0519-ENT077	Third permanent molar	0.70744	-10.5	20.1
ACL-4809	RIMAC-RINC.M382	RINC-G9698.V-0519-ENT077	Rib fragment	0.70730	-10.4	20.2
ACL-4811	RIMAC-RINC.M384	RINC-G9698.V-0520.1-ENT078	First permanent molar	0.70753	-9.7	20.9
ACL-4812	RIMAC-RINC.M385	RINC-G9698.V-0520.1-ENT078	Third permanent molar	0.70764	-10.5	20.0
ACL-4813	RIMAC-RINC.M386	RINC-G9698.V-0520.1-ENT078	Rib fragment	0.70733	-10.6	20.0
ACL-4815	RIMAC-RINC.M388	RINC-G9698.V-0520.2-ENT078	First deciduous incisor	0.70784	NA	NA
ACL-4816	RIMAC-RINC.M389	RINC-G9698.V-0520.2-ENT078	Second deciduous molar	0.70748	-8.4	22.3
ACL-4817	RIMAC-RINC.M390	RINC-G9698.V-0520.2-ENT078	Rib fragment	0.70733	-8.2	22.4
ACL-4819	RIMAC-RINC.M392	RINC-G9698.V-0521-ENT079	Rib fragment	0.70780	-10.9	19.7
ACL-4820	RIMAC-RINC.M393	RINC-G9698.V-0543-ENT099	First deciduous incisor	0.70761	NA	NA
ACL-4821	RIMAC-RINC.M394	RINC-G9698.V-0543-ENT099	First permanent molar	0.70730	-9.3	21.3
ACL-4822	RIMAC-RINC.M395	RINC-G9698.V-0543-ENT099	Rib fragment	0.70749	-9.7	20.9

APPENDIX F

STABLE OXYGEN ISOTOPE DATA FOR WATER SAMPLES FROM THE STUDY REGION

Region (Area), Country	**Laboratory Number**	**Specimen Number**	**Material**	**$\delta^{18}O_{mw}$ (V-SMOW) (‰)**
Huarochirí (Huarochirí), Peru	ACL-2467	HUARO-HU002	water (canal)	-13.0
Huarochirí (San Lázaro de Escomarca), Peru	ACL-2466	HUARO-ES001	water (river)	-12.0
Huarochirí (San Lorenzo de Quinti), Peru	ACL-2468	HUARO-SL014	water (river)	-11.7
Lurín Valley (Antioquía), Peru	ACL-2465	LURIN-AN003	water (river)	-12.0
Lurín Valley (Cieneguilla), Peru	ACL-2463	LURIN-CI003	water (river)	-11.9
Lurín Valley (Guayabo), Peru	ACL-2980	LURIN-GUA002	water (canal)	-12.3
Lurín Valley (Guayabo), Peru	ACL-2981	LURIN-GUA003	water (well)	-12.3
Lurín Valley (Mamacona), Peru	ACL-2982	LURIN-MAM001	water (river)	-13.3
Lurín Valley (Manchay Bajo), Peru	ACL-2461	LURIN-MA005	water (canal)	-12.1
Lurín Valley (Manchay Bajo), Peru	ACL-2462	LURIN-MA006	water (river)	-11.8
Lurín Valley (Pantanos de Villa), Peru	ACL-2983	LURIN-PAN001	water (lake)	-11.3
Lurín Valley (Puente Lurín), Peru	ACL-2984	LURIN-PLUR001	water (river)	-11.3
Lurín Valley (Quebrada Verde), Peru	ACL-2985	LURIN-PQV001	water (river)	-12.0
Lurín Valley (Sisicaya), Peru	ACL-2464	LURIN-SI001	water (river)	-12.2
Lurín Valley (Lurín) , Peru	ACL-4012	LURIN-PUK001	water (spring)	-10.6
Rimac Valley (Cocachacra), Peru	ACL-2987	RIMAC-COC001	water (river)	-12.5
Rimac Valley (Cupiche), Peru	ACL-2986	RIMAC-CUP001	water (river)	-12.7
Rimac Valley (Huayco Loro), Peru	ACL-2989	RIMAC-HUL001	water (river)	-14.4
Rimac Valley (Matucana), Peru	ACL-2991	RIMAC-MAT002	water (canal)	-12.0
Rimac Valley (Matucana), Peru	ACL-2990	RIMAC-MAT001	water (river)	-12.6
Rimac Valley (San Mateo), Peru	ACL-2993	RIMAC-SNM001	water (river)	-14.6
Rimac Valley (Santa Eulalia), Peru	ACL-2992	RIMAC-STE001	water (river)	-14.3

APPENDIX G

STABLE CARBON AND NITROGEN ISOTOPE DATA FOR MODERN BOTANICAL AND FAUNAL SAMPLES

Region (Site), Country	ACL Number	Specimen Number	Flora/ Fauna type	Species	Material	Corrected δ^{13}C (‰)	Corrected δ^{15}N (‰)	% C	% N	C:N (mole %)
FLORA										
Rimac Valley (Cupiche), Peru	ACL-3026	RIMAC-CUP008	C3	*Annona cherimola*	leaves	-27.4	3.4	41.8	2.4	20.7
Lurín Valley (Mercado Lurín), Peru	ACL-3999	LURIN-MELU006	C3	*Annona cherimola*	fruit	-24.4	7.9	40.7	1.2	40.6
Lurín Valley (Mercado Lurín), Peru	ACL-3995	LURIN-MELU002	C3	*Bunchosia armeniaca*	fruit	-23.2	1.9	38.4	1.4	32.7
Lurín Valley (Mercado Lurín), Peru	ACL-3994	LURIN-MELU001	C3	*Capiscum* sp.	fruit	-26.4	15.1	43.1	2.5	20.1
Lurín Valley (Manchay Bajo), Peru	ACL-2469	LURIN-MA011	C3	*Capiscum* sp.	fruit	-24.5	7.5	40.5	3.5	13.5
Lurín Valley (Manchay Bajo), Peru	ACL-3012	LURIN-MA022	C3	*Capiscum* sp.	fruit	-25.2	8.0	39.5	2.7	16.9
Lurín Valley (Guayabo), Peru	ACL-3017	LURIN-GUA005	C3	*Capiscum* sp.	fruit	-27.4	7.2	40.9	2.3	20.6
Lurín Valley (Manchay Bajo), Peru	ACL-2470	LURIN-MA012	C3	*Capiscum* sp.	leaves	-26.1	7.9	36.3	4.1	10.3
Lurín Valley (Manchay Bajo), Peru	ACL-3010	LURIN-MA020	C3	*Capiscum* sp.	leaves	-26.8	11.9	29.4	3.8	9.0
Lurín Valley (Guayabo), Peru	ACL-3016	LURIN-GUA004	C3	*Capiscum* sp.	leaves	-26.1	8.4	34.5	3.0	13.5
Rimac Valley (Matucana), Peru	ACL-3033	RIMAC-MAT003	C3	*Chenopodium ambrosioides*	whole plant	-22.7	8.2	44.8	2.6	19.7
Lurín Valley (Wong Market), Peru	ACL-4006	LURIN-WON006	C3	*Chenopodium pallidicaule*	seeds	-25.4	8.0	43.4	2.6	19.6

Region (Site), Country	**ACL Number**	**Specimen Number**	**Flora/ Fauna type**	**Species**	**Material**	**Corrected δ^{13}C (‰)**	**Corrected δ^{15}N (‰)**	**% C**	**% N**	**C:N (mole %)**
Lurín Valley (Samaca), Peru	ACL-4011	LURIN-SAM002	C3	*Chenopodium quinoa*	seeds	-24.1	4.0	41.5	2.4	20.4
Lurín Valley (Mercado Lurín), Peru	ACL-4008	LURIN-MELU009	C3	*Cucurbita* sp.	fruit	-21.9	1.0	40.3	3.1	15.2
Rimac Valley (Cupiche), Peru	ACL-3032	RIMAC-CUP015	C3	*Inga feuillei*	fruit	-25.5	2.8	40.2	1.3	36.3
Rimac Valley (Cupiche), Peru	ACL-3027	RIMAC-CUP009	C3	*Inga feuillei*	leaves	-29.8	4.8	45.3	3.8	14.0
Lurín Valley (Mercado Lurín), Peru	ACL-4000	LURIN-MELU007	C3	*Ipomoea batatas*	tuber	-23.7	6.5	40.3	0.7	69.8
Lurín Valley (Manchay), Peru	ACL-3014	LURIN-MA024	C3	*Ipomoea batatas*	leaves	-28.5	7.8	38.4	5.1	8.8
Lurín Valley (Manchay Bajo), Peru	ACL-3009	LURIN-MA019	C3	*Lucuma bifera*	fruit	-28.5	4.3	41.5	0.8	60.8
Rimac Valley (Cupiche), Peru	ACL-3024	RIMAC-CUP006	C3	*Lucuma bifera*	fruit	-25.4	5.2	43.2	1.6	32.5
Rimac Valley (Cupiche), Peru	ACL-3030	RIMAC-CUP012	C3	*Lucuma bifera*	leaves	-28.6	3.8	44.8	1.5	34.1
Lurín Valley (Mercado Lurín), Peru	ACL-4001	LURIN-MELU008	C3	*Manihot esculenta*	tuber	-23.0	5.1	40.3	0.3	159.2
Rimac Valley (Cupiche), Peru	ACL-3021	RIMAC-CUP014	C3	*Passiflora edulis*	fruit	-25.6	6.9	45.7	1.3	41.3
Rimac Valley (Cupiche), Peru	ACL-3025	RIMAC-CUP007	C3	*Passiflora edulis*	leaves	-24.7	8.3	38.2	4.1	11.0
Lurín Valley (Mercado Lurín), Peru	ACL-3996	LURIN-MELU003	C3	*Passiflora ligularis*	fruit	-24.2	3.6	46.2	1.6	33.8

Region (Site), Country	ACL Number	Specimen Number	Flora/ Fauna type	Species	Material	Corrected δ^{13}C (‰)	Corrected δ^{15}N (‰)	% C	% N	C:N (mole %)
Rimac Valley (Cupiche), Peru	ACL-3022	RIMAC-CUP004	C3	*Persea americana*	fruit	-28.0	3.7	40.9	0.4	127.9
Rimac Valley (Cupiche), Peru	ACL-3023	RIMAC-CUP005	C3	*Persea americana*	fruit	-29.7	3.4	51.2	0.6	93.5
Rimac Valley (Cupiche), Peru	ACL-3028	RIMAC-CUP010	C3	*Persea americana*	leaves	-28.3	2.7	43.2	1.5	32.6
Rimac Valley (Cupiche), Peru	ACL-3029	RIMAC-CUP011	C3	*Persea americana*	leaves	-28.0	1.8	44.0	1.6	32.7
Rimac Valley (Santa Eulalia), Peru	ACL-3037	RIMAC-STE003	C3	*Schinus molle*	fruit	-25.4	7.1	48.9	1.4	42.2
Rimac Valley (Cupiche), Peru	ACL-3031	RIMAC-CUP013	C3	*Schinus molle*	leaves	-27.3	3.4	45.0	2.6	20.1
Rimac Valley (Matucana), Peru	ACL-3036	RIMAC-STE002	C3	*Schinus molle*	leaves	-28.0	6.6	45.7	3.2	16.8
Lurín Valley (Wong Market), Peru	ACL-4007	LURIN-WON007	C3	*Solanum muricatum*	fruit	-21.0	4.8	38.6	1.9	24.0
Rimac Valley (Santa Eulalia), Peru	ACL-3038	RIMAC-SNM003	C3	*Solanum* sp.	tuber	-27.2	4.7	38.4	0.9	51.3
Rimac Valley (San Mateo), Peru	ACL-3039	RIMAC-SNM004	C3	*Solanum* sp.	tuber	-26.2	5.1	38.0	1.0	45.3
Lurín Valley (Wong Market), Peru	ACL-4005	LURIN-WON005	C4	*Amaranthus caudatus*	seeds	-10.2	4.2	42.5	2.1	23.9
Lurín Valley (Wong Market), Peru	ACL-4004	LURIN-WON004	C4	*Zea mays*	kernels	-10.6	6.8	40.6	1.3	36.1
Lurín Valley (Manchay Bajo), Peru	ACL-2471	LURIN-MA003	C4	*Zea mays*	kernels	-10.5	10.1	39.6	1.7	26.6

Region (Site), Country	**ACL Number**	**Specimen Number**	**Flora/ Fauna type**	**Species**	**Material**	**Corrected δ^{13}C (‰)**	**Corrected δ^{15}N (‰)**	**% C**	**% N**	**C:N (mole %)**
Lurín Valley (Manchay Bajo), Peru	ACL-2473	LURIN-MA013	C4	*Zea mays*	kernels	-10.1	10.7	41.5	3.7	13.2
Huarochirí (San Lorenzo de Quinti), Peru	ACL-2475	HUARO-SL004	C4	*Zea mays*	kernels	-10.5	7.8	40.3	1.2	38.7
Lurín Valley (Manchay Bajo), Peru	ACL-2474	LURIN-MA014	C4	*Zea mays*	leaves	-10.5	10.4	36.2	0.8	53.5
Huarochirí (San Lorenzo de Quinti), Peru	ACL-3008	HUARO-SL005	C4	*Zea mays*	leaves	-10.9	8.6	34.6	0.6	70.3
Lurín Valley (Manchay Bajo), Peru	ACL-3013	LURIN-MA023	C4	*Zea mays*	leaves	-9.8	9.3	34.6	2.2	18.2
Lurín Valley (Guayabo), Peru	ACL-3018	LURIN-GUA006	C4	*Zea mays*	leaves	-10.8	12.5	36.7	3.5	12.2
Rimac Valley (San Mateo), Peru	ACL-3040	LURIN-MA015	C4	*Zea mays*	leaves	-10.3	9.2	38.6	1.1	40.4
Lurín Valley (Puente Quebrada Verde), Peru	ACL-3020	LURIN-PQV002	CAM	*Agave* sp.	leaves	-11.5	1.6	37.8	0.6	77.1
Rimac Valley (Matucana), Peru	ACL-3035	RIMAC-MAT006	CAM	*Agave* sp.	leaves	-13.8	7.5	37.3	1.2	36.2
Lurín Valley (Guayabo), Peru	ACL-3019	LURIN-GUA007	CAM	*Opuntia* sp.	paddle	-11.0	11.8	30.2	1.1	31.6
Lurín Valley (Mercado Lurín), Peru	ACL-3998	LURIN-MELU005	CAM	*Opuntia* sp.	fruit	-10.6	3.5	39.3	1.0	46.0
Lurín Valley (Mercado Lurín), Peru	ACL-3997	LURIN-MELU004	CAM	*Opuntia* sp.	fruit	-10.9	4.1	36.8	0.9	49.1

Region (Site), Country	ACL Number	Specimen Number	Flora/ Fauna type	Species	Material	Corrected $\delta^{13}C$ (‰)	Corrected $\delta^{15}N$ (‰)	% C	% N	C:N (mole %)
Lurín Valley (Wong Market), Peru	ACL-4002	LURIN-WON002	Legume	*Arachis hypogaea*	nuts	-26.4	0.2	50.3	4.2	13.8
Lurín Valley (Samaca Vendor), Peru	ACL-4010	LURIN-SAM001	Legume	*Canavalia* sp.	beans	-20.8	-0.3	40.8	4.4	10.9
Lurín Valley (Manchay Bajo), Peru	ACL-3011	LURIN-MA021	Legume	*Phaseolus* sp.	leaves	-27.9	6.3	36.4	4.1	10.5
Lurín Valley (Wong Market), Peru	ACL-4009	LURIN-WON008	Legume	*Phaseolus* sp.	beans	-25.5	5.8	39.2	3.5	13.1
Lurín Valley (Wong Market), Peru	ACL-4003	LURIN-WON003	Legume	*Vicia faba*	beans	-22.2	1.3	41.4	4.7	10.3
Lurín Valley (Playa Norte), Peru	ACL-3988	LURIN-NOR017	Marine	*Chondracanthus* sp.	whole plant	-15.5	11.9	28.1	2.6	12.4
Lurín Valley (Terminal Villa Maria), Peru	ACL-3990	LURIN-VM001	Marine	*Chondracanthus* sp.	whole plant	-13.1	16.9	26.0	1.5	20.1
Lurín Valley (Terminal Villa Maria), Peru	ACL-3992	LURIN-VM003	Marine	*Chondracanthus* sp.	whole plant	-17.4	15.3	28.2	2.8	11.7
Lurín Valley (Terminal Villa Maria), Peru	ACL-3993	LURIN-VM004	Marine	*Chondracanthus* sp.	whole plant	-15.9	21.4	27.5	1.8	17.6
Lurín Valley (Playa Norte), Peru	ACL-3987	LURIN-NOR016	Marine	*Lessonia* sp.	whole plant	-16.8	11.9	28.4	2.9	11.5
Lurín Valley (Manchay Bajo), Peru	ACL-3985	LURIN-NOR014	Marine	*Macrocystis* sp.	whole plant	-19.8	13.8	30.0	2.3	15.5
Lurín Valley (Playa Norte), Peru	ACL-3986	LURIN-NOR015	Marine	*Macrocystis* sp.	whole plant	-18.5	9.6	30.6	1.9	18.4

Region (Site), Country	**ACL Number**	**Specimen Number**	**Flora/ Fauna type**	**Species**	**Material**	**Corrected $\delta^{13}C$ (‰)**	**Corrected $\delta^{15}N$ (‰)**	**% C**	**% N**	**C:N (mole %)**
Lurín Valley (Playa Norte), Peru	ACL-3989	LURIN-NOR018	Marine	*Ulva* sp.	whole plant	-12.8	12.6	31.0	2.9	12.3
Lurín Valley (Terminal Villa Maria), Peru	ACL-3991	LURIN-VM002	Marine	*Ulva* sp.	whole plant	-13.5	15.2	28.7	3.0	11.1
FAUNA										
Lurín Valley (Playa Caballeros), Peru	ACL-3005	LURIN-CAB012	marine fish	*Alphestes fasciatus*	bone	-8.5	15.0	39.5	15.9	2.9
Lurín Valley (Playa Caballeros), Peru	ACL-3413	LURIN-CAB012	marine fish	*Alphestes fasciatus*	muscle	-11.7	16.8	28.4	10.6	3.1
Lurín Valley (Playa Caballeros), Peru	ACL-3003	LURIN-CAB010	marine fish	*Anisotremus scapularis* T.	bone	-10.0	13.6	38.4	15.1	3.0
Lurín Valley (Playa Caballeros), Peru	ACL-3411	LURIN-CAB010	marine fish	*Anisotremus scapularis* T.	muscle	-12.6	15.4	32.9	13.0	3.0
Lurín Valley (Playa Caballeros), Peru	ACL-3004	LURIN-CAB011	marine fish	*Brevoortia maculata chilcae*	bone	-11.9	12.6	39.0	14.9	3.0
Lurín Valley (Playa Caballeros), Peru	ACL-3412	LURIN-CAB011	marine fish	*Brevoortia maculata chilcae*	muscle	-14.3	13.7	39.5	12.7	3.6
Lurín Valley (Playa Caballeros), Peru	ACL-2996	LURIN-CAB003	marine fish	*Cheilodactylus variegatus* V.	bone	-9.0	14.2	39.3	15.3	3.0
Lurín Valley (Playa Caballeros), Peru	ACL-3404	LURIN-CAB003	marine fish	*Cheilodactylus variegatus* V.	muscle	-12.1	16.9	41.2	13.9	3.5
Lurín Valley (Terminal Villa Maria), Peru	ACL-3982	LURIN-VM021	marine fish	*Coryphaena hippurus*	bone	-12.3	10.8	41.4	16.7	2.9
Lurín Valley (Playa Caballeros), Peru	ACL-2995	LURIN-CAB002	marine fish	*Engraulis ringens*	whole body	-13.7	13.1	31.1	11.4	3.2
Lurín Valley (Playa Caballeros), Peru	ACL-2998	LURIN-CAB005	marine fish	*Genypterus maculatus* T.	bone	-12.6	17.8	40.8	14.0	3.4
Lurín Valley (Playa Caballeros), Peru	ACL-3406	LURIN-CAB005	marine fish	*Genypterus maculatus* T.	muscle	-13.3	17.8	40.9	13.4	3.6

