THESIS

DEATH AND THE FAMILY: TESTING ANDEAN LINEAGE TOMBS THROUGH CRANIAL NON-METRICS

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ABSTRACT

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Historical records indicate that ancestor worship was practiced as part of *ayllu* social organization in the Inka empire during the Late Horizon and beginning of the Colonial Period (1440 A.D. - 1650 A.D.). This same set of beliefs and practices is often ascribed to the Late Intermediate Period (900 A.D. – 1440 A.D.) throughout the Andes by many researchers (Doyle 1988; Herrera 2003; Ibarra 2013; Isbell 1997; Mantha 2006; Martiarena 2014). It is important for the study of any site so far removed from the historical records to be cautious when using these documents for the interpretation of the archaeological record. The significance of this study is that little has been done using a bioarchaeological approach to test the assumption that *ayllus* and ancestor worship were present in the Conchucos region during the Late Intermediate Period.

The site of Marcajirca is located on the ridge of a sacred ancestor mountain, Mt Llamoq, in North Central Peru. Although the site is a village, it has an especially large amount of mortuary architecture consisting of above ground tombs or *chullpas*, as well as caves, and underground structures that contain human remains. One way to infer *ayllu* organization and ancestor worship as well as validate the use of historical records for Marcajirca would be to identify affinity and kinship structure in collective burials in combination with material evidence that these burials were used for ancestor worship. Were the *chullpas* and caves at the Late Intermediate Site of Marcajirca reserved for family burials and ancestor worship?

In order to test this, I attempted to determine if the people in one tomb were significantly different biologically from the people found in other tombs based on the relative prevalence of heritable non-metric traits. Twenty four non-metric traits on 106 crania from 15 different tombs were scored. The frequencies of these non-metric traits were used to calculate the mean measure of divergence to produce a numerical summary of the biological distance between groups of skeletal remains.

There were a few noticeable patterns from the non-metric analyses at Marcajirca. Cave 19 differs the most from other tombs at statistically significant levels. Many of the other caves and chullpas do not exhibit statistically significant differences and often exhibit negative distance values. These results do not provide enough information to positively identify each tomb as a unique family burial, but may be more indicative of a wider *ayllu* group present at Marcajirca. Only Cave 19 represents a distinct group, possibly from an outlying community that considered itself as part of the larger *ayllu* linked by their belief in Llamoq as its founding ancestor.

In the case of Marcajirca, it does appear as though historical records related to kinship and ancestor worship can be applied to the archaeological interpretations for this site and its role in the regional *ayllus*. Future research based on intersite biodistance analysis could be used to determine if there was a real biological distinction between the various *ayllus* reported to exist in the Conchucos Region.

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Chapter 1. Introduction

Prehistoric Andean culture is frequently characterized by beliefs and practices centered on ancestors and their roles in kin and larger social groups known as *ayllus* (Buikstra 1995; Dillehay 1995; Ibarra 2003b, 2005, 2013, 2014; Isbell 1997; Leon Gomez 2003; Moseley 2001; Salomon 1995; Weismantel 2006; Rowe 1995). *Ayllus* are seen as communities centered on their connections to actual and mythical ancestors who were embodied within tombs or natural landscapes (DeLeonardis and Lau 2004; Gil Garcia 2002; Isbell 1997; Lane and Lujan 2011; Nielsen 2008). Andeans often interacted with their deceased ancestors regularly through forms of ancestor worship at certain sacred locations or *huacas* which helped to uphold family and *ayllu* organization (Astvaldsson 2004; Bray 2015; Isbell 1997; Mannheim and Slas Carreno 2015). Historical records suggest the presence of *ayllus* and ancestor worship in the northern highlands of Peru and most archaeologists have assumed this to be true (Herrera 2005; Ibarra 2003b, 2005, 2013, 2014; Lane and Herrera 2005; Lane and Lujan 2011; Lau 2015; Leon Gomez 2003; Mantha 2009; Martierena 2014; Orsini 2014; Valverde 2008).