Region (Site), Country	ACL Number	Specimen Number	Flora/ Fauna type	Species	Material	Corrected δ^{13}C (‰)	Corrected δ^{15}N (‰)	% C	% N	C:N (mole %)
Lurín Valley (Playa Caballeros), Peru	ACL-3007	LURIN-CAB014	marine fish	*Labrisomus philippii* S.	bone	-9.2	17.4	39.7	15.8	2.9
Lurín Valley (Playa Caballeros), Peru	ACL-3415	LURIN-CAB014	marine fish	*Labrisomus philippii* S.	muscle	-12.4	19.1	43.1	15.2	3.3
Lurín Valley (Playa Caballeros), Peru	ACL-3002	LURIN-CAB009	marine fish	*Mugil cephalus* L.	bone	-11.3	10.7	39.1	15.4	3.0
Lurín Valley (Playa Caballeros), Peru	ACL-3410	LURIN-CAB009	marine fish	*Mugil cephalus* L.	muscle	-13.1	14.1	34.1	12.2	3.3
Lurín Valley (Playa Caballeros), Peru	ACL-3006	LURIN-CAB013	marine fish	*Mustelus* sp.	bone	-9.9	15.1	36.7	13.7	3.1
Lurín Valley (Terminal Villa Maria), Peru	ACL-3978	LURIN-VM017	marine fish	*Nectarges* sp.	muscle	-14.1	15.8	38.9	15.5	2.9
Lurín Valley (Playa Caballeros), Peru	ACL-2997	LURIN-CAB004	marine fish	*Paralichthys adspersus*	bone	-9.8	13.7	38.6	15.3	3.0
Lurín Valley (Playa Caballeros), Peru	ACL-3405	LURIN-CAB004	marine fish	*Paralichthys adspersus*	muscle	-13.6	15.1	38.3	12.4	3.6
Lurín Valley (Terminal Villa Maria), Peru	ACL-3981	LURIN-VM020	marine fish	*Paralonchurus* sp.	muscle	-14.7	15.2	24.2	8.1	3.5
Lurín Valley (Terminal Villa Maria), Peru	ACL-3980	LURIN-VM019	marine fish	*Pseudojulis notospilus* G.	muscle	-16.2	11.9	40.8	13.6	3.5
Lurín Valley (Playa Caballeros), Peru	ACL-3000	LURIN-CAB007	marine fish	*Pseudupeneus grandisquamis*	bone	-9.7	15.4	39.3	15.9	2.9
Lurín Valley (Playa Caballeros), Peru	ACL-3408	LURIN-CAB007	marine fish	*Pseudupeneus grandisquamis*	muscle	-13.0	15.2	40.8	13.8	3.4
Lurín Valley (Playa Caballeros), Peru	ACL-2999	LURIN-CAB006	marine fish	*Rhinobatos planiceps* G.	bone	-10.0	12.5	35.6	12.7	3.3
Lurín Valley (Playa Caballeros), Peru	ACL-3407	LURIN-CAB006	marine fish	*Rhinobatos planiceps* G.	muscle	-12.7	13.6	41.2	14.0	3.4

Region (Site), Country	ACL Number	Specimen Number	Flora/ Fauna type	Species	Material	Corrected $\delta^{13}C$ (‰)	Corrected $\delta^{15}N$ (‰)	% C	% N	C:N (mole %)
Lurín Valley (Terminal Villa Maria), Peru	ACL-3975	LURIN-VM014	marine fish	*Sarda chiliensis*	muscle	-14.2	18.3	43.3	15.0	3.4
Lurín Valley (Playa Caballeros), Peru	ACL-2994	LURIN-CAB001	marine fish	*Sciaena deliciosa*	bone	-10.7	13.6	38.6	14.5	3.1
Lurín Valley (Playa Caballeros), Peru	ACL-3403	LURIN-CAB001	marine fish	*Sciaena deliciosa*	muscle	-13.0	15.4	27.3	9.6	3.3
Lurín Valley (Terminal Villa Maria), Peru	ACL-3983	LURIN-VM022	marine fish	*Sciaena gilberti* A.	bone	-9.9	14.9	41.6	17.2	2.8
Lurín Valley (Playa Caballeros), Peru	ACL-3001	LURIN-CAB008	marine fish	*Seriolella violacea*	bone	-9.4	12.7	38.0	15.4	2.9
Lurín Valley (Playa Caballeros), Peru	ACL-3409	LURIN-CAB008	marine fish	*Seriolella violacea*	muscle	-13.7	14.6	31.1	11.4	3.2
Lurín Valley (Terminal Villa Maria), Peru	ACL-3979	LURIN-VM018	marine fish	*Stellifer* sp.	soft tissue	-11.7	16.7	41.4	15.6	3.1
Lurín Valley (Terminal Villa Maria), Peru	ACL-3976	LURIN-VM015	marine invertebrate	*Concholepas concholepas*	soft tissue	-11.4	12.8	39.0	13.5	3.4
Lurín Valley (Terminal Villa Maria), Peru	ACL-3970	LURIN-VM009	marine invertebrate	*Donax* sp.	soft tissue	-15.8	8.9	32.7	10.3	3.7
Lurín Valley (Terminal Villa Maria), Peru	ACL-3972	LURIN-VM011	marine invertebrate	*Dosidicus gigas*	soft tissue	-10.9	10.8	35.9	14.4	2.9
Lurín Valley (Terminal Villa Maria), Peru	ACL-3968	LURIN-VM007	marine invertebrate	*Fissurella* sp.	soft tissue	-11.6	14.3	39.9	15.7	3.0
Lurín Valley (Terminal Villa Maria), Peru	ACL-3973	LURIN-VM012	marine invertebrate	*Loliga* sp.	soft tissue	-12.5	10.8	38.0	13.9	3.2

Region (Site), Country	ACL Number	Specimen Number	Flora/ Fauna type	Species	Material	Corrected $\delta^{13}C$ (‰)	Corrected $\delta^{15}N$ (‰)	% C	% N	C:N (mole %)
Lurín Valley (Terminal Villa Maria), Peru	ACL-3971	LURIN-VM010	marine invertebrate	*Mesoderma donacium*	soft tissue	-12.5	8.0	35.1	12.0	3.4
Lurín Valley (Terminal Villa Maria), Peru	ACL-3974	LURIN-VM013	marine invertebrate	*Octupus fontanianus*	soft tissue	-13.5	11.3	39.4	15.1	3.1
Lurín Valley (Terminal Villa Maria), Peru	ACL-3969	LURIN-VM008	marine invertebrate	*Thais chocolata*	soft tissue	-13.2	12.3	40.8	14.6	3.3
Lurín Valley (Playa Caballeros), Peru	ACL-3414	LURIN-CAB013	marine shark	*Mustelus mento*	muscle	-12.5	16.0	39.6	13.8	3.3
Lurín Valley (Playa Norte), Peru	ACL-3963	LURIN-NOR012	reptile	*Liolaemus* sp.	whole body	-11.7	15.6	38.8	15.2	3.0
Lurín Valley (Manchay Bajo), Peru	ACL-2443	LURIN-MA008	terrestrial herbivore	*Cavia porcellus*	bone	-19.3	7.3	42.6	16.6	3.0
Lurín Valley (Cieneguilla), Peru	ACL-2445	LURIN-CI002	terrestrial herbivore	*Cavia porcellus*	bone	-19.2	6.9	42.0	16.6	2.9
Lurín Valley (Antioquia), Peru	ACL-2446	LURIN-AN001	terrestrial herbivore	*Cavia porcellus*	bone	-22.9	4.5	42.5	16.8	2.9
Huarochirí (San Lorenzo de Quinti), Peru	ACL-2448	HUARO-SL001	terrestrial herbivore	*Cavia porcellus*	bone	-23.4	5.8	43.6	17.4	2.9

APPENDIX H

PUBLISHED STABLE CARBON AND NITROGEN ISOTOPE VALUES FOR MODERN HIGH TROPHIC LEVEL MARINE FAUNA

Region, Country	Species	Common name	Material	Average δ^{13}C vs. VPDB (‰)	Average δ^{15}N vs AIR (‰)	Study
Beagle Channel, Argentina	*Arctocephalus australis*	South American fur seal	Bone collagen, archaeological	-11.8 (n=1)	NA	Albero et al. (1986)
San Diego, California, USA	*Balaenoptera musculus*	Blue whale	Muscle, modern	-17.6 (n=1)	NA	Rau et al. 1983
Southern California, USA	*Balaenoptera musculus*	Blue whale	Bone collagen, modern	-13.6±1.3 (n=2)	13.8±2.9 (n=2)	Schoeninger and DeNiro (1984)
San Pedro Channel, California, USA	*Carcharodon charcharias*	Great white shark	Muscle, modern	-15.9 (n=1)	NA	Rau et al. 1983
Southern California, USA	*Delphinus delphis*	Common dolphin	Bone collagen, modern	-13.9±0.9 (n=3)	15.6±0.9 (n=3)	Schoeninger and DeNiro (1984)
Arica, Chile	*Delphinus delphis*	Common dolphin	Bone collagen, modern	-12.7 (n=1)	18.9 (n=1)	Tieszen and Chapman (1992)
Peninsula Valdés, Argentina	*Eubalaena australis*	Southern right whale	Skin, modern	-20.8±1.3 (n=131)	8.0±1.9 (n=131)	Valenzuela et al. (2009)
Arica, Chile	*Otaria flavescens*	South American sea lion	Bone collagen, modern	-12.9±0.7 (n=6)	20.2±1.3 (n=3)	Tieszen and Chapman (1992)
Arica, Chile	*Otaria flavescens*	South American sea lion	Fur, modern	-13.8 (n=1)	NA	Tieszen and Chapman (1992)
Arica, Chile	*Otaria flavescens*	South American sea lion	Skin, modern	-16.1±0.8 (n=2)	18.2 (n=1)	Tieszen and Chapman (1992)
Cobquecura and Talcahuano-San Vicente, Chile	*Otaria flavescens*	South American sea lion	Hair and vibrissae, modern	-12.5±0.7 (n=27)	21.0±0.8 (n=27)	Hückstadt et al. (2007)
Arica, Chile	*Pelicanus occidentalis*	Brown pelican	Bone collagen, modern	-12.8±0.4 (n=3)	16.7±0.9 (n=3)	Tieszen and Chapman (1992)
Arica, Chile	*Pelicanus occidentalis*	Brown pelican	Beak, modern	-13.2 (n=1)	NA	Tieszen and Chapman (1992)
Arica, Chile	*Pelicanus occidentalis*	Brown pelican	Feather, modern	-14.2 (n=1)	NA	Tieszen and Chapman (1992)

Region, Country	**Species**	**Common name**	**Material**	**Average $\delta^{13}C$ vs. VPDB (‰)**	**Average $\delta^{15}N$ vs AIR (‰)**	**Study**
Galápagos Islands, Ecuador, Central Peru, Northern Chile, and Southwest Pacific	*Physeter macrocephalus*	Sperm whale	Skin, modern	-16.0±0.7 (n=106)	16.8±3.5 (n=106)	Marcoux et al. (2007)
Arica, Chile	*Prionace glauca*	Blue shark	Muscle, modern	-16.6±3.1 (n=3)	17.8±1.3 (n=2)	Tieszen and Chapman (1992)
Arica, Chile	*Prionace glauca*	Blue shark	Bone collagen, modern	-14.7 (n=1)	NA	Tieszen and Chapman (1992)
Arica, Chile	*Squalus acanthius*	Spiny dogfish	Bone collagen, modern	-14.1 (n=1)	21.6 (n=1)	Tieszen and Chapman (1992)
Arica, Chile	*Xiaphius gladius*	Broadbill swordfish	Bone collagen, modern	-14.9 (n=1)	21.1 (n=1)	Tieszen and Chapman (1992)
Arica, Chile	*Xiaphius gladius*	Broadbill swordfish	Muscle, modern	-19.1±0.5 (n=3)	16.9±2.2 (n=3)	Tieszen and Chapman (1992)

APPENDIX I

STABLE CARBON AND NITROGEN ISOTOPE DATA FOR ARCHAEOLOGICAL HUMAN BONE COLLAGEN AND APATITE

Individual Code	ACL Number	Specimen Number	Sample description	% yield	$\delta^{13}C_{col}$ (‰)	$\delta^{15}N$ (‰)	% C	% N	C:N (mole:mole)	$\delta^{13}C_{ap}$ (‰)	$\Delta\delta^{13}C_{col\text{-}ap}$
ARMA-PER97-ENT12	ACL-4430	RIMAC-ARMA.M003	Rib fragment	1.0	-12.2	13.5	40.3	16.2	2.9	-7.2	-4.9
ARMA-PER97-ENT33	ACL-4434	RIMAC-ARMA.M007	Rib fragment	13.3	-8.5	19.0	40.6	16.2	2.9	-5.9	-2.6
ARMA-PER97-ENT35	ACL-4437	RIMAC-ARMA.M010	Rib fragment	13.5	-7.9	18.4	42.9	17.3	2.9	-3.8	-4.1
ARMA-PER97-ENT42	ACL-4441	RIMAC-ARMA.M014	Rib fragment	13.0	-10.0	17.2	41.0	16.3	2.9	-5.5	-4.4
ARMA-PER97-ENT43A	ACL-4445	RIMAC-ARMA.M018	Rib fragment	13.4	-9.0	12.0	40.7	16.3	2.9	-5.1	-3.9
ARMA-PER97-ENT45	ACL-4449	RIMAC-ARMA.M022	Rib fragment	6.3	-11.0	16.4	39.3	15.9	2.9	-7.4	-3.7
ARMA-PER97-ENT45A	ACL-4451	RIMAC-ARMA.M024	Rib fragment	8.0	-9.6	18.6	37.0	14.7	2.9	-7.9	-1.7
ARMA-PER97-ENT46	ACL-4455	RIMAC-ARMA.M028	Rib fragment	12.3	-10.1	16.9	42.2	16.9	2.9	-7.5	-2.6
ARMA-PER97-ENT49	ACL-4457	RIMAC-ARMA.M030	Rib fragment	12.4	-10.4	18.0	42.8	17.0	2.9	-6.5	-3.9
ARMA-PER97-ENT57	ACL-4461	RIMAC-ARMA.M034	Rib fragment	13.8	-10.4	16.3	43.1	17.0	2.9	-7.4	-3.0
ARMA-PER97-ENT65	ACL-4465	RIMAC-ARMA.M038	Rib fragment	12.2	-11.8	12.4	40.8	16.4	2.9	-7.4	-4.5
ARMA-PER97-ENT68	ACL-4469	RIMAC-ARMA.M042	Rib fragment	11.0	-10.2	16.4	41.5	16.8	2.9	-7.2	-3.0
ARMA-PER97-ENT75A	ACL-4473	RIMAC-ARMA.M046	Rib fragment	5.6	-8.1	19.3	39.2	15.7	2.9	-5.5	-2.6
ARMA-D04.I-CF09	ACL-4476	RIMAC-ARMA.M049	Rib fragment	12.8	-10.4	16.6	41.1	16.6	2.9	-6.1	-4.3
ARMA-D04.I-CF25B	ACL-4480	RIMAC-ARMA.M053	Rib fragment	16.8	-13.2	14.9	42.4	16.8	3.0	-7.8	-5.4
ARMA-D04.II-CF005A	ACL-4484	RIMAC-ARMA.M057	Rib fragment	10.4	-11.3	16.0	39.9	16.0	2.9	-6.8	-4.5
ARMA-D04.II-CF007A	ACL-4488	RIMAC-ARMA.M061	Rib fragment	10.3	-11.1	11.6	41.1	16.5	2.9	-6.4	-4.8

Individual Code	ACL Number	Specimen Number	Sample description	% yield	$\delta^{13}C_{col}$ (‰)	$\delta^{15}N$ (‰)	% C	% N	C:N (mole:mole)	$\delta^{13}C_{ap}$ (‰)	$\Delta\delta^{13}C_{col\text{-}ap}$
ARMA-D04.II-CF007B	ACL-4490	RIMAC-ARMA.M063	Rib fragment	17.2	-13.1	14.8	36.4	14.7	2.9	-10.8	-2.3
ARMA-D04.II-CF013	ACL-4494	RIMAC-ARMA.M067	Rib fragment	9.6	-11.3	15.7	39.7	15.8	2.9	-8.2	-3.2
ARMA-D04.II-CF026D	ACL-4496	RIMAC-ARMA.M069	Rib fragment	15.7	-9.8	16.4	42.1	17.0	2.9	-5.2	-4.6
ARMA-D04.II-CF030	ACL-4499	RIMAC-ARMA.M072	Rib fragment	12.5	-9.4	14.8	44.3	17.6	2.9	-5.1	-4.3
ARMA-D04.II-CF031A	ACL-4503	RIMAC-ARMA.M076	Rib fragment	10.9	-10.2	15.7	39.2	15.6	2.9	-6.3	-3.9
ARMA-D04.II-CF038	ACL-4505	RIMAC-ARMA.M078	Rib fragment	10.7	-10.7	21.3	40.3	16.3	2.9	-6.8	-3.9
ARMA-D04.II-CF040A	ACL-4506	RIMAC-ARMA.M079	Rib fragment	17.7	-10.0	16.8	40.7	15.8	3.0	-5.5	-4.6
ARMA-D04.II-CF052	ACL-4510	RIMAC-ARMA.M083	Rib fragment	14.7	-11.6	14.1	41.7	16.5	3.0	-8.0	-3.6
ARMA-D04.II-CF055 (#2931)	ACL-4514	RIMAC-ARMA.M087	Rib fragment	15.5	-7.9	19.4	39.6	15.8	2.9	-7.0	-0.8
ARMA-D04.II-CF057	ACL-4518	RIMAC-ARMA.M091	Rib fragment	13.0	-11.1	16.0	41.6	16.8	2.9	-8.0	-3.1
ARMA-D04.II-CF062	ACL-4522	RIMAC-ARMA.M095	Rib fragment	11.0	-11.6	15.4	39.9	16.3	2.9	-8.2	-3.5
ARMA-D04.II-CF073B	ACL-4526	RIMAC-ARMA.M099	Rib fragment	10.1	-11.3	13.5	40.3	16.4	2.9	-7.8	-3.5
ARMA-D04.II-CF080	ACL-4530	RIMAC-ARMA.M103	Rib fragment	12.5	-10.9	16.5	42.6	16.9	2.9	-7.3	-3.6
ARMA-D04.II-CF082B	ACL-4532	RIMAC-ARMA.M105	Rib fragment	16.1	-10.9	18.6	42.0	16.6	2.9	-8.4	-2.5
ARMA-D04.II-CF084	ACL-4536	RIMAC-ARMA.M109	Rib fragment	15.4	-9.1	16.7	42.0	16.8	2.9	-5.1	-4.0
ARMA-D04.II-CF085A	ACL-4540	RIMAC-ARMA.M113	Rib fragment	14.3	-10.5	16.5	41.3	16.4	2.9	-7.6	-2.9
ARMA-D04.II-CF093B	ACL-4544	RIMAC-ARMA.M117	Rib fragment	13.1	-11.2	13.7	40.6	16.4	2.9	-7.6	-3.5

Individual Code	ACL Number	Specimen Number	Sample description	% yield	$\delta^{13}C_{col}$ (‰)	$\delta^{15}N$ (‰)	% C	% N	C:N (mole:mole)	$\delta^{13}C_{ap}$ (‰)	$\Delta\delta^{13}C_{col-ap}$
ARMA-D04.II-CF101B	ACL-4548	RIMAC-ARMA.M121	Rib fragment	22.9	-8.8	20.8	39.0	15.3	3.0	-6.5	-2.3
ARMA-D04.II-CF103	ACL-4552	RIMAC-ARMA.M125	Rib fragment	11.9	-10.4	16.5	40.3	16.0	2.9	-7.3	-3.1
ARMA-D04.II-CF105	ACL-4556	RIMAC-ARMA.M129	Rib fragment	19.1	-10.4	17.5	41.0	16.1	3.0	-6.7	-3.7
ARMA-D04.II-CF110	ACL-4560	RIMAC-ARMA.M133	Rib fragment	14.4	-11.2	16.7	42.7	17.1	2.9	-7.0	-4.3
ARMA-D04.II-CF111A	ACL-4564	RIMAC-ARMA.M137	Rib fragment	19.1	-9.0	18.8	42.2	16.6	3.0	-5.5	-3.5
ARMA-D04.II-CF111B	ACL-4567	RIMAC-ARMA.M140	Rib fragment	16.7	-8.7	17.3	40.7	16.1	2.9	-5.5	-3.2
ARMA-D04.II-CF111C.1	ACL-4570	RIMAC-ARMA.M143	Rib fragment	20.0	-9.6	21.0	40.2	16.1	2.9	-9.4	-0.2
ARMA-D04.II-CF111C.2	ACL-4572	RIMAC-ARMA.M145	Rib fragment	18.2	-9.1	18.7	37.9	14.8	3.0	-6.3	-2.7
ARMA-D04.II-CF114	ACL-4576	RIMAC-ARMA.M149	Rib fragment	10.5	-10.3	16.9	41.0	16.2	2.9	-6.3	-4.0
ARMA-D04.II-CF118	ACL-4580	RIMAC-ARMA.M153	Rib fragment	14.2	-10.6	15.5	41.1	16.4	2.9	-6.7	-4.0
ARMA-D04.II-CF119A	ACL-4584	RIMAC-ARMA.M157	Rib fragment	11.2	-11.5	15.8	42.9	17.1	2.9	-8.0	-3.5
ARMA-D04.II-CF121	ACL-4587	RIMAC-ARMA.M160	Rib fragment	12.2	-10.6	16.8	41.2	16.6	2.9	-7.3	-3.3
ARMA-D04.II-CF122	ACL-4591	RIMAC-ARMA.M164	Rib fragment	12.7	-11.3	15.9	39.6	15.9	2.9	-8.2	-3.1
ARMA-D04.II-CF125	ACL-4595	RIMAC-ARMA.M168	Rib fragment	12.9	-10.7	15.9	42.4	16.9	2.9	-7.5	-3.2
ARMA-D04.II-CF127	ACL-4599	RIMAC-ARMA.M172	Rib fragment	13.1	-10.2	16.3	40.7	16.3	2.9	-6.5	-3.7
ARMA-D04.II-CF129	ACL-4603	RIMAC-ARMA.M176	Rib fragment	14.3	-12.1	12.9	42.2	16.9	2.9	-8.6	-3.6
ARMA-D04.II-CF134	ACL-4607	RIMAC-ARMA.M180	Rib fragment	11.5	-11.1	15.3	39.1	15.7	2.9	-7.2	-3.9

Individual Code	**ACL Number**	**Specimen Number**	**Sample description**	**% yield**	**$\delta^{13}C_{col}$ (‰)**	**$\delta^{15}N$ (‰)**	**% C**	**% N**	**C:N (mole:mole)**	**$\delta^{13}C_{ap}$ (‰)**	**$\Delta\delta^{13}C_{col\text{-}ap}$**
ARMA-D04.II-CF135	ACL-4611	RIMAC-ARMA.M184	Rib fragment	11.3	-11.2	16.7	42.1	16.8	2.9	-7.3	-3.9
ARMA-D04.II-CF138	ACL-4615	RIMAC-ARMA.M188	Rib fragment	18.8	-9.9	18.9	42.0	16.6	3.0	-7.8	-2.1
ARMA-D04.II-CF139	ACL-4619	RIMAC-ARMA.M192	Rib fragment	14.1	-11.2	15.5	41.4	16.5	2.9	-6.8	-4.4
ARMA-D04.II-CF141	ACL-4623	RIMAC-ARMA.M196	Rib fragment	10.1	-12.0	13.1	41.0	16.7	2.9	-7.9	-4.1
ARMA-D04.II-CF142	ACL-4627	RIMAC-ARMA.M200	Rib fragment	12.4	-11.2	15.7	41.3	16.6	2.9	-7.0	-4.2
ARMA-D04.II-CF144A	ACL-4631	RIMAC-ARMA.M204	Rib fragment	9.5	-12.1	16.0	40.0	16.1	2.9	-8.2	-3.9
ARMA-D04.II-CF144B	ACL-4634	RIMAC-ARMA.M207	Rib fragment	15.9	-10.3	16.2	41.5	16.5	2.9	-7.3	-3.0
ARMA-D04.II-CF146	ACL-4637	RIMAC-ARMA.M210	Rib fragment	17.6	-10.5	12.6	43.1	17.2	2.9	-5.7	-4.8
ARMA-D04.II-CF150	ACL-4641	RIMAC-ARMA.M214	Rib fragment	19.1	-10.8	12.9	43.0	16.6	3.0	-6.1	-4.7
ARMA-D04.II-CF151	ACL-4645	RIMAC-ARMA.M218	Rib fragment	15.3	-11.5	14.3	41.8	16.6	2.9	-7.1	-4.4
ARMA-D04.II-CF154	ACL-4649	RIMAC-ARMA.M222	Rib fragment	9.9	-10.0	17.8	41.2	16.2	3.0	-6.0	-4.0
ARMA-D04.II-CF157 (#3706)	ACL-4652	RIMAC-ARMA.M225	Rib fragment	10.5	-10.4	16.4	39.8	15.9	2.9	-6.1	-4.3
ARMA-D04.II-CF167	ACL-4656	RIMAC-ARMA.M229	Rib fragment	11.5	-10.3	14.1	42.4	16.9	2.9	-6.2	-4.1
ARMA-D04.II-CF172B	ACL-4659	RIMAC-ARMA.M232	Rib fragment	19.1	-12.2	16.1	41.3	16.5	2.9	-9.1	-3.0
ARMA-D04.II-CF182	ACL-4663	RIMAC-ARMA.M236	Rib fragment	13.1	-9.2	16.4	41.1	16.4	2.9	-4.4	-4.8
ARMA-D04.II-CF188	ACL-4667	RIMAC-ARMA.M240	Rib fragment	10.1	-10.0	13.3	42.4	16.8	2.9	-5.7	-4.4
RINC-D02.I-CF01	ACL-4671	RIMAC-RINC.M244	Rib fragment	9.2	-10.6	11.8	41.1	16.6	2.9	-6.3	-4.3

Individual Code	**ACL Number**	**Specimen Number**	**Sample description**	**% yield**	**$\delta^{13}C_{col}$ (‰)**	**$\delta^{15}N$ (‰)**	**% C**	**% N**	**C:N (mole:mole)**	**$\delta^{13}C_{ap}$ (‰)**	**$\Delta\delta^{13}C_{col\text{-}ap}$**
RINC-G9698.I-1135-1A	ACL-4675	RIMAC-RINC.M248	Rib fragment	13.1	-8.7	14.4	40.2	15.9	3.0	-4.6	-4.1
RINC-G9698.II-0434-ENT033	ACL-4679	RIMAC-RINC.M252	Rib fragment	13.4	-8.4	11.8	40.3	16.1	2.9	-3.6	-4.8
RINC-G9698.II-0463-ENT040	ACL-4683	RIMAC-RINC.M256	Rib fragment	10.5	-11.7	11.6	41.6	16.7	2.9	-6.8	-4.9
RINC-G9698.II-0560-ENT110	ACL-4687	RIMAC-RINC.M260	Rib fragment	11.9	-10.0	13.5	37.1	14.9	2.9	-7.0	-3.1
RINC-G9698.II-0563-ENT53	ACL-4691	RIMAC-RINC.M264	Rib fragment	6.8	-9.2	13.9	38.3	15.5	2.9	-5.3	-3.9
RINC-G9698.II-0567-ENT116	ACL-4695	RIMAC-RINC.M268	Rib fragment	13.5	-11.6	11.6	43.2	16.5	3.1	-6.6	-5.0
RINC-D02.IIA-CF03	ACL-4699	RIMAC-RINC.M272	Rib fragment	8.2	-12.1	14.3	35.4	14.1	2.9	-7.7	-4.3
RINC-D02.IIA-CF05	ACL-4702	RIMAC-RINC.M275	Rib fragment	12.9	-8.4	14.6	39.9	15.9	2.9	-4.1	-4.4
RINC-D02.IIA-CF07	ACL-4705	RIMAC-RINC.M278	Rib fragment	18.4	-7.2	17.7	39.4	15.4	3.0	-4.8	-2.4
RINC-D02.IIA-CF23	ACL-4708	RIMAC-RINC.M281	Rib fragment	23.3	-10.3	13.4	42.9	15.5	3.2	-5.1	-5.2
RINC-D02.IIA-CF25	ACL-4712	RIMAC-RINC.M285	Rib fragment	15.8	-7.6	16.1	39.0	14.8	3.1	-4.4	-3.2
RINC-D02.IIA-CF29	ACL-4716	RIMAC-RINC.M289	Rib fragment	12.1	-10.6	12.2	39.9	16.1	2.9	-6.2	-4.4
RINC-D02.IIA-CF31	ACL-4720	RIMAC-RINC.M293	Rib fragment	15.1	-10.0	14.4	37.1	14.6	3.0	-8.4	-1.5
RINC-D02.IIA-CF34	ACL-4724	RIMAC-RINC.M297	Rib fragment	16.0	-8.5	13.5	40.0	16.0	2.9	-5.3	-3.1
RINC-D02.IIA-CF38A	ACL-4727	RIMAC-RINC.M300	Rib fragment	10.1	-9.0	14.6	37.2	14.9	2.9	-4.7	-4.3
RINC-D02.IIA-CF41	ACL-4730	RIMAC-RINC.M303	Rib fragment	1.3	*NA*	*NA*	*NA*	*NA*	*NA*	-8.6	*NA*
RINC-D02.IIA-CF45	ACL-4733	RIMAC-RINC.M306	Rib fragment	15.9	-8.3	16.1	42.2	16.0	3.1	-5.6	-2.8

Individual Code	ACL Number	Specimen Number	Sample description	% yield	$\delta^{13}C_{col}$ (‰)	$\delta^{15}N$ (‰)	% C	% N	C:N (mole:mole)	$\delta^{13}C_{ap}$ (‰)	$\Delta\delta^{13}C_{col-ap}$
RINC-D02.IIA-CF56	ACL-4735	RIMAC-RINC.M308	Rib fragment	20.1	-11.4	13.9	41.3	16.5	2.9	-6.8	-4.6
RINC-D02.IIA-CF57	ACL-4738	RIMAC-RINC.M311	Rib fragment	12.8	-10.2	10.8	42.3	17.1	2.9	-5.4	-4.8
RINC-D02.IIA-CF59	ACL-4742	RIMAC-RINC.M315	Rib fragment	13.8	-10.2	15.2	40.6	16.2	2.9	-6.6	-3.7
RINC-D02.IIA-CF72	ACL-4744	RIMAC-RINC.M317	Rib fragment	18.1	-8.0	16.3	39.6	15.7	2.9	-5.9	-2.1
RINC-D02.IIA-CF76	ACL-4745	RIMAC-RINC.M318	Rib fragment	14.9	-11.9	15.6	39.4	14.3	3.2	-8.2	-3.7
RINC-D02.IIA-CF77	ACL-4748	RIMAC-RINC.M321	Rib fragment	16.3	-9.7	14.9	41.4	15.7	3.1	-6.3	-3.4
RINC-D02.IIA-CF79	ACL-4752	RIMAC-RINC.M325	Rib fragment	14.9	-9.7	16.6	40.5	15.6	3.0	-8.4	-1.4
RINC-D02.IIA-CF82A	ACL-4756	RIMAC-RINC.M329	Rib fragment	13.8	-8.3	13.2	42.2	16.8	2.9	-4.1	-4.2
RINC-D02.IIA-CF87	ACL-4758	RIMAC-RINC.M331	Tibia fragment	13.9	-15.2	12.6	39.6	15.7	2.9	-12.6	-2.6
RINC-D02.IIA-CF91	ACL-4761	RIMAC-RINC.M334	Rib fragment	2.7	-9.3	14.4	28.5	11.4	2.9	-5.5	-3.8
RINC-D02.IIA-CF95	ACL-4765	RIMAC-RINC.M338	Rib fragment	8.1	-11.8	13.8	40.5	16.3	2.9	-7.4	-4.4
RINC-D02.IIA-CF97	ACL-4769	RIMAC-RINC.M342	Rib fragment	18.7	-11.3	12.2	37.3	14.8	2.9	-6.9	-4.4
RINC-G9698.IIAE-1026-2	ACL-4773	RIMAC-RINC.M346	Rib fragment	12.8	-9.6	14.4	40.6	16.3	2.9	-5.7	-3.9
RINC-G9698.IIAE-1115-1	ACL-4776	RIMAC-RINC.M349	Rib fragment	14.5	-11.7	10.8	41.1	16.1	3.0	-9.0	-2.6
RINC-G9698.IIAE-1119A	ACL-4779	RIMAC-RINC.M352	Rib fragment	14.2	-11.0	16.3	44.9	17.7	3.0	-6.5	-4.5
RINC-G9698.IIAE-1119B	ACL-4781	RIMAC-RINC.M354	Rib fragment	9.0	-14.2	9.3	37.9	15.0	3.0	-12.6	-1.5
RINC-G9698.IIAE-1154	ACL-4784	RIMAC-RINC.M357	Rib fragment	11.2	-10.7	14.0	39.4	16.1	2.9	-6.9	-3.9

Individual Code	ACL Number	Specimen Number	Sample description	% yield	$\delta^{13}C_{col}$ (‰)	$\delta^{15}N$ (‰)	% C	% N	C:N (mole:mole)	$\delta^{13}C_{ap}$ (‰)	$\Delta\delta^{13}C_{col\text{-}ap}$
RINC-G9698.IIAE-1169	ACL-4787	RIMAC-RINC.M360	Rib fragment	7.2	-11.1	12.4	39.4	15.8	2.9	-7.4	-3.7
RINC-G9698.IIAE-1183	ACL-4791	RIMAC-RINC.M364	Rib fragment	9.1	-9.8	13.4	41.5	16.8	2.9	-6.3	-3.4
RINC-G9698.IIAE-1199	ACL-4794	RIMAC-RINC.M367	Rib fragment	2.2	-11.8	13.4	36.3	14.3	3.0	-7.8	-4.1
RINC-G9698.IV-0226	ACL-4795	RIMAC-RINC.M368	Rib fragment	13.7	-12.2	11.6	41.7	16.1	3.0	-6.8	-5.4
RINC-G9698.V-0496-ENT054	ACL-4797	RIMAC-RINC.M370	Rib fragment	11.2	-10.6	12.0	41.9	17.0	2.9	-5.6	-5.0
RINC-G9698.V-0499-ENT057	ACL-4802	RIMAC-RINC.M375	Rib fragment	9.7	-11.0	10.8	39.8	15.8	2.9	-6.5	-4.5
RINC-G9698.V-0509-ENT067	ACL-4806	RIMAC-RINC.M379	Rib fragment	15.1	-9.0	12.9	40.4	16.3	2.9	-2.9	-6.0
RINC-G9698.V-0519-ENT077	ACL-4809	RIMAC-RINC.M382	Rib fragment	10.9	-9.9	12.9	39.1	15.7	2.9	-6.0	-3.9
RINC-G9698.V-0520.1-ENT078	ACL-4813	RIMAC-RINC.M386	Rib fragment	10.3	-9.2	15.6	39.4	15.5	3.0	-4.8	-4.4
RINC-G9698.V-0520.2-ENT078	ACL-4817	RIMAC-RINC.M390	Rib fragment	15.1	-8.3	16.5	40.0	15.6	3.0	-5.4	-2.9
RINC-G9698.V-0521-ENT079	ACL-4819	RIMAC-RINC.M392	Rib fragment	18.6	-11.8	12.8	42.4	16.3	3.0	-7.8	-4.0
RINC-G9698.V-0543-ENT099	ACL-4822	RIMAC-RINC.M395	Rib fragment	15.8	-9.4	12.3	39.3	15.3	3.0	-4.9	-4.6

APPENDIX J

STABLE CARBON AND NITROGEN ISOTOPE DATA FOR ARCHAEOLOGICAL HAIR KERATIN SAMPLES

Individual Code	ACL Number	Specimen Number	$\delta^{13}C_{ker}$ (‰)	$\delta^{15}N_{ker}$ (‰)	% C	% N	C:N (mole:mole)
ARMA-PER97-ENT12	ACL-4431	RIMAC-ARMA.M004	-11.2	14.6	41.6	15.1	3.2
ARMA-PER97-ENT35	ACL-4438	RIMAC-ARMA.M011	-9.2	17.2	42.5	15.0	3.3
ARMA-PER97-ENT42	ACL-4442	RIMAC-ARMA.M015	-10.5	17.5	41.2	14.7	3.3
ARMA-PER97-ENT43A	ACL-4446	RIMAC-ARMA.M019	-9.2	11.4	40.0	14.6	3.2
ARMA-PER97-ENT45A	ACL-4452	RIMAC-ARMA.M025	-11.2	18.0	41.3	14.4	3.4
ARMA-PER97-ENT46	ACL-4456	RIMAC-ARMA.M029	-10.7	17.0	41.9	14.9	3.3
ARMA-PER97-ENT49	ACL-4458	RIMAC-ARMA.M031	-13.3	19.3	41.9	14.9	3.3
ARMA-PER97-ENT57	ACL-4462	RIMAC-ARMA.M035	-12.0	16.5	41.9	15.0	3.2
ARMA-PER97-ENT65	ACL-4466	RIMAC-ARMA.M039	-13.6	11.9	41.6	14.5	3.4
ARMA-PER97-ENT68	ACL-4470	RIMAC-ARMA.M043	-14.3	15.5	40.4	14.2	3.3
ARMA-D04.I-CF09	ACL-4477	RIMAC-ARMA.M050	-12.8	15.2	42.9	15.3	3.3
ARMA-D04.I-CF25B	ACL-4481	RIMAC-ARMA.M054	-16.6	14.5	41.7	14.9	3.3
ARMA-D04.II-CF005A	ACL-4485	RIMAC-ARMA.M058	-13.8	17.2	42.5	15.6	3.2
ARMA-D04.II-CF007A	ACL-4489	RIMAC-ARMA.M062	-12.2	12.9	41.9	15.3	3.2
ARMA-D04.II-CF007B	ACL-4491	RIMAC-ARMA.M064	-12.7	16.6	41.3	14.7	3.3
ARMA-D04.II-CF013	ACL-4495	RIMAC-ARMA.M068	-14.5	16.6	42.5	15.3	3.2
ARMA-D04.II-CF030	ACL-4500	RIMAC-ARMA.M073	-11.3	14.4	41.9	15.1	3.2
ARMA-D04.II-CF031A	ACL-4504	RIMAC-ARMA.M077	-12.9	16.6	42.4	15.4	3.2
ARMA-D04.II-CF052	ACL-4511	RIMAC-ARMA.M084	-11.7	14.7	43.0	15.4	3.3
ARMA-D04.II-CF055 (#2931)	ACL-4515	RIMAC-ARMA.M088	-9.4	17.3	42.2	15.1	3.2
ARMA-D04.II-CF057	ACL-4519	RIMAC-ARMA.M092	-12.2	17.6	42.1	15.5	3.2
ARMA-D04.II-CF062	ACL-4523	RIMAC-ARMA.M096	-11.7	15.1	41.6	15.0	3.2
ARMA-D04.II-CF073B	ACL-4527	RIMAC-ARMA.M100	-13.3	13.1	41.9	14.9	3.3
ARMA-D04.II-CF080	ACL-4531	RIMAC-ARMA.M104	-13.3	15.6	42.3	15.0	3.3
ARMA-D04.II-CF082B	ACL-4533	RIMAC-ARMA.M106	-12.3	18.8	38.7	13.6	3.3
ARMA-D04.II-CF084	ACL-4537	RIMAC-ARMA.M110	-12.5	15.1	41.8	15.2	3.2
ARMA-D04.II-CF085A	ACL-4541	RIMAC-ARMA.M114	-13.4	17.2	41.9	15.0	3.3
ARMA-D04.II-CF093B	ACL-4545	RIMAC-ARMA.M118	-12.1	12.9	42.3	15.3	3.2
ARMA-D04.II-CF101B	ACL-4549	RIMAC-ARMA.M122	-10.3	20.2	40.7	14.3	3.3
ARMA-D04.II-CF103	ACL-4553	RIMAC-ARMA.M126	-14.9	18.7	42.1	15.0	3.3
ARMA-D04.II-CF105	ACL-4557	RIMAC-ARMA.M130	-12.9	16.9	40.7	14.6	3.2
ARMA-D04.II-CF110	ACL-4561	RIMAC-ARMA.M134	-11.1	16.7	41.6	14.9	3.3

Individual Code	ACL Number	Specimen Number	$\delta^{13}C_{ker}$ (‰)	$\delta^{15}N_{ker}$ (‰)	% C	% N	C:N (mole:mole)
ARMA-D04.II-CF111A	ACL-4565	RIMAC-ARMA.M138	-11.2	18.4	41.4	14.6	3.3
ARMA-D04.II-CF111B	ACL-4568	RIMAC-ARMA.M141	-11.1	16.9	41.6	14.5	3.4
ARMA-D04.II-CF111C.1	ACL-4571	RIMAC-ARMA.M144	-12.7	20.2	41.9	15.0	3.3
ARMA-D04.II-CF111C.2	ACL-4573	RIMAC-ARMA.M146	-12.5	20.1	41.3	14.6	3.3
ARMA-D04.II-CF114	ACL-4577	RIMAC-ARMA.M150	-12.7	16.7	42.2	15.2	3.3
ARMA-D04.II-CF118	ACL-4581	RIMAC-ARMA.M154	-11.4	17.6	42.3	15.1	3.3
ARMA-D04.II-CF121	ACL-4588	RIMAC-ARMA.M161	-12.7	14.2	41.9	14.9	3.3
ARMA-D04.II-CF122	ACL-4592	RIMAC-ARMA.M165	-12.2	17.9	41.9	14.6	3.4
ARMA-D04.II-CF125	ACL-4596	RIMAC-ARMA.M169	-12.2	16.7	41.5	14.8	3.3
ARMA-D04.II-CF127	ACL-4600	RIMAC-ARMA.M173	-12.2	18.0	41.1	14.7	3.3
ARMA-D04.II-CF129	ACL-4604	RIMAC-ARMA.M177	-13.3	15.5	41.9	15.0	3.3
ARMA-D04.II-CF134	ACL-4608	RIMAC-ARMA.M181	-13.6	15.4	42.3	14.9	3.3
ARMA-D04.II-CF135	ACL-4612	RIMAC-ARMA.M185	-12.2	15.7	42.3	15.0	3.3
ARMA-D04.II-CF138	ACL-4616	RIMAC-ARMA.M189	-11.2	18.0	41.6	14.8	3.3
ARMA-D04.II-CF139	ACL-4620	RIMAC-ARMA.M193	-13.1	15.9	42.6	15.2	3.3
ARMA-D04.II-CF141	ACL-4624	RIMAC-ARMA.M197	-12.8	16.5	41.1	14.8	3.2
ARMA-D04.II-CF142	ACL-4628	RIMAC-ARMA.M201	-13.8	14.6	41.7	15.1	3.2
ARMA-D04.II-CF146	ACL-4638	RIMAC-ARMA.M211	-12.6	12.1	42.4	14.5	3.4
ARMA-D04.II-CF150	ACL-4642	RIMAC-ARMA.M215	-11.6	12.4	43.1	15.0	3.3
ARMA-D04.II-CF151	ACL-4646	RIMAC-ARMA.M219	-11.9	15.5	41.3	14.5	3.3
ARMA-D04.II-CF157 (#3706)	ACL-4653	RIMAC-ARMA.M226	-12.6	17.3	40.6	14.5	3.3
ARMA-D04.II-CF167	ACL-4657	RIMAC-ARMA.M230	-12.2	14.1	41.4	14.8	3.3
ARMA-D04.II-CF172B	ACL-4660	RIMAC-ARMA.M233	-13.7	16.0	41.5	14.7	3.3
ARMA-D04.II-CF182	ACL-4664	RIMAC-ARMA.M237	-11.6	14.5	42.2	15.5	3.2
ARMA-D04.II-CF188	ACL-4668	RIMAC-ARMA.M241	-11.2	15.2	42.6	15.4	3.2
RINC-D02.I-CF01	ACL-4672	RIMAC-RINC.M245	-12.2	11.8	40.7	14.0	3.4
RINC-G9698.I-1135-1A	ACL-4676	RIMAC-RINC.M249	-9.8	13.1	41.5	14.8	3.3
RINC-G9698.II-0434-ENT033	ACL-4680	RIMAC-RINC.M253	-9.4	11.3	42.1	15.1	3.2
RINC-G9698.II-0463-ENT040	ACL-4684	RIMAC-RINC.M257	-12.5	10.8	41.2	14.8	3.2
RINC-G9698.II-0560-ENT110	ACL-4688	RIMAC-RINC.M261	-12.9	10.3	41.8	14.8	3.3
RINC-G9698.II-0563-ENT53	ACL-4692	RIMAC-RINC.M265	-11.2	11.2	43.8	15.1	3.4
RINC-G9698.II-0567-ENT116	ACL-4696	RIMAC-RINC.M269	-11.2	11.5	43.2	15.2	3.3

Individual Code	**ACL Number**	**Specimen Number**	**$\delta^{13}C_{ker}$ (‰)**	**$\delta^{15}N_{ker}$ (‰)**	**% C**	**% N**	**C:N (mole:mole)**
RINC-D02.IIA-CF03	ACL-4700	RIMAC-RINC.M273	-13.1	13.0	40.8	14.4	3.3
RINC-D02.IIA-CF05	ACL-4703	RIMAC-RINC.M276	-11.0	13.0	41.8	13.9	3.5
RINC-D02.IIA-CF23	ACL-4709	RIMAC-RINC.M282	-10.8	13.2	42.9	14.7	3.4
RINC-D02.IIA-CF25	ACL-4713	RIMAC-RINC.M286	-8.9	15.5	42.2	14.6	3.4
RINC-D02.IIA-CF29	ACL-4717	RIMAC-RINC.M290	-12.3	12.1	41.7	14.6	3.3
RINC-D02.IIA-CF31	ACL-4721	RIMAC-RINC.M294	-11.1	13.8	40.1	14.3	3.3
RINC-D02.IIA-CF34	ACL-4725	RIMAC-RINC.M298	-9.8	12.7	40.5	14.2	3.3
RINC-D02.IIA-CF38A	ACL-4728	RIMAC-RINC.M301	-10.5	14.8	40.9	14.0	3.4
RINC-D02.IIA-CF45	ACL-4734	RIMAC-RINC.M307	-8.5	15.8	40.9	14.1	3.4
RINC-D02.IIA-CF57	ACL-4739	RIMAC-RINC.M312	-13.7	10.0	44.0	15.3	3.4
RINC-D02.IIA-CF59	ACL-4743	RIMAC-RINC.M316	-12.3	12.2	42.2	14.7	3.3
RINC-D02.IIA-CF77	ACL-4749	RIMAC-RINC.M322	-9.9	13.1	41.1	14.6	3.3
RINC-D02.IIA-CF79	ACL-4753	RIMAC-RINC.M326	-12.1	15.3	40.9	14.5	3.3
RINC-D02.IIA-CF82A	ACL-4757	RIMAC-RINC.M330	-10.0	12.4	42.1	14.7	3.3
RINC-D02.IIA-CF91	ACL-4762	RIMAC-RINC.M335	-10.6	13.1	42.5	14.7	3.4
RINC-D02.IIA-CF95	ACL-4766	RIMAC-RINC.M339	-19.3	8.0	41.8	14.5	3.4
RINC-D02.IIA-CF97	ACL-4770	RIMAC-RINC.M343	-13.7	11.9	41.8	14.4	3.4
RINC-G9698.IIAE-1169	ACL-4788	RIMAC-RINC.M361	-13.4	10.4	41.0	14.9	3.2
RINC-G9698.IIAE-1183	ACL-4792	RIMAC-RINC.M365	-11.9	10.5	40.9	14.0	3.4
RINC-G9698.V-0496-ENT054	ACL-4798	RIMAC-RINC.M371	-13.4	11.9	41.8	14.7	3.3
RINC-G9698.V-0499-ENT057	ACL-4803	RIMAC-RINC.M376	-12.4	9.4	42.7	15.1	3.3
RINC-G9698.V-0519-ENT077	ACL-4810	RIMAC-RINC.M383	-11.5	12.8	41.8	14.6	3.3
RINC-G9698.V-0520.1-ENT078	ACL-4814	RIMAC-RINC.M387	-11.1	16.8	41.9	14.4	3.4
RINC-G9698.V-0520.2-ENT078	ACL-4818	RIMAC-RINC.M391	-10.3	14.4	42.6	14.4	3.4
RINC-G9698.V-0543-ENT099	ACL-4823	RIMAC-RINC.M396	-10.6	11.3	40.7	13.8	3.4

APPENDIX K

DENTAL WEAR DATA

Individual	IndCode	Age	Sex	WearAvg Tot	WearAvg Ant	WearAvg Premol	WearAvgMol
ARMA-D04.I-CF09	001	YA	F	4.58	4.45	4.67	4.83
ARMA-D04.I-CF10	002	Adol	F	3.37	3.57	3.00	3.53
ARMA-D04.I-CF29	005	MA	F	6.18	6.40	5.67	6.38
ARMA-D04.II-CF003	006	YA	F	2.87	3.14	2.67	2.68
ARMA-D04.II-CF005A	007	YA	F	4.54	4.25	5.67	3.89
ARMA-D04.II-CF007A	008	YA	PF	5.53	5.36	5.71	5.59
ARMA-D04.II-CF010A	011	MA	M	5.34	5.00	5.14	6.30
ARMA-D04.II-CF013	012	MA	M	5.73	5.60	6.00	5.60
ARMA-D04.II-CF020	014	MA	F	5.86	5.33	6.13	6.94
ARMA-D04.II-CF030	021	MA	F	3.86	3.44	4.38	3.83
ARMA-D04.II-CF031A	022	OA	F	5.82	5.86	6.00	5.63
ARMA-D04.II-CF035	023	MA	F	6.00	6.00	6.00	NA
ARMA-D04.II-CF056.2	032	OA	F	5.00	5.00	6.00	3.00
ARMA-D04.II-CF062	034	OA	F	6.57	6.50	6.67	NA
ARMA-D04.II-CF073A	038	MA	F	3.16	2.70	3.50	3.31
ARMA-D04.II-CF073B	039	MA	F	5.93	7.11	6.80	2.95
ARMA-D04.II-CF079	041	MA	PM	5.14	4.75	6.25	4.30
ARMA-D04.II-CF080	042	MA	F	4.06	4.60	4.00	1.50
ARMA-D04.II-CF085A	046	OA	F	5.03	5.00	5.00	5.08
ARMA-D04.II-CF086	048	YA	F	5.72	5.90	6.14	3.38
ARMA-D04.II-CF088	050	MA	F	4.75	6.50	3.00	NA
ARMA-D04.II-CF093B	054	OA	F	4.88	NA	3.67	8.50
ARMA-D04.II-CF097	057	OA	F	5.14	5.25	5.67	4.63
ARMA-D04.II-CF098	058	MA	M	4.49	4.58	4.50	4.38
ARMA-D04.II-CF103	060	OA	M	6.61	6.86	6.00	5.50

Individual	IndCode	Age	Sex	WearAvg Tot	WearAvg Ant	WearAvg Premol	WearAvgMol
ARMA-D04.II-CF106	062	MA	F	6.21	6.83	6.50	3.50
ARMA-D04.II-CF108	063	YA	F	2.94	3.92	2.50	2.18
ARMA-D04.II-CF109	064	OA	F	3.50	4.00	NA	3.25
ARMA-D04.II-CF112	070	MA	F	4.96	NA	4.00	5.44
ARMA-D04.II-CF113.1	071	MA	PM	4.90	5.00	4.80	4.90
ARMA-D04.II-CF114	072	YA	M	4.88	5.00	4.75	NA
ARMA-D04.II-CF115	073	YA	F	5.28	6.00	5.50	3.88
ARMA-D04.II-CF118	075	MA	F	2.78	2.88	3.00	2.46
ARMA-D04.II-CF119A	076	MA	M	5.80	5.86	5.71	5.82
ARMA-D04.II-CF120	077	OA	F	4.00	NA	4.00	NA
ARMA-D04.II-CF121	078	MA	M	5.26	4.50	4.88	5.95
ARMA-D04.II-CF122	079	MA	M	5.05	5.00	5.88	4.36
ARMA-D04.II-CF123	080	MA	M	5.19	5.30	5.67	4.19
ARMA-D04.II-CF124	081	YA	M	5.11	4.83	5.00	7.25
ARMA-D04.II-CF125	082	YA	M	2.90	2.33	2.80	3.35
ARMA-D04.II-CF126	083	OA	F	NA	NA	NA	NA
ARMA-D04.II-CF127	084	MA	F	2.86	3.08	2.75	2.67
ARMA-D04.II-CF128A	085	Adol	F	1.92	1.50	2.14	2.03
ARMA-D04.II-CF129	087	MA	F	1.56	3.57	4.29	1.96
ARMA-D04.II-CF132	089	MA	M	7.45	7.86	6.75	NA
ARMA-D04.II-CF133	090	MA	F	5.13	4.80	5.67	NA
ARMA-D04.II-CF134	091	OA	F	4.31	5.00	5.00	3.17
ARMA-D04.II-CF135	092	MA	F	4.68	5.00	5.25	4.04
ARMA-D04.II-CF141	095	MA	M	4.75	4.80	2.75	8.63
ARMA-D04.II-CF142	096	Adol	F	2.48	3.33	1.75	2.28
ARMA-D04.II-CF143	097	MA	M	6.40	5.71	6.25	7.75

Individual	IndCode	Age	Sex	WearAvg Tot	WearAvg Ant	WearAvg Premol	WearAvgMol
ARMA-D04.II-CF144A	098	MA	F	4.60	4.55	5.00	4.15
ARMA-D04.II-CF145	100	MA	F	4.31	5.00	4.88	3.03
ARMA-D04.II-CF147.1	102	YA	F	2.15	2.50	1.33	2.45
ARMA-D04.II-CF149	105	MA	M	5.50	6.00	5.67	3.50
ARMA-D04.II-CF150	106	Adol	PM	2.54	3.33	1.57	2.14
ARMA-D04.II-CF151	107	MA	F	3.05	3.42	3.00	2.61
ARMA-D04.II-CF153 (#3634)	108	MA	F	6.41	6.60	6.00	6.75
ARMA-D04.II-CF154	109	MA	M	6.56	6.82	6.83	5.44
ARMA-D04.II-CF156A	113	YA	M	4.40	4.08	4.13	4.93
ARMA-D04.II-CF157 (#3706)	116	YA	F	2.79	3.70	2.63	2.15
ARMA-D04.II-CF160	117	MA	F	3.70	3.58	4.33	2.92
ARMA-D04.II-CF163	119	MA	F	4.86	5.00	4.75	4.68
ARMA-D04.II-CF164	120	OA	F	4.22	5.60	4.00	2.00
ARMA-D04.II-CF165	121	YA	PF	1.99	2.25	1.88	1.90
ARMA-D04.II-CF167	123	YA	M	4.13	3.83	4.63	4.06
ARMA-D04.II-CF168	124	MA	PM	4.29	4.40	4.43	4.16
ARMA-D04.II-CF170	126	OA	F	4.42	4.80	4.17	3.95
ARMA-D04.II-CF172A	127	YA	F	2.69	2.70	2.50	2.88
ARMA-D04.II-CF182	131	YA	M	3.79	4.33	4.50	3.23
ARMA-D04.II-CF186	132	MA	F	3.07	3.33	3.14	2.77
ARMA-D04.II-CF188	134	YA	M	4.72	5.00	5.67	4.06
ARMA-D04.II-CF189	135	MA	F	4.64	4.33	5.00	4.60
ARMA-PER97-ENT24B.1	138	YA	PM	1.81	1.75	1.40	2.02
ARMA-PER97-ENT27.1	139	OA	F	5.33	5.00	6.00	NA
ARMA-PER97-ENT31.1	141	MA	M	4.49	4.00	4.50	5.38
ARMA-PER97-ENT34	143	YA	F	3.35	4.00	4.20	2.81

Individual	IndCode	Age	Sex	WearAvg Tot	WearAvg Ant	WearAvg Premol	WearAvgMol
ARMA-PER97-ENT35	144	MA	M	5.40	5.50	5.13	5.57
ARMA-PER97-ENT37	145	YA	M	6.26	6.56	6.40	5.60
ARMA-PER97-ENT39	147	MA	M	5.57	5.20	5.33	7.25
ARMA-PER97-ENT40	148	MA	M	4.25	4.67	3.50	4.50
ARMA-PER97-ENT42	151	MA	M	6.06	6.67	5.50	5.83
ARMA-PER97-ENT43	152	MA	M	5.60	5.33	6.67	NA
ARMA-PER97-ENT45	154	OA	F	8.21	5.14	5.71	5.57
ARMA-PER97-ENT46	156	YA	PF	2.97	3.58	2.88	2.42
ARMA-PER97-ENT49	159	OA	PF	NA	NA	NA	NA
ARMA-PER97-ENT50	161	MA	F	5.41	5.40	4.75	6.18
ARMA-PER97-ENT65	165	YA	M	3.88	3.86	4.13	3.73
ARMA-PER97-ENT68	166	MA	F	5.84	6.86	6.00	3.17
ARMA-PER97-ENT74	167	MA	F	4.76	5.33	5.60	3.50
RINC-D02.I-CF01	169	YA	M	6.11	6.43	6.50	4.63
RINC-D02.IIA-CF26	179	OA	F	4.88	5.50	4.25	NA
RINC-D02.IIA-CF29	180	MA	F	4.43	5.00	4.00	4.33
RINC-D02.IIA-CF36	186	Adult	M	3.88	2.67	6.00	3.20
RINC-D02.IIA-CF57	198	MA	PM	6.75	7.75	5.50	1.25
RINC-D02.IIA-CF59	199	MA	M	5.09	5.00	5.57	4.67
RINC-D02.IIA-CF64	201	YA	M	5.66	5.64	5.43	5.85
RINC-D02.IIA-CF82A	211	YA	F	2.28	2.43	2.25	2.20
RINC-D02.IIA-CF83.1	213	Adult	Amb	4.29	4.67	5.00	3.00
RINC-D02.IIA-CF91	217	OA	F	4.01	4.70	3.57	3.46
RINC-D02.IIA-CF95	219	OA	F	6.08	6.43	5.80	5.75
RINC-D02.IIA-CF97	220	YA	M	4.21	4.70	4.38	3.32
RINC-G9698.I-1135-1B	222	MA	M	5.25	6.20	5.75	3.90

Individual	IndCode	Age	Sex	WearAvg Tot	WearAvg Ant	WearAvg Premol	WearAvgMol
RINC-G9698.II-0463-ENT040	230	MA	M	5.37	5.08	5.13	5.86
RINC-G9698.II-0563-ENT053	233	YA	M	3.27	4.08	2.88	2.53
RINC-G9698.IIAE-1025	240	YA	M	3.98	5.25	4.14	2.95
RINC-G9698.IIAE-1026-2	242	MA	PF	5.37	5.80	6.00	3.75
RINC-G9698.IIAE-1119A	245	YA	F	2.30	2.91	1.75	2.09
RINC-G9698.IIAE-1154	247	MA	F	3.67	2.50	5.00	4.60
RINC-G9698.IIAE-1164	248	OA	F	5.01	5.00	5.20	4.89
RINC-G9698.IIAE-1169	249	Adol	F	3.13	3.50	3.50	2.52
RINC-G9698.IIAE-1183	251	YA	M	6.86	6.75	6.75	7.20
RINC-G9698.IIAE-1199	252	OA	F	6.00	6.00	6.00	NA
RINC-G9698.V-0512-ENT070	268	YA	F	2.25	NA	1.75	3.25
RINC-G9698.V-0519-ENT077	270	YA	M	5.24	5.64	4.83	4.75
RINC-G9698.V-0520.1-ENT078	271	OA	F	5.25	5.00	5.60	5.50

Codes	Variable	Variable Description
IndCode	Individual code	Unique individual code assigned for dental analyses.
WearAvgTot	Total average wear score	Calculated as the sum of all wear scores divided by the total number of all teeth with observable occlusal surfaces (i.e., number of teeth with wear scores). Note that molar wear scores are calculated as the average of quadrant scores.
WearAvgAnt	Average wear score for anterior teeth	Calculated as the sum of wear scores for anterior teeth (incisors and canines) divided by the number of anterior teeth with observable occlusal surfaces (i.e., number of anterior teeth with wear scores).
WearAvgPremol	Average wear score for premolars	Calculated as the sum of wear scores for premolars divided by the number of premolars with observable occlusal surfaces (i.e., number of premolars with wear scores).
WearAvgMol	Average wear score for molars	Calculated as the sum of wear scores for molars (i.e., sum of quadrant averages) divided by the number of molars with observable occlusal surfaces (i.e., number of molars with wear scores).

APPENDIX L

DENTAL CALCULUS DATA

Individual	IndCode	Age	Sex	SumCalc ScoresAnt	TotObsLL SurfAnt	SumCalc ScoresPos	TotObsBL SurfPos	TotSum CalcScores	TotObs BLLSurf	PerCalc Surf
ARMA-D04.I-CF09	001	YA	F	0	22	0	22	0.00	44.00	0.00
ARMA-D04.I-CF10	002	Adol	F	0	12	0	36	0.00	48.00	0.00
ARMA-D04.I-CF29	005	MA	F	2	10	3	10	5.00	20.00	0.25
ARMA-D04.II-CF003	006	YA	F	0	14	2	20	2.00	34.00	0.06
ARMA-D04.II-CF005A	007	YA	F	10	16	11	30	21.00	46.00	0.46
ARMA-D04.II-CF007A	008	YA	PF	1	22	0	30	1.00	52.00	0.02
ARMA-D04.II-CF010A	011	MA	M	1	20	3	38	4.00	58.00	0.07
ARMA-D04.II-CF013	012	MA	M	6	20	0	29	6.00	49.00	0.12
ARMA-D04.II-CF020	014	MA	F	0	24	0	24	0.00	48.00	0.00
ARMA-D04.II-CF030	021	MA	F	2	18	0	36	2.00	54.00	0.04
ARMA-D04.II-CF031A	022	OA	F	10	14	12	22	22.00	36.00	0.61
ARMA-D04.II-CF035	023	MA	F	0	2	2	6	2.00	8.00	0.25
ARMA-D04.II-CF056.2	032	OA	F	0	8	0	6	0.00	14.00	0.00
ARMA-D04.II-CF062	034	OA	F	1	8	2	8	3.00	16.00	0.19
ARMA-D04.II-CF073A	038	MA	F	6	20	0	40	6.00	60.00	0.10
ARMA-D04.II-CF073B	039	MA	F	0	18	4	24	4.00	42.00	0.10
ARMA-D04.II-CF079	041	MA	PM	21	24	8	28	29.00	52.00	0.56
ARMA-D04.II-CF080	042	MA	F	0	18	0	10	0.00	28.00	0.00
ARMA-D04.II-CF085A	046	OA	F	1	8	1	12	2.00	20.00	0.10
ARMA-D04.II-CF086	048	YA	F	8	20	2	20	10.00	40.00	0.25
ARMA-D04.II-CF088	050	MA	F	2	6	1	6	3.00	12.00	0.25
ARMA-D04.II-CF093B	054	OA	F	NA	0	1	8	1.00	8.00	0.13
ARMA-D04.II-CF097	057	OA	F	0	10	0	20	0.00	30.00	0.00
ARMA-D04.II-CF098	058	MA	M	0	24	2	38	2.00	62.00	0.03
ARMA-D04.II-CF103	060	OA	M	1	14	0	8	1.00	22.00	0.05
ARMA-D04.II-CF106	062	MA	F	0	12	0	16	0.00	28.00	0.00

Individual	IndCode	Age	Sex	SumCalc ScoresAnt	TotObsLL SurfAnt	SumCalc ScoresPos	TotObsBL SurfPos	TotSum CalcScores	TotObs BLLSurf	PerCalc Surf
ARMA-D04.II-CF108	063	YA	F	0	24	0	38	0.00	62.00	0.00
ARMA-D04.II-CF109	064	OA	F	2	2	2	6	4.00	8.00	0.50
ARMA-D04.II-CF112	070	MA	F	NA	0	5	10	5.00	10.00	0.50
ARMA-D04.II-CF113.1	071	MA	PM	12	10	16	22	28.00	32.00	0.88
ARMA-D04.II-CF114	072	YA	M	5	10	6	8	11.00	18.00	0.61
ARMA-D04.II-CF115	073	YA	F	0	12	3	22	3.00	34.00	0.09
ARMA-D04.II-CF118	075	MA	F	0	16	1	28	1.00	44.00	0.02
ARMA-D04.II-CF119A	076	MA	M	2	14	1	34	3.00	48.00	0.06
ARMA-D04.II-CF120	077	OA	F	NA	0	0	2	0.00	2.00	0.00
ARMA-D04.II-CF121	078	MA	M	6	12	4	38	10.00	50.00	0.20
ARMA-D04.II-CF122	079	MA	M	5	16	2	34	7.00	50.00	0.14
ARMA-D04.II-CF123	080	MA	M	8	24	3	22	11.00	46.00	0.24
ARMA-D04.II-CF124	081	YA	M	8	14	9	14	17.00	28.00	0.61
ARMA-D04.II-CF125	082	YA	M	1	6	2	20	3.00	26.00	0.12
ARMA-D04.II-CF126	083	OA	F	NA	0	NA	0	NA	0.00	NA
ARMA-D04.II-CF127	084	MA	F	7	24	0	38	7.00	62.00	0.11
ARMA-D04.II-CF128A	085	Adol	F	0	12	0	30	0.00	42.00	0.00
ARMA-D04.II-CF129	087	MA	F	0	14	0	28	0.00	42.00	0.00
ARMA-D04.II-CF132	089	MA	M	1	14	1	10	2.00	24.00	0.08
ARMA-D04.II-CF133	090	MA	F	0	10	0	8	0.00	18.00	0.00
ARMA-D04.II-CF134	091	OA	F	0	12	0	12	0.00	24.00	0.00
ARMA-D04.II-CF135	092	MA	F	2	10	4	20	6.00	30.00	0.20
ARMA-D04.II-CF141	095	MA	M	2	10	20	20	22.00	30.00	0.73
ARMA-D04.II-CF142	096	Adol	F	0	18	0	34	0.00	52.00	0.00
ARMA-D04.II-CF143	097	MA	M	8	14	2	26	10.00	40.00	0.25
ARMA-D04.II-CF144A	098	MA	F	16	22	8	28	24.00	50.00	0.48

Individual	IndCode	Age	Sex	SumCalc ScoresAnt	TotObsLL SurfAnt	SumCalc ScoresPos	TotObsBL SurfPos	TotSum CalcScores	TotObs BLLSurf	PerCalc Surf
ARMA-D04.II-CF145	100	MA	F	7	20	13	38	20.00	58.00	0.34
ARMA-D04.II-CF147.1	102	YA	F	0	20	0	22	0.00	42.00	0.00
ARMA-D04.II-CF149	105	MA	M	2	6	1	8	3.00	14.00	0.21
ARMA-D04.II-CF150	106	Adol	PM	0	24	0	28	0.00	52.00	0.00
ARMA-D04.II-CF151	107	MA	F	0	24	0	34	0.00	58.00	0.00
ARMA-D04.II-CF153 (#3634)	108	MA	F	6	12	2	16	8.00	28.00	0.29
ARMA-D04.II-CF154	109	MA	M	9	22	9	20	18.00	42.00	0.43
ARMA-D04.II-CF156A	113	YA	M	27	24	9	40	36.00	64.00	0.56
ARMA-D04.II-CF157 (#3706)	116	YA	F	0	20	0	40	0.00	60.00	0.00
ARMA-D04.II-CF160	117	MA	F	4	24	0	24	4.00	48.00	0.08
ARMA-D04.II-CF163	119	MA	F	0	24	2	26	2.00	50.00	0.04
ARMA-D04.II-CF164	120	OA	F	1	10	0	8	1.00	18.00	0.06
ARMA-D04.II-CF165	121	YA	PF	0	16	0	40	0.00	56.00	0.00
ARMA-D04.II-CF167	123	YA	M	3	24	1	34	4.00	58.00	0.07
ARMA-D04.II-CF168	124	MA	PM	3	12	1	36	4.00	48.00	0.08
ARMA-D04.II-CF170	126	OA	F	0	20	0	30	0.00	50.00	0.00
ARMA-D04.II-CF172A	127	YA	F	0	20	0	32	0.00	52.00	0.00
ARMA-D04.II-CF182	131	YA	M	0	12	0	31	0.00	43.00	0.00
ARMA-D04.II-CF186	132	MA	F	6	23	0	38	6.00	61.00	0.10
ARMA-D04.II-CF188	134	YA	M	0	17	0	38	0.00	55.00	0.00
ARMA-D04.II-CF189	135	MA	F	1	18	0	26	1.00	44.00	0.02
ARMA-PER97-ENT24B.1	138	YA	PM	0	8	0	32	0.00	40.00	0.00
ARMA-PER97-ENT27.1	139	OA	F	1	4	1	2	2.00	6.00	0.33
ARMA-PER97-ENT31.1	141	MA	M	6	22	11	24	17.00	46.00	0.37
ARMA-PER97-ENT34	143	YA	F	0	2	8	30	8.00	32.00	0.25

Individual	IndCode	Age	Sex	SumCalc ScoresAnt	TotObsLL SurfAnt	SumCalc ScoresPos	TotObsBL SurfPos	TotSum CalcScores	TotObs BLLSurf	PerCalc Surf
ARMA-PER97-ENT35	144	MA	M	2	20	5	32	7.00	52.00	0.13
ARMA-PER97-ENT37	145	YA	M	0	18	3	20	3.00	38.00	0.08
ARMA-PER97-ENT39	147	MA	M	1	20	10	28	11.00	48.00	0.23
ARMA-PER97-ENT40	148	MA	M	1	8	2	12	3.00	20.00	0.15
ARMA-PER97-ENT42	151	MA	M	5	6	3	12	8.00	18.00	0.44
ARMA-PER97-ENT43	152	MA	M	0	2	NA	0	0.00	2.00	0.00
ARMA-PER97-ENT45	154	OA	F	5	16	1	28	6.00	44.00	0.14
ARMA-PER97-ENT46	156	YA	PF	0	24	0	40	0.00	64.00	0.00
ARMA-PER97-ENT49	159	OA	PF	NA	0	NA	0	0.00	0.00	0.00
ARMA-PER97-ENT50	161	MA	F	5	20	0	32	5.00	52.00	0.10
ARMA-PER97-ENT65	165	YA	M	6	12	8	38	14.00	50.00	0.28
ARMA-PER97-ENT68	166	MA	F	3	10	12	14	15.00	24.00	0.63
ARMA-PER97-ENT74	167	MA	F	4	12	10	20	14.00	32.00	0.44
RINC-D02.I-CF01	169	YA	M	2	16	2	8	4.00	24.00	0.17
RINC-D02.IIA-CF26	179	OA	F	3	9	5	8	8.00	17.00	0.47
RINC-D02.IIA-CF29	180	MA	F	0	8	5	10	5.00	18.00	0.28
RINC-D02.IIA-CF36	186	Adult	M	2	18	2	22	4.00	40.00	0.10
RINC-D02.IIA-CF57	198	MA	PM	NA	NA	NA	NA	NA	NA	NA
RINC-D02.IIA-CF59	199	MA	M	13	20	7	32	20.00	52.00	0.38
RINC-D02.IIA-CF64	201	YA	M	17	22	12	36	29.00	58.00	0.50
RINC-D02.IIA-CF82A	211	YA	F	0	14	0	36	0.00	50.00	0.00
RINC-D02.IIA-CF83.1	213	Adult	Amb	11	14	16	18	27.00	32.00	0.84
RINC-D02.IIA-CF91	217	OA	F	0	20	0	32	0.00	52.00	0.00
RINC-D02.IIA-CF95	219	OA	F	1	20	11	20	12.00	40.00	0.30
RINC-D02.IIA-CF97	220	YA	M	0	10	0	18	0.00	28.00	0.00
RINC-G9698.I-1135-1B	222	MA	M	8	10	14	18	22.00	28.00	0.79

Individual	IndCode	Age	Sex	SumCalc ScoresAnt	TotObsLL SurfAnt	SumCalc ScoresPos	TotObsBL SurfPos	TotSum CalcScores	TotObs BLLSurf	PerCalc Surf
RINC-G9698.II-0463-ENT040	230	MA	M	7	24	1	38	8.00	62.00	0.13
RINC-G9698.II-0563-ENT053	233	YA	M	4	24	0	38	4.00	62.00	0.06
RINC-G9698.IIAE-1025	240	YA	M	1	18	0	38	1.00	56.00	0.02
RINC-G9698.IIAE-1026-2	242	MA	PF	0	24	0	22	0.00	46.00	0.00
RINC-G9698.IIAE-1119A	245	YA	F	2	22	0	38	2.00	60.00	0.03
RINC-G9698.IIAE-1154	247	MA	F	0	24	1	26	1.00	50.00	0.02
RINC-G9698.IIAE-1164	248	OA	F	7	20	13	24	20.00	44.00	0.45
RINC-G9698.IIAE-1169	249	Adol	F	0	24	0	40	0.00	64.00	0.00
RINC-G9698.IIAE-1183	251	YA	M	12	16	19	26	31.00	42.00	0.74
RINC-G9698.IIAE-1199	252	OA	F	0	2	0	2	0.00	4.00	0.00
RINC-G9698.V-0512-ENT070	268	YA	F	0	2	0	18	0.00	20.00	0.00
RINC-G9698.V-0519-ENT077	270	YA	M	0	22	1	24	1.00	46.00	0.02
RINC-G9698.V-0520.1-ENT078	271	OA	F	4	20	0	22	4.00	42.00	0.10

Codes	Variable	Variable Description
SumCalcScoresAnt	Sum of calculus scores for anterior teeth	Calculated as the sum of all calculus scores on both labial/buccal and lingual aspects of incisors and canines
TotObsLLSurfAnt	Total number of observable labial and lingual aspects of tooth crowns of anterior teeth	Count. Equals total number of observable labial and lingual aspects of incisors and canines.
SumCalcScoresPos	Sum of calculus scores for posterior teeth	Calculated as the sum of all calculus scores on both labial/buccal and lingual aspects of premolars and molars

TotObsBLSurfPos	Total number of observable buccal and lingual aspects of tooth crowns of posterior teeth	Count. Equals total number of observable buccal and lingual aspects of premolars and molars.
TotSumCalcScores	Sum of calculus scores for all teeth	Calculated as the sum of all calculus scores on both labial/buccal and lingual aspects of all teeth
TotObsBLLSurf	Total observable buccal/labial and lingual surfaces for all teeth	Calculated as the sum of all observable buccal, labial, and lingual surfaces of all teeth.
PerCalcSurf	Average calculus score per surface	Calculated as the sum of calculus scores divided by the total number of observable buccal, labial, and lingual surfaces.

APPENDIX M

DENTAL CARIES DATA

Individual	IndCode	Age	Sex	TotNum ObsTeeth	TotNum CarTeeth	TotNum Caries	PerCar Teeth
ARMA-D04.I-CF09	001	YA	F	21	4	4	0.19
ARMA-D04.I-CF10	002	Adol	F	28	0	0	0.00
ARMA-D04.I-CF29	005	MA	F	10	1	1	0.10
ARMA-D04.II-CF003	006	YA	F	17	4	4	0.24
ARMA-D04.II-CF005A	007	YA	F	23	3	3	0.13
ARMA-D04.II-CF007A	008	YA	PF	26	9	12	0.35
ARMA-D04.II-CF010A	011	MA	M	29	14	15	0.48
ARMA-D04.II-CF013	012	MA	M	25	10	13	0.40
ARMA-D04.II-CF020	014	MA	F	24	5	6	0.21
ARMA-D04.II-CF030	021	MA	F	27	0	0	0.00
ARMA-D04.II-CF031A	022	OA	F	18	0	0	0.00
ARMA-D04.II-CF035	023	MA	F	4	2	2	0.50
ARMA-D04.II-CF056.2	032	OA	F	7	0	0	0.00
ARMA-D04.II-CF062	034	OA	F	8	3	3	0.38
ARMA-D04.II-CF073A	038	MA	F	30	4	5	0.13
ARMA-D04.II-CF073B	039	MA	F	21	4	5	0.19
ARMA-D04.II-CF079	041	MA	PM	26	2	2	0.08
ARMA-D04.II-CF080	042	MA	F	14	9	10	0.64
ARMA-D04.II-CF085A	046	OA	F	10	4	5	0.40
ARMA-D04.II-CF086	048	YA	F	20	10	11	0.50
ARMA-D04.II-CF088	050	MA	F	7	7	8	1.00
ARMA-D04.II-CF093B	054	OA	F	4	0	0	0.00
ARMA-D04.II-CF097	057	OA	F	15	7	9	0.47
ARMA-D04.II-CF098	058	MA	M	31	4	5	0.13
ARMA-D04.II-CF103	060	OA	M	11	5	6	0.45
ARMA-D04.II-CF106	062	MA	F	14	5	5	0.36
ARMA-D04.II-CF108	063	YA	F	31	1	1	0.03
ARMA-D04.II-CF109	064	OA	F	4	2	2	0.50
ARMA-D04.II-CF112	070	MA	F	6	3	3	0.50
ARMA-D04.II-CF113.1	071	MA	PM	16	1	1	0.06
ARMA-D04.II-CF114	072	YA	M	9	2	2	0.22
ARMA-D04.II-CF115	073	YA	F	17	4	4	0.24

Individual	IndCode	Age	Sex	TotNum ObsTeeth	TotNum CarTeeth	TotNum Caries	PerCar Teeth
ARMA-D04.II-CF118	075	MA	F	22	11	18	0.50
ARMA-D04.II-CF119A	076	MA	M	23	4	4	0.17
ARMA-D04.II-CF120	077	OA	F	1	0	0	0.00
ARMA-D04.II-CF121	078	MA	M	25	0	0	0.00
ARMA-D04.II-CF122	079	MA	M	25	1	1	0.04
ARMA-D04.II-CF123	080	MA	M	22	12	13	0.55
ARMA-D04.II-CF124	081	YA	M	14	4	4	0.29
ARMA-D04.II-CF125	082	YA	M	13	2	2	0.15
ARMA-D04.II-CF126	083	OA	F	0	NA	NA	NA
ARMA-D04.II-CF127	084	MA	F	31	3	3	0.10
ARMA-D04.II-CF128A	085	Adol	F	21	0	0	0.00
ARMA-D04.II-CF129	087	MA	F	21	4	4	0.19
ARMA-D04.II-CF132	089	MA	M	12	2	2	0.17
ARMA-D04.II-CF133	090	MA	F	9	6	7	0.67
ARMA-D04.II-CF134	091	OA	F	12	7	9	0.58
ARMA-D04.II-CF135	092	MA	F	15	5	6	0.33
ARMA-D04.II-CF141	095	MA	M	15	3	3	0.20
ARMA-D04.II-CF142	096	Adol	F	26	0	0	0.00
ARMA-D04.II-CF143	097	MA	M	20	13	13	0.65
ARMA-D04.II-CF144A	098	MA	F	25	8	9	0.32
ARMA-D04.II-CF145	100	MA	F	29	5	5	0.17
ARMA-D04.II-CF147.1	102	YA	F	21	1	1	0.05
ARMA-D04.II-CF149	105	MA	M	7	1	1	0.14
ARMA-D04.II-CF150	106	Adol	PM	26	0	0	0.00
ARMA-D04.II-CF151	107	MA	F	29	0	0	0.00
ARMA-D04.II-CF153 (#3634)	108	MA	F	13	2	2	0.15
ARMA-D04.II-CF154	109	MA	M	21	3	3	0.14
ARMA-D04.II-CF156A	113	YA	M	31	3	3	0.10
ARMA-D04.II-CF157 (#3706)	116	YA	F	30	1	1	0.03
ARMA-D04.II-CF160	117	MA	F	24	5	5	0.21
ARMA-D04.II-CF163	119	MA	F	25	5	5	0.20
ARMA-D04.II-CF164	120	OA	F	9	3	3	0.33

Individual	IndCode	Age	Sex	TotNum ObsTeeth	TotNum CarTeeth	TotNum Caries	PerCar Teeth
ARMA-D04.II-CF165	121	YA	PF	28	0	0	0.00
ARMA-D04.II-CF167	123	YA	M	29	3	4	0.10
ARMA-D04.II-CF168	124	MA	PM	23	1	1	0.04
ARMA-D04.II-CF170	126	OA	F	25	7	8	0.28
ARMA-D04.II-CF172A	127	YA	F	26	0	0	0.00
ARMA-D04.II-CF182	131	YA	M	22	1	1	0.05
ARMA-D04.II-CF186	132	MA	F	31	2	3	0.06
ARMA-D04.II-CF188	134	YA	M	28	3	3	0.11
ARMA-D04.II-CF189	135	MA	F	22	4	4	0.18
ARMA-PER97-ENT24B.1	138	YA	PM	20	0	0	0.00
ARMA-PER97-ENT27.1	139	OA	F	3	0	0	0.00
ARMA-PER97-ENT31.1	141	MA	M	24	3	3	0.13
ARMA-PER97-ENT34	143	YA	F	16	4	4	0.25
ARMA-PER97-ENT35	144	MA	M	26	2	3	0.08
ARMA-PER97-ENT37	145	YA	M	21	6	6	0.29
ARMA-PER97-ENT39	147	MA	M	24	14	16	0.58
ARMA-PER97-ENT40	148	MA	M	10	8	9	0.80
ARMA-PER97-ENT42	151	MA	M	9	3	4	0.33
ARMA-PER97-ENT43	152	MA	M	15	0	0	0.00
ARMA-PER97-ENT45	154	OA	F	22	6	7	0.27
ARMA-PER97-ENT46	156	YA	PF	32	0	0	0.00
ARMA-PER97-ENT49	159	OA	PF	0	NA	NA	NA
ARMA-PER97-ENT50	161	MA	F	26	3	3	0.12
ARMA-PER97-ENT65	165	YA	M	25	0	0	0.00
ARMA-PER97-ENT68	166	MA	F	17	3	3	0.18
ARMA-PER97-ENT74	167	MA	F	23	9	9	0.39
RINC-D02.I-CF01	169	YA	M	13	10	10	0.77
RINC-D02.IIA-CF26	179	OA	F	10	0	0	0.00
RINC-D02.IIA-CF29	180	MA	F	9	5	5	0.56
RINC-D02.IIA-CF36	186	Adult	M	20	3	3	0.15
RINC-D02.IIA-CF57	198	MA	PM	NA	NA	NA	NA
RINC-D02.IIA-CF59	199	MA	M	26	5	7	0.19

Individual	IndCode	Age	Sex	TotNum ObsTeeth	TotNum CarTeeth	TotNum Caries	PerCar Teeth
RINC-D02.IIA-CF64	201	YA	M	30	3	3	0.10
RINC-D02.IIA-CF82A	211	YA	F	26	2	3	0.08
RINC-D02.IIA-CF83.1	213	Adult	Ambiguous	16	8	9	0.50
RINC-D02.IIA-CF91	217	OA	F	26	6	6	0.23
RINC-D02.IIA-CF95	219	OA	F	20	10	11	0.50
RINC-D02.IIA-CF97	220	YA	M	29	0	0	0.00
RINC-G9698.I-1135-1B	222	MA	M	15	3	4	0.20
RINC-G9698.II-0463-ENT040	230	MA	M	31	6	6	0.19
RINC-G9698.II-0563-ENT053	233	YA	M	31	2	2	0.06
RINC-G9698.IIAE-1025	240	YA	M	28	0	0	0.00
RINC-G9698.IIAE-1026-2	242	MA	PF	24	17	18	0.71
RINC-G9698.IIAE-1119A	245	YA	F	30	0	0	0.00
RINC-G9698.IIAE-1154	247	MA	F	26	4	4	0.15
RINC-G9698.IIAE-1164	248	OA	F	22	0	0	0.00
RINC-G9698.IIAE-1169	249	Adol	F	32	2	2	0.06
RINC-G9698.IIAE-1183	251	YA	M	21	2	3	0.10
RINC-G9698.IIAE-1199	252	OA	F	2	1	2	0.50
RINC-G9698.V-0512-ENT070	268	YA	F	11	3	3	0.27
RINC-G9698.V-0519-ENT077	270	YA	M	23	6	3	0.26
RINC-G9698.V-0520.1-ENT078	271	OA	F	22	8	9	0.36

Codes	Variable	Variable Description
TotNumObsTeeth	Total number observable teeth	Count. Equals total number of observable teeth. Excludes teeth that are unobservable in crypts or unobservable due to postmortem damage or loss.
TotNumCarTeeth	Total number carious teeth	Count. Equals total number of teeth with one or more caries observed.
TotNumCaries	Total number caries	Count. Equals total number of caries observable in all teeth.
PerCarTeeth	Percent rate of carious teeth	Calculated as the total number of carious teeth divided by the total number of observable teeth

APPENDIX N

PERIAPICAL DENTAL ABSCESSES DATA

Individual	IndCode	Age	Sex	TotNum AlvSurf	TotNum AbsAnt	TotNum AbsPos	TotNum Abs	PerAbs Surf
ARMA-D04.I-CF09	001	YA	F	64	0	0	0	0.00
ARMA-D04.I-CF10	002	Adol	F	64	0	0	0	0.00
ARMA-D04.I-CF29	005	MA	F	64	0	2	2	0.03
ARMA-D04.II-CF003	006	YA	F	60	0	0	0	0.00
ARMA-D04.II-CF005A	007	YA	F	64	0	0	0	0.00
ARMA-D04.II-CF007A	008	YA	PF	64	0	2	2	0.03
ARMA-D04.II-CF010A	011	MA	M	54	1	5	6	0.11
ARMA-D04.II-CF013	012	MA	M	54	1	0	1	0.02
ARMA-D04.II-CF020	014	MA	F	64	0	0	0	0.00
ARMA-D04.II-CF030	021	MA	F	60	0	0	0	0.00
ARMA-D04.II-CF031A	022	OA	F	60	1	0	1	0.02
ARMA-D04.II-CF035	023	MA	F	60	1	0	1	0.02
ARMA-D04.II-CF056.2	032	OA	F	40	0	0	0	0.00
ARMA-D04.II-CF062	034	OA	F	64	0	1	1	0.02
ARMA-D04.II-CF073A	038	MA	F	64	0	0	0	0.00
ARMA-D04.II-CF073B	039	MA	F	64	3	3	6	0.09
ARMA-D04.II-CF079	041	MA	PM	60	0	0	0	0.00
ARMA-D04.II-CF080	042	MA	F	64	4	0	4	0.06
ARMA-D04.II-CF085A	046	OA	F	24	0	0	0	0.00
ARMA-D04.II-CF086	048	YA	F	64	1	1	2	0.03
ARMA-D04.II-CF088	050	MA	F	64	1	0	1	0.02
ARMA-D04.II-CF093B	054	OA	F	64	0	0	0	0.00
ARMA-D04.II-CF097	057	OA	F	48	0	3	3	0.06
ARMA-D04.II-CF098	058	MA	M	64	0	0	0	0.00
ARMA-D04.II-CF103	060	OA	M	62	0	0	0	0.00
ARMA-D04.II-CF106	062	MA	F	56	1	1	2	0.04
ARMA-D04.II-CF108	063	YA	F	36	0	0	0	0.00
ARMA-D04.II-CF109	064	OA	F	58	0	0	0	0.00
ARMA-D04.II-CF112	070	MA	F	18	0	0	0	0.00
ARMA-D04.II-CF113.1	071	MA	PM	56	0	0	0	0.00
ARMA-D04.II-CF114	072	YA	M	46	1	0	1	0.02

Individual	IndCode	Age	Sex	TotNum AlvSurf	TotNum AbsAnt	TotNum AbsPos	TotNum Abs	PerAbs Surf
ARMA-D04.II-CF115	073	YA	F	46	0	0	0	0.00
ARMA-D04.II-CF118	075	MA	F	64	0	2	2	0.03
ARMA-D04.II-CF119A	076	MA	M	58	0	0	0	0.00
ARMA-D04.II-CF120	077	OA	F	64	0	0	0	0.00
ARMA-D04.II-CF121	078	MA	M	64	0	0	0	0.00
ARMA-D04.II-CF122	079	MA	M	64	0	0	0	0.00
ARMA-D04.II-CF123	080	MA	M	64	0	3	3	0.05
ARMA-D04.II-CF124	081	YA	M	52	1	0	1	0.02
ARMA-D04.II-CF125	082	YA	M	42	0	0	0	0.00
ARMA-D04.II-CF126	083	OA	F	32	0	0	0	0.00
ARMA-D04.II-CF127	084	MA	F	30	0	1	1	0.03
ARMA-D04.II-CF128A	085	Adol	F	56	0	0	0	0.00
ARMA-D04.II-CF129	087	MA	F	64	0	0	0	0.00
ARMA-D04.II-CF132	089	MA	M	62	5	2	7	0.11
ARMA-D04.II-CF133	090	MA	F	58	0	0	0	0.00
ARMA-D04.II-CF134	091	OA	F	32	0	0	0	0.00
ARMA-D04.II-CF135	092	MA	F	64	0	0	0	0.00
ARMA-D04.II-CF141	095	MA	M	60	0	1	1	0.02
ARMA-D04.II-CF142	096	Adol	F	60	0	0	0	0.00
ARMA-D04.II-CF143	097	MA	M	52	0	4	4	0.08
ARMA-D04.II-CF144A	098	MA	F	64	0	2	2	0.03
ARMA-D04.II-CF145	100	MA	F	60	0	1	1	0.02
ARMA-D04.II-CF147.1	102	YA	F	56	0	0	0	0.00
ARMA-D04.II-CF149	105	MA	M	42	1	0	1	0.02
ARMA-D04.II-CF150	106	Adol	PM	56	0	0	0	0.00
ARMA-D04.II-CF151	107	MA	F	58	0	0	0	0.00
ARMA-D04.II-CF153 (#3634)	108	MA	F	48	0	1	1	0.02
ARMA-D04.II-CF154	109	MA	M	50	0	1	1	0.02
ARMA-D04.II-CF156A	113	YA	M	64	0	0	0	0.00
ARMA-D04.II-CF157 (#3706)	116	YA	F	64	0	0	0	0.00
ARMA-D04.II-CF160	117	MA	F	54	0	2	2	0.04

Individual	IndCode	Age	Sex	TotNum AlvSurf	TotNum AbsAnt	TotNum AbsPos	TotNum Abs	PerAbs Surf
ARMA-D04.II-CF163	119	MA	F	64	0	1	1	0.02
ARMA-D04.II-CF164	120	OA	F	60	2	0	2	0.03
ARMA-D04.II-CF165	121	YA	PF	58	0	0	0	0.00
ARMA-D04.II-CF167	123	YA	M	64	0	0	0	0.00
ARMA-D04.II-CF168	124	MA	PM	62	0	0	0	0.00
ARMA-D04.II-CF170	126	OA	F	58	0	1	1	0.02
ARMA-D04.II-CF172A	127	YA	F	54	0	0	0	0.00
ARMA-D04.II-CF182	131	YA	M	64	0	0	0	0.00
ARMA-D04.II-CF186	132	MA	F	64	0	0	0	0.00
ARMA-D04.II-CF188	134	YA	M	64	1	2	3	0.05
ARMA-D04.II-CF189	135	MA	F	62	0	0	0	0.00
ARMA-PER97-ENT24B.1	138	YA	PM	64	0	0	0	0.00
ARMA-PER97-ENT27.1	139	OA	F	62	0	0	0	0.00
ARMA-PER97-ENT31.1	141	MA	M	60	0	2	2	0.03
ARMA-PER97-ENT34	143	YA	F	64	0	0	0	0.00
ARMA-PER97-ENT35	144	MA	M	64	0	0	0	0.00
ARMA-PER97-ENT37	145	YA	M	64	0	1	1	0.02
ARMA-PER97-ENT39	147	MA	M	64	0	1	1	0.02
ARMA-PER97-ENT40	148	MA	M	28	0	2	2	0.07
ARMA-PER97-ENT42	151	MA	M	60	0	0	0	0.00
ARMA-PER97-ENT43	152	MA	M	12	0	NA	0	0.00
ARMA-PER97-ENT45	154	OA	F	64	0	2	2	0.03
ARMA-PER97-ENT46	156	YA	PF	64	0	0	0	0.00
ARMA-PER97-ENT49	159	OA	PF	64	0	0	0	0.00
ARMA-PER97-ENT50	161	MA	F	62	1	1	2	0.03
ARMA-PER97-ENT65	165	YA	M	64	0	0	0	0.00
ARMA-PER97-ENT68	166	MA	F	64	3	1	4	0.06
ARMA-PER97-ENT74	167	MA	F	64	0	1	1	0.02
RINC-D02.I-CF01	169	YA	M	64	0	3	3	0.05
RINC-D02.IIA-CF26	179	OA	F	64	0	0	0	0.00
RINC-D02.IIA-CF29	180	MA	F	62	0	0	0	0.00

Individual	IndCode	Age	Sex	TotNum AlvSurf	TotNum AbsAnt	TotNum AbsPos	TotNum Abs	PerAbs Surf
RINC-D02.IIA-CF36	186	Adult	M	64	1	0	1	0.02
RINC-D02.IIA-CF57	198	MA	PM	NA	NA	NA	NA	NA
RINC-D02.IIA-CF59	199	MA	M	64	0	2	2	0.03
RINC-D02.IIA-CF64	201	YA	M	64	2	0	2	0.03
RINC-D02.IIA-CF82A	211	YA	F	60	0	0	0	0.00
RINC-D02.IIA-CF83.1	213	Adult	Amb	62	0	0	0	0.00
RINC-D02.IIA-CF91	217	OA	F	60	0	2	2	0.03
RINC-D02.IIA-CF95	219	OA	F	60	3	0	3	0.05
RINC-D02.IIA-CF97	220	YA	M	64	0	0	0	0.00
RINC-G9698.I-1135-1B	222	MA	M	64	0	1	1	0.02
RINC-G9698.II-0463-ENT040	230	MA	M	64	0	0	0	0.00
RINC-G9698.II-0563-ENT053	233	YA	M	64	0	0	0	0.00
RINC-G9698.IIAE-1025	240	YA	M	54	1	0	1	0.02
RINC-G9698.IIAE-1026-2	242	MA	PF	60	1	2	3	0.05
RINC-G9698.IIAE-1119A	245	YA	F	64	0	0	0	0.00
RINC-G9698.IIAE-1154	247	MA	F	64	0	1	1	0.02
RINC-G9698.IIAE-1164	248	OA	F	48	0	0	0	0.00
RINC-G9698.IIAE-1169	249	Adol	F	64	0	0	0	0.00
RINC-G9698.IIAE-1183	251	YA	M	62	0	0	0	0.00
RINC-G9698.IIAE-1199	252	OA	F	64	0	0	0	0.00
RINC-G9698.V-0512-ENT070	268	YA	F	32	0	0	0	0.00
RINC-G9698.V-0519-ENT077	270	YA	M	64	0	1	1	0.02
RINC-G9698.V-0520.1-ENT078	271	OA	F	60	1	3	4	0.07

Codes	Variable	Variable Description
TotNumAlvSurf	Total number alveolar surfaces observable	Count. Equals total number of observable labial/buccal and lingual alveolar bone surfaces.
TotNumAbsAnt	Total number periapical abscesses in anterior teeth	Count. Equals total number of periapical abscesses observed on the labial/buccal and/or lingual aspects of the alveolar bone of incisors and canines.

TotNumAbsPos	Total number periapical abscesses in posterior teeth	Count. Equals total number of periapical abscesses observed on the labial/buccal and/or lingual aspects of the alveolar bone of premolars and molars.
PerAbsSurf	Percent rate periapical abscesses in all teeth	Calculated as the total number of periapical abscesses divided by the total number of observable alveolar surfaces

APPENDIX O

ANTEMORTEM TOOTH LOSS DATA

Individual	IndCode	Age	Sex	TotNum AlvSoc	TotNum AMTL	PerAMTL Loci
ARMA-D04.I-CF09	001	YA	F	35	9	0.26
ARMA-D04.I-CF10	002	Adol	F	32	0	0.00
ARMA-D04.I-CF29	005	MA	F	32	13	0.41
ARMA-D04.II-CF003	006	YA	F	32	6	0.19
ARMA-D04.II-CF005A	007	YA	F	32	5	0.16
ARMA-D04.II-CF007A	008	YA	PF	32	4	0.13
ARMA-D04.II-CF010A	011	MA	M	32	1	0.03
ARMA-D04.II-CF013	012	MA	M	32	4	0.13
ARMA-D04.II-CF020	014	MA	F	32	7	0.22
ARMA-D04.II-CF030	021	MA	F	30	0	0.00
ARMA-D04.II-CF031A	022	OA	F	30	7	0.23
ARMA-D04.II-CF035	023	MA	F	32	19	0.59
ARMA-D04.II-CF056.2	032	OA	F	24	10	0.42
ARMA-D04.II-CF062	034	OA	F	32	21	0.66
ARMA-D04.II-CF073A	038	MA	F	32	0	0.00
ARMA-D04.II-CF073B	039	MA	F	32	6	0.19
ARMA-D04.II-CF079	041	MA	PM	32	4	0.13
ARMA-D04.II-CF080	042	MA	F	32	13	0.41
ARMA-D04.II-CF085A	046	OA	F	32	9	0.28
ARMA-D04.II-CF086	048	YA	F	32	8	0.25
ARMA-D04.II-CF088	050	MA	F	32	18	0.56
ARMA-D04.II-CF093B	054	OA	F	32	18	0.56
ARMA-D04.II-CF097	057	OA	F	32	6	0.19
ARMA-D04.II-CF098	058	MA	M	32	0	0.00
ARMA-D04.II-CF103	060	OA	M	32	15	0.47

Individual	IndCode	Age	Sex	TotNum AlvSoc	TotNum AMTL	PerAMTL Loci
ARMA-D04.II-CF106	062	MA	F	32	10	0.31
ARMA-D04.II-CF108	063	YA	F	31	0	0.00
ARMA-D04.II-CF109	064	OA	F	29	23	0.79
ARMA-D04.II-CF112	070	MA	F	28	0	0.00
ARMA-D04.II-CF113.1	071	MA	PM	32	3	0.09
ARMA-D04.II-CF114	072	YA	M	32	13	0.41
ARMA-D04.II-CF115	073	YA	F	31	6	0.19
ARMA-D04.II-CF118	075	MA	F	32	4	0.13
ARMA-D04.II-CF119A	076	MA	M	29	2	0.07
ARMA-D04.II-CF120	077	OA	F	32	24	0.75
ARMA-D04.II-CF121	078	MA	M	32	0	0.00
ARMA-D04.II-CF122	079	MA	M	32	3	0.09
ARMA-D04.II-CF123	080	MA	M	32	6	0.19
ARMA-D04.II-CF124	081	YA	M	32	10	0.31
ARMA-D04.II-CF125	082	YA	M	28	1	0.04
ARMA-D04.II-CF126	083	OA	F	16	16	1.00
ARMA-D04.II-CF127	084	MA	F	31	0	0.00
ARMA-D04.II-CF128A	085	Adol	F	32	0	0.00
ARMA-D04.II-CF129	087	MA	F	32	4	0.13
ARMA-D04.II-CF132	089	MA	M	32	14	0.44
ARMA-D04.II-CF133	090	MA	F	32	14	0.44
ARMA-D04.II-CF134	091	OA	F	32	7	0.22
ARMA-D04.II-CF135	092	MA	F	32	4	0.13
ARMA-D04.II-CF141	095	MA	M	32	13	0.41
ARMA-D04.II-CF142	096	Adol	F	31	0	0.00

Individual	IndCode	Age	Sex	TotNum AlvSoc	TotNum AMTL	PerAMTL Loci
ARMA-D04.II-CF143	097	MA	M	32	3	0.09
ARMA-D04.II-CF144A	098	MA	F	32	3	0.09
ARMA-D04.II-CF145	100	MA	F	32	1	0.03
ARMA-D04.II-CF147.1	102	YA	F	28	0	0.00
ARMA-D04.II-CF149	105	MA	M	26	18	0.69
ARMA-D04.II-CF150	106	Adol	PM	32	0	0.00
ARMA-D04.II-CF151	107	MA	F	29	0	0.00
ARMA-D04.II-CF153 (#3634)	108	MA	F	29	12	0.41
ARMA-D04.II-CF154	109	MA	M	32	9	0.28
ARMA-D04.II-CF156A	113	YA	M	32	1	0.03
ARMA-D04.II-CF157 (#3706)	116	YA	F	32	0	0.00
ARMA-D04.II-CF160	117	MA	F	32	8	0.25
ARMA-D04.II-CF163	119	MA	F	32	7	0.22
ARMA-D04.II-CF164	120	OA	F	32	14	0.44
ARMA-D04.II-CF165	121	YA	PF	32	0	0.00
ARMA-D04.II-CF167	123	YA	M	32	3	0.09
ARMA-D04.II-CF168	124	MA	PM	31	0	0.00
ARMA-D04.II-CF170	126	OA	F	32	2	0.06
ARMA-D04.II-CF172A	127	YA	F	27	0	0.00
ARMA-D04.II-CF182	131	YA	M	32	0	0.00
ARMA-D04.II-CF186	132	MA	F	32	0	0.00
ARMA-D04.II-CF188	134	YA	M	32	0	0.00
ARMA-D04.II-CF189	135	MA	F	31	6	0.19
ARMA-PER97-ENT24B.1	138	YA	PM	32	0	0.00
ARMA-PER97-ENT27.1	139	OA	F	32	27	0.84

Individual	IndCode	Age	Sex	TotNum AlvSoc	TotNum AMTL	PerAMTL Loci
ARMA-PER97-ENT31.1	141	MA	M	30	5	0.17
ARMA-PER97-ENT34	143	YA	F	32	1	0.03
ARMA-PER97-ENT35	144	MA	M	32	4	0.13
ARMA-PER97-ENT37	145	YA	M	32	9	0.28
ARMA-PER97-ENT39	147	MA	M	32	6	0.19
ARMA-PER97-ENT40	148	MA	M	14	1	0.07
ARMA-PER97-ENT42	151	MA	M	30	10	0.33
ARMA-PER97-ENT43	152	MA	M	25	0	0.00
ARMA-PER97-ENT45	154	OA	F	32	4	0.13
ARMA-PER97-ENT46	156	YA	PF	32	0	0.00
ARMA-PER97-ENT49	159	OA	PF	32	32	1.00
ARMA-PER97-ENT50	161	MA	F	31	3	0.10
ARMA-PER97-ENT65	165	YA	M	32	1	0.03
ARMA-PER97-ENT68	166	MA	F	32	9	0.28
ARMA-PER97-ENT74	167	MA	F	32	4	0.13
RINC-D02.I-CF01	169	YA	M	32	12	0.38
RINC-D02.IIA-CF26	179	OA	F	32	20	0.63
RINC-D02.IIA-CF29	180	MA	F	31	17	0.55
RINC-D02.IIA-CF36	186	Adult	M	32	11	0.34
RINC-D02.IIA-CF57	198	MA	PM	NA	NA	NA
RINC-D02.IIA-CF59	199	MA	M	32	3	0.09
RINC-D02.IIA-CF64	201	YA	M	32	1	0.03
RINC-D02.IIA-CF82A	211	YA	F	30	0	0.00
RINC-D02.IIA-CF83.1	213	Adult	Ambiguous	31	6	0.19
RINC-D02.IIA-CF91	217	OA	F	30	2	0.07

Individual	IndCode	Age	Sex	TotNum AlvSoc	TotNum AMTL	PerAMTL Loci
RINC-D02.IIA-CF95	219	OA	F	30	10	0.33
RINC-D02.IIA-CF97	220	YA	M	32	2	0.06
RINC-G9698.I-1135-1B	222	MA	M	32	16	0.50
RINC-G9698.II-0463-ENT040	230	MA	M	32	0	0.00
RINC-G9698.II-0563-ENT053	233	YA	M	32	0	0.00
RINC-G9698.IIAE-1025	240	YA	M	32	0	0.00
RINC-G9698.IIAE-1026-2	242	MA	PF	31	6	0.19
RINC-G9698.IIAE-1119A	245	YA	F	32	1	0.03
RINC-G9698.IIAE-1154	247	MA	F	32	5	0.16
RINC-G9698.IIAE-1164	248	OA	F	32	4	0.13
RINC-G9698.IIAE-1169	249	Adol	F	32	0	0.00
RINC-G9698.IIAE-1183	251	YA	M	31	3	0.10
RINC-G9698.IIAE-1199	252	OA	F	32	29	0.91
RINC-G9698.V-0512-ENT070	268	YA	F	16	1	0.06
RINC-G9698.V-0519-ENT077	270	YA	M	32	4	0.13
RINC-G9698.V-0520.1-ENT078	271	OA	F	30	6	0.20

Codes	Variable	Variable Description
TotNumAlvSoc	Total number alveolar sockets observable	Count. Equals total number of observable alveolar sockets.
TotNumAMTL	Total number of teeth lost antemortem	Count. Note that only alveolar sockets exhibiting moderate to complete resorption such that postmortem loss could be eliminated are scored. Questionable cases which could have potentially held a small root are counted as absent, or postmortem tooth loss.
PerAMTLLoci	Percent rate of AMTL	Calculated as the total number of teeth lost antemortem divided by the total number of observable alveolar sockets (loci).

APPENDIX P

ARCHAEOLOGICAL MORTUARY CONTEXTUAL DATA

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
ARMA-D04.I-CF09	001	YA	F	no	ND	abs	flexed	ND
ARMA-D04.I-CF10	002	Adol	F	no	ND	abs	extended	prone
ARMA-D04.I-CF23	003	C	UD	no	circ	abs	ND	ND
ARMA-D04.I-CF25B	004	C	UD	no	ND	abs	extended	left
ARMA-D04.I-CF29	005	MA	F	no	ND	abs	flexed	vertical
ARMA-D04.II-CF003	006	YA	F	no	ND	abs	flexed	supine
ARMA-D04.II-CF005A	007	YA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF007A	008	YA	PF	no	circ	abs	flexed	supine
ARMA-D04.II-CF007B	009	I	UD	no	circ	ND	ND	ND
ARMA-D04.II-CF008	010	I	UD	no	circ	abs	ND	ND
ARMA-D04.II-CF010A	011	MA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF013	012	MA	M	no	circ	abs	flexed	vertical
ARMA-D04.II-CF018	013	Adult	UD	no	circ	abs	ND	ND
ARMA-D04.II-CF020	014	MA	F	no	oval	abs	extended	prone
ARMA-D04.II-CF021B	015	I	UD	no	irreg	abs	extended	supine
ARMA-D04.II-CF021C	016	I	UD	no	irreg	abs	extended	supine
ARMA-D04.II-CF024.2	017	YA	M	no	oval	abs	flexed	ND
ARMA-D04.II-CF026D	018	C	UD	no	oval	abs	flexed	ND
ARMA-D04.II-CF027	019	I	UD	no	circ	abs	flexed	ND
ARMA-D04.II-CF028	020	I	UD	no	circ	abs	flexed	vertical
ARMA-D04.II-CF030	021	MA	F	no	ND	arma	flexed	ND
ARMA-D04.II-CF031A	022	OA	F	no	circ	abs	flexed	vertical
ARMA-D04.II-CF035	023	MA	F	no	ND	arma	flexed	ND
ARMA-D04.II-CF038	024	Adult	UD	no	ND	abs	flexed	ND
ARMA-D04.II-CF040A	025	I	UD	no	oval	abs	flexed	ND
ARMA-D04.II-CF044	026	I	UD	no	ND	abs	extended	supine
ARMA-D04.II-CF051	027	F	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF052	028	C	UD	no	circ	abs	ND	ND
ARMA-D04.II-CF055B (#2931)	029	I	UD	no	circ	abs	ND	ND
ARMA-D04.II-CF055A (#2949)	030	YA	M	no	circ	arma	ND	ND
ARMA-D04.II-CF056.1	031	YA	M	no	oval	abs	semiflexed	right
ARMA-D04.II-CF056.2	032	OA	F	no	circ	abs	flexed	vertical
ARMA-D04.II-CF057	033	MA	F	no	ND	ND	ND	ND

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
ARMA-D04.II-CF062	034	OA	F	no	ND	abs	flexed	vertical
ARMA-D04.II-CF064A	035	Adult	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF065B	036	C	UD	no	circ	abs	flexed	ND
ARMA-D04.II-CF067	037	Adult	PM	no	irreg	abs	semiflexed	right
ARMA-D04.II-CF073A	038	MA	F	no	circ	abs	flexed	vertical
ARMA-D04.II-CF073B	039	MA	F	no	circ	abs	flexed	vertical
ARMA-D04.II-CF076	040	C	UD	no	circ	abs	flexed	vertical
ARMA-D04.II-CF079	041	MA	PM	no	oval	abs	extended	supine
ARMA-D04.II-CF080	042	MA	F	no	circ	abs	flexed	vertical
ARMA-D04.II-CF082A	043	C	UD	no	irreg	arma	flexed	vertical
ARMA-D04.II-CF082B	044	I	UD	no	irreg	abs	extended	supine
ARMA-D04.II-CF084	045	C	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF085A	046	OA	F	no	circ	arma	flexed	ND
ARMA-D04.II-CF085B.1	047	I	UD	no	circ	ND	ND	ND
ARMA-D04.II-CF086	048	YA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF087	049	I	UD	no	circ	arma	ND	ND
ARMA-D04.II-CF088	050	MA	F	no	circ	abs	flexed	vertical
ARMA-D04.II-CF090	051	I	UD	no	oval	abs	extended	supine
ARMA-D04.II-CF091	052	F	UD	no	circ	abs	extended	ND
ARMA-D04.II-CF092	053	YA	M	no	irreg	arma	ND	ND
ARMA-D04.II-CF093B	054	OA	F	no	circ	arma	flexed	ND
ARMA-D04.II-CF094	055	C	UD	no	circ	abs	ND	ND
ARMA-D04.II-CF095	056	YA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF097	057	OA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF098	058	MA	M	no	ND	arma	flexed	vertical
ARMA-D04.II-CF101B	059	I	UD	no	circ	abs	extended	supine
ARMA-D04.II-CF103	060	OA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF105	061	C	UD	no	circ	arma	flexed	ND
ARMA-D04.II-CF106	062	MA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF108	063	YA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF109	064	OA	F	no	ND	arma	ND	ND
ARMA-D04.II-CF110	065	C	UD	no	ND	abs	flexed	ND
ARMA-D04.II-CF111A	066	I	UD	no	circ	arma	flexed	vertical

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
ARMA-D04.II-CF111B	067	I	UD	no	circ	abs	extended	ND
ARMA-D04.II-CF111C.1	068	I	UD	no	circ	abs	extended	ND
ARMA-D04.II-CF111C.2	069	F	UD	no	circ	abs	extended	ND
ARMA-D04.II-CF112	070	MA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF113.1	071	MA	PM	ND	ND	abs	flexed	ND
ARMA-D04.II-CF114	072	YA	M	no	circ	arma	flexed	ND
ARMA-D04.II-CF115	073	YA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF117	074	C	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF118	075	MA	F	no	circ	arma	ND	ND
ARMA-D04.II-CF119A	076	MA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF120	077	OA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF121	078	MA	M	no	circ	abs	flexed	vertical
ARMA-D04.II-CF122	079	MA	M	mark	circ	arma	flexed	ND
ARMA-D04.II-CF123	080	MA	M	no	circ	mat	flexed	ND
ARMA-D04.II-CF124	081	YA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF125	082	YA	M	no	circ	abs	flexed	ND
ARMA-D04.II-CF126	083	OA	F	no	circ	arma	flexed	ND
ARMA-D04.II-CF127	084	MA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF128A	085	Adol	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF128B	086	I	UD	no	circ	ND	ND	ND
ARMA-D04.II-CF129	087	MA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF131	088	MA	F	no	ND	arma	flexed	vertical
ARMA-D04.II-CF132	089	MA	M	ND	ND	arma	flexed	vertical
ARMA-D04.II-CF133	090	MA	F	ND	ND	mat	flexed	right
ARMA-D04.II-CF134	091	OA	F	ND	ND	arma	flexed	ND
ARMA-D04.II-CF135	092	MA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF138	093	I	UD	ND	ND	abs	extended	supine
ARMA-D04.II-CF139	094	C	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF141	095	MA	M	no	circ	abs	flexed	vertical
ARMA-D04.II-CF142	096	Adol	F	no	irreg	arma	flexed	vertical
ARMA-D04.II-CF143	097	MA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF144A	098	MA	F	mark	circ	arma	flexed	vertical
ARMA-D04.II-CF144B	099	C	UD	mark	circ	arma	flexed	vertical

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
ARMA-D04.II-CF145	100	MA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF146	101	YA	F	no	circ	abs	flexed	vertical
ARMA-D04.II-CF147.1	102	YA	F	no	irreg	arma	flexed	vertical
ARMA-D04.II-CF147.2	103	C	UD	no	irreg	ND	ND	ND
ARMA-D04.II-CF148	104	I	UD	ND	ND	arma	flexed	vertical
ARMA-D04.II-CF149	105	MA	M	no	oval	abs	flexed	right
ARMA-D04.II-CF150	106	Adol	PM	no	oval	abs	semiflexed	supine
ARMA-D04.II-CF151	107	MA	F	no	circ	arma	ND	ND
ARMA-D04.II-CF153 (#3634)	108	MA	F	no	oval	abs	flexed	supine
ARMA-D04.II-CF154	109	MA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF155 (#3638)	110	C	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF155.1 (#3649)	111	I	UD	no	ND	ND	ND	ND
ARMA-D04.II-CF155.2 (#3649)	112	I	UD	no	ND	ND	ND	ND
ARMA-D04.II-CF156A	113	YA	M	no	circ	arma	flexed	vertical
ARMA-D04.II-CF156B	114	C	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF157 (#3528)	115	I	UD	no	circ	ND	ND	ND
ARMA-D04.II-CF157 (#3706)	116	YA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF160	117	MA	F	no	circ	arma	flexed	vertical
ARMA-D04.II-CF161	118	C	UD	no	circ	arma	flexed	vertical
ARMA-D04.II-CF163	119	MA	F	ND	ND	arma	flexed	ND
ARMA-D04.II-CF164	120	OA	F	ND	ND	abs	flexed	ND
ARMA-D04.II-CF165	121	YA	PF	ND	ND	arma	flexed	vertical
ARMA-D04.II-CF166	122	C	UD	ND	ND	abs	flexed	vertical
ARMA-D04.II-CF167	123	YA	M	ND	ND	abs	flexed	ND
ARMA-D04.II-CF168	124	MA	PM	ND	ND	arma	flexed	vertical
ARMA-D04.II-CF169	125	MA	M	ND	ND	arma	flexed	vertical
ARMA-D04.II-CF170	126	OA	F	ND	ND	arma	flexed	vertical
ARMA-D04.II-CF172A	127	YA	F	ND	ND	arma	flexed	ND
ARMA-D04.II-CF172B	128	I	UD	ND	ND	abs	extended	supine
ARMA-D04.II-CF174	129	I	UD	ND	ND	arma	ND	ND
ARMA-D04.II-CF178	130	I	UD	ND	ND	arma	ND	supine
ARMA-D04.II-CF182	131	YA	M	no	oval	arma	flexed	vertical
ARMA-D04.II-CF186	132	MA	F	no	circ	abs	flexed	ND

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
ARMA-D04.II-CF187	133	C	UD	no	quad	abs	flexed	ND
ARMA-D04.II-CF188	134	YA	M	ND	ND	abs	flexed	ND
ARMA-D04.II-CF189	135	MA	F	no	ND	arma	flexed	ND
ARMA-PER97-ENT08	136	C	UD	no	ND	abs	ND	ND
ARMA-PER97-ENT12	137	C	UD	struct	ND	abs	flexed	right
ARMA-PER97-ENT24B.1	138	YA	PM	no	ND	abs	flexed	right
ARMA-PER97-ENT27.1	139	OA	F	no	ND	arma	flexed	ND
ARMA-PER97-ENT27.2	140	I	UD	no	ND	ND	ND	ND
ARMA-PER97-ENT31.1	141	MA	M	no	circ	arma	flexed	ND
ARMA-PER97-ENT33	142	I	UD	no	ND	arma	flexed	ND
ARMA-PER97-ENT34	143	YA	F	no	ND	arma	flexed	ND
ARMA-PER97-ENT35	144	MA	M	no	ND	arma	flexed	ND
ARMA-PER97-ENT37	145	YA	M	no	ND	arma	flexed	ND
ARMA-PER97-ENT37A	146	C	UD	no	ND	ND	ND	ND
ARMA-PER97-ENT39	147	MA	M	no	circ	arma	flexed	vertical
ARMA-PER97-ENT40	148	MA	M	no	ND	abs	flexed	ND
ARMA-PER97-ENT40A.1	149	F	UD	no	ND	ND	ND	ND
ARMA-PER97-ENT40A.2	150	I	UD	no	ND	ND	ND	ND
ARMA-PER97-ENT42	151	MA	M	no	ND	arma	flexed	ND
ARMA-PER97-ENT43	152	MA	M	no	ND	arma	flexed	ND
ARMA-PER97-ENT43A	153	I	UD	no	ND	ND	ND	ND
ARMA-PER97-ENT45	154	OA	F	no	circ	ND	semiflexed	ND
ARMA-PER97-ENT45A	155	I	UD	no	circ	abs	ND	ND
ARMA-PER97-ENT46	156	YA	PF	no	ND	abs	flexed	ND
ARMA-PER97-ENT47	157	OA	F	no	ND	arma	flexed	ND
ARMA-PER97-ENT47A	158	I	UD	no	ND	ND	flexed	supine
ARMA-PER97-ENT49	159	OA	PF	no	ND	arma	flexed	ND
ARMA-PER97-ENT49A	160	I	UD	no	ND	ND	semiflexed	ND
ARMA-PER97-ENT50	161	MA	F	no	ND	arma	flexed	ND
ARMA-PER97-ENT55	162	C	UD	no	ND	arma	ND	ND
ARMA-PER97-ENT55A	163	I	UD	no	ND	abs	extended	ND
ARMA-PER97-ENT57	164	C	UD	no	ND	abs	flexed	right
ARMA-PER97-ENT65	165	YA	M	no	ND	abs	flexed	supine

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
ARMA-PER97-ENT68	166	MA	F	no	ND	arma	flexed	ND
ARMA-PER97-ENT74	167	MA	F	no	ND	abs	flexed	left
ARMA-PER97-ENT75A	168	I	UD	struct	circ	arma	extended	ND
RINC-D02.I-CF01	169	YA	M	no	oval	abs	flexed	vertical
RINC-D02.IIA-CF02	170	I	UD	no	ND	abs	ND	supine
RINC-D02.IIA-CF03	171	I	UD	no	ND	abs	extended	ND
RINC-D02.IIA-CF05	172	I	UD	no	oval	abs	ND	ND
RINC-D02.IIA-CF07	173	I	UD	no	ND	mat	ND	ND
RINC-D02.IIA-CF10	174	I	UD	mark	ND	abs	flexed	supine
RINC-D02.IIA-CF16	175	I	UD	no	oval	abs	extended	supine
RINC-D02.IIA-CF18	176	I	UD	no	oval	arma	extended	supine
RINC-D02.IIA-CF23	177	C	UD	no	oval	abs	flexed	right
RINC-D02.IIA-CF25	178	I	UD	no	circ	abs	flexed	vertical
RINC-D02.IIA-CF26	179	OA	F	no	oval	arma	flexed	vertical
RINC-D02.IIA-CF29	180	MA	F	no	oval	arma	flexed	vertical
RINC-D02.IIA-CF31	181	I	UD	no	oval	arma	flexed	vertical
RINC-D02.IIA-CF32	182	I	UD	no	ND	abs	flexed	vertical
RINC-D02.IIA-CF33	183	F	UD	no	oval	arma	ND	ND
RINC-D02.IIA-CF34	184	I	UD	no	circ	abs	flexed	vertical
RINC-D02.IIA-CF35	185	I	UD	no	circ	abs	flexed	vertical
RINC-D02.IIA-CF36	186	Adult	M	no	oval	abs	flexed	vertical
RINC-D02.IIA-CF37	187	MA	M	no	oval	abs	flexed	vertical
RINC-D02.IIA-CF38A	188	F	UD	no	oval	mat	semiflexed	vertical
RINC-D02.IIA-CF38B	189	F	UD	no	oval	ND	ND	ND
RINC-D02.IIA-CF39	190	I	UD	no	circ	mat	ND	vertical
RINC-D02.IIA-CF40	191	I	UD	no	oval	mat	flexed	supine
RINC-D02.IIA-CF41	192	F	UD	no	circ	mat	extended	supine
RINC-D02.IIA-CF42	193	OA	F	no	oval	mat	flexed	supine
RINC-D02.IIA-CF43	194	Adult	UD	no	circ	abs	flexed	supine
RINC-D02.IIA-CF44	195	I	UD	no	circ	mat	flexed	vertical
RINC-D02.IIA-CF45	196	I	UD	no	circ	abs	ND	ND
RINC-D02.IIA-CF56	197	I	UD	no	circ	mat	flexed	supine
RINC-D02.IIA-CF57	198	MA	PM	no	circ	abs	flexed	vertical

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
RINC-D02.IIA-CF59	199	MA	M	no	oval	abs	flexed	supine
RINC-D02.IIA-CF63	200	I	UD	no	oval	arma	ND	ND
RINC-D02.IIA-CF64	201	YA	M	no	circ	abs	semiflexed	vertical
RINC-D02.IIA-CF65	202	OA	F	no	circ	abs	flexed	vertical
RINC-D02.IIA-CF68	203	I	UD	no	ND	abs	extended	ND
RINC-D02.IIA-CF72	204	I	UD	no	oval	arma	ND	ND
RINC-D02.IIA-CF73	205	I	UD	no	oval	arma	flexed	vertical
RINC-D02.IIA-CF75	206	I	UD	no	oval	abs	flexed	vertical
RINC-D02.IIA-CF76	207	I	UD	no	ND	abs	ND	supine
RINC-D02.IIA-CF77	208	I	UD	no	circ	abs	flexed	vertical
RINC-D02.IIA-CF79	209	I	UD	no	oval	abs	ND	ND
RINC-D02.IIA-CF81	210	I	UD	no	circ	arma	ND	ND
RINC-D02.IIA-CF82A	211	YA	F	no	circ	abs	flexed	ND
RINC-D02.IIA-CF82B	212	I	UD	no	circ	abs	ND	ND
RINC-D02.IIA-CF83.1	213	Adult	Ambiguous	no	oval	abs	ND	ND
RINC-D02.IIA-CF83.2	214	Adult	UD	no	oval	abs	ND	ND
RINC-D02.IIA-CF85	215	F	UD	no	circ	arma	flexed	ND
RINC-D02.IIA-CF87	216	F	UD	no	oval	abs	ND	ND
RINC-D02.IIA-CF91	217	OA	F	no	circ	abs	ND	ND
RINC-D02.IIA-CF93	218	I	UD	no	circ	abs	flexed	vertical
RINC-D02.IIA-CF95	219	OA	F	no	circ	abs	flexed	ND
RINC-D02.IIA-CF97	220	YA	M	no	oval	abs	flexed	vertical
RINC-G9698.I-1135-1A	221	I	UD	ND	ND	abs	ND	ND
RINC-G9698.I-1135-1B	222	MA	M	ND	ND	abs	flexed	vertical
RINC-G9698.I-1135-1C	223	C	UD	ND	ND	abs	flexed	ND
RINC-G9698.I-1177	224	I	UD	no	ND	abs	ND	ND
RINC-G9698.I-1178	225	I	UD	ND	ND	arma	extended	vertical
RINC-G9698.II-0405	226	F	UD	ND	ND	mat	ND	ND
RINC-G9698.II-0434-ENT033	227	C	UD	ND	ND	ND	ND	ND
RINC-G9698.II-0442	228	I	UD	ND	ND	ND	ND	ND
RINC-G9698.II-0446-ENT040	229	C	UD	ND	ND	abs	flexed	vertical
RINC-G9698.II-0463-ENT040	230	MA	M	ND	ND	abs	flexed	ND
RINC-G9698.II-0477-ENT044	231	C	UD	ND	ND	abs	ND	ND

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
RINC-G9698.II-0560-ENT110	232	I	UD	ND	ND	ND	ND	ND
RINC-G9698.II-0563-ENT053	233	YA	M	ND	ND	mat	flexed	ND
RINC-G9698.II-0565-ENT114	234	Adult	F	ND	ND	ND	flexed	ND
RINC-G9698.II-0567-ENT116	235	Adult	F	ND	ND	abs	flexed	right
RINC-G9698.II-0569-ENT118	236	MA	M	ND	ND	abs	ND	ND
RINC-G9698.II-0580-ENT125	237	MA	PF	no	oval	abs	flexed	vertical
RINC-G9698.IIA-641-FAR134	238	I	UD	no	ND	abs	extended	ND
RINC-G9698.IIA-744	239	Adult	UD	ND	NR	abs	ND	ND
RINC-G9698.IIAE-1025	240	YA	M	ND	NR	abs	extended	supine
RINC-G9698.IIAE-1026-1	241	I	UD	ND	NR	ND	ND	ND
RINC-G9698.IIAE-1026-2	242	MA	PF	ND	NR	ND	ND	ND
RINC-G9698.IIAE-1032	243	MA	F	ND	NR	abs	flexed	ND
RINC-G9698.IIAE-1115-1	244	C	UD	ND	NR	abs	flexed	ND
RINC-G9698.IIAE-1119A	245	YA	F	ND	NR	abs	ND	ND
RINC-G9698.IIAE-1119B	246	I	UD	ND	NR	abs	extended	supine
RINC-G9698.IIAE-1154	247	MA	F	no	circ	abs	flexed	vertical
RINC-G9698.IIAE-1164	248	OA	F	no	oval	abs	flexed	vertical
RINC-G9698.IIAE-1169	249	Adol	F	no	circ	abs	flexed	vertical
RINC-G9698.IIAE-1176	250	YA	PM	no	circ	abs	flexed	vertical
RINC-G9698.IIAE-1183	251	YA	M	no	quad	abs	flexed	prone
RINC-G9698.IIAE-1199	252	OA	F	no	ND	abs	flexed	vertical
RINC-G9698.IIAE-1336	255	C	UD	no	oval	abs	flexed	ND
RINC-G9698.IIAE-1337.2	256	I	UD	no	ND	abs	ND	ND
RINC-G9698.IIAE-1387	257	I	UD	no	ND	ND	ND	ND
RINC-G9698.IIAE-1388	258	I	UD	no	ND	abs	extended	ND
RINC-G9698.IIAE-1393	259	MA	F	no	ND	abs	ND	vertical
RINC-G9698.IV-0226	260	Adol	PF	no	quad	abs	extended	supine
RINC-G9698.V-0496-ENT054	261	YA	M	ND	ND	mat	semiflexed	vertical
RINC-G9698.V-0499-ENT057	262	I	UD	ND	ND	abs	ND	ND
RINC-G9698.V-0504-ENT062	263	Adult	UD	ND	ND	mat	ND	ND
RINC-G9698.V-0505-ENT063	264	YA	M	ND	ND	ND	extended	ND
RINC-G9698.V-0508-ENT066	265	I	UD	ND	ND	abs	ND	ND
RINC-G9698.V-0509-ENT067	266	C	UD	ND	ND	ND	ND	ND

Individual	IndCode	Age	Sex	BurStruct	BurShape	FramePres	Flexion	Position
RINC-G9698.V-0511-ENT069	267	YA	M	ND	ND	mat	ND	ND
RINC-G9698.V-0512-ENT070	268	YA	F	ND	ND	mat	ND	ND
RINC-G9698.V-0517-ENT075	269	I	UD	ND	ND	ND	ND	ND
RINC-G9698.V-0519-ENT077	270	YA	M	ND	ND	ND	ND	ND
RINC-G9698.V-0520.1-ENT078	271	OA	F	ND	ND	ND	ND	ND
RINC-G9698.V-0520.2-ENT078	272	I	UD	ND	ND	ND	ND	ND
RINC-G9698.V-0521-ENT079	273	MA	F	ND	ND	ND	ND	ND
RINC-G9698.V-0527-ENT083	274	I	UD	ND	ND	ND	ND	ND
RINC-G9698.V-0533-ENT089	276	I	UD	ND	ND	mat	ND	ND
RINC-G9698.V-0536-ENT092	277	Adult	UD	ND	ND	ND	ND	ND
RINC-G9698.V-0542-ENT098	278	Adult	F	ND	ND	ND	ND	ND
RINC-G9698.V-0543-ENT099	279	I	UD	ND	ND	ND	ND	ND

Codes	Variable	Variable Description
BurStruct	Burial structural form	no = Matrix only present; mark = Grave marker present; struct = Burial structure present; ND = No information available (includes cases where structure could not be defined during excavation or was not recorded in report). Note that juveniles described as associated with an adult individual are scored as having the same burial structure as the adult burial as are individuals not described in the excavation report but from the same mortuary context as one or more other individuals whose contexts are described.
BurShape	Shape of burial matrix or cist	irreg = Irregular; circ = Circular or round; oval = Oblong, Elongated, Oval-shaped, or Ellipsoidal; quad = Quadrangular; ND = No information available (includes cases where shape could not be defined during excavation or was not recorded in report). Note that juveniles described as associated with an adult individual are scored as having the same burial shape as the adult burial as are individuals not described in the excavation report but from the same mortuary context as one or more other individuals whose contexts are described.
FramePres	Presence or absence of funerary litter frame associated with body	abs = no frame present; arma = vertical cane frame (armazon) present; mat = horizontal mat or stretcher present variably constructed from canes and/or vegetal fiber; ND = No information available

Flexion	Flexion of torso and legs	flexed = flexed; semiflexed = partially flexed; extended = extended; ND = No information available
Position	Position of body	vertical = vertical sitting or squatting or extended position; supine = on back, face up; prone = on stomach, face down; left = left side down; right = right side down; ND = No information available