This set of beliefs and practices is ascribed to the Late Intermediate Period (900 A.D. – 1440 A.D.), but is often inferred based on colonial and ethnohistoric records (Doyle 1988; Herrera 2003; Ibarra 2013; Isbell 1997; Mantha 2006; Martiarena 2014; Rowe 1995; Stanish 2012). These assumptions are problematic for two reasons. First, these records were written at least 100 years after the end of the Late Intermediate Period, after the spread of the Inka Empire during the Late Horizon and then the arrival of the Spanish (Cobo 1990; Guamán Poma de Ayala 1980; De le Vega 1976; Doyle 1988; Espinoza Soriano 1981; Salomon 1991). Due to the temporal gap between the Late Intermediate Period and the earliest written accounts in Peru, it is

inappropriate to describe this time period based on historical documents without further evidence. Second, the majority of the early colonial records were focused on the Inkas centered in southern Peru at Cuzco (Cobo 1990; Guamán Poma de Ayala 1980; De La Vega 1976). The area of Ancash in the North Central Highlands of Peru, in particular the Conchucos region located east of the Cordillera Blanca as seen in Figure 1, is an area far removed from the center of the Inka Empire. Considering these problems, it is fair to question if the cultural beliefs and practices attributed to the Late Intermediate Period by historical records actually reflect the situation in the Conchucos region.

Figure 1.1. Location of Conchucos region in Peru.

The application of *ayllu* and ancestor worship based on historical records from the Cusco region to the Conchucos region is the problem addressed in this thesis. In order to address this problem, multiple lines of evidence of these beliefs and practices must be found in the archaeological record at a LIP site in Conchucos. The evidence needed to validate the use of historical documents in the Conchucos region would be of the practices of ancestor worship and the use of sacred mountains or *apus* for burials as part of *ayllu* organization. One way to infer *ayllu* organization and ancestor worship would be to identify affinity and kinship structure through family burials in combination with material evidence that these burials were used for ancestor worship.

The goal of identifying affinity and kinship between individuals leads to the research question to be addressed in this study. Were the *chullpas* and caves at the Late Intermediate Site of Marcajirca reserved for family burials and ancestor worship? Or were the *chullpas* just interments separated by status or some other quality and not focused on family for the purpose of familial veneration? In order to make that a question that can be tested, it can be worded as: are the people in one tomb significantly different biologically from the people found in another tomb? This will be tested by scoring non-metric traits on the crania found in the tombs at Marcajirca and the comparison of trait frequencies. Through this we can answer the question by testing if there is a significant difference in trait frequency between tombs. The hypothesis is that there is greater difference in trait frequency between tombs than within tombs. The null hypothesis is that there is no significant difference in trait frequency between tombs. Rejecting the null hypothesis would indicate that the tombs at Marcajirca were used as familial or lineage tombs. This result would uphold the assumption created by historic records that an *ayllu*

organization along with ancestor worship were in place at a site in Conchucos, namely Marcajirca, during the Late Intermediate Period.

The purpose of this study is to better understand the mortuary practices and ancestral relationships at Marcajirca, which is a village site located in the Conchucos region in Ancash, Peru dated primarily to the Late Intermediate Period. The site is located on the ridge of a sacred ancestor mountain, or *apu*. Although it is a village, it has an especially large amount of mortuary architecture consisting of above ground tombs or *chullpas*, caves, and underground structures that contain human remains (Ibarra and Landeck 2008; Ibarra 2013). The analysis of the mortuary practices at Marcajirca will provide insight into whether ancestor worship was practiced there and how it compares other Late Intermediate Period sites in the Conchucos region. The significance of this study is that little has been done using a bioarchaeological approach to test the assumptions about *ayllus* and ancestor worship based on historical records in the Conchucos region, let alone at Marcajirca.

Bebel Ibarra has been investigating Marcajirca since 1999 (Ibarra 2009). He has surveyed and excavated multiple sites in the area, focusing on Marcajirca in recent years as well as promoting local heritage throughout the Huari province through media and books. The first two years of investigation at Marcajirca consisted of surface survey and mapping of the site as well as cleaning, which was performed by Bebel and other local Huari volunteers interested in the project. In subsequent years excavations have shifted to focus on the skeletal remains found within the tombs.

In order to provide funding, labor, and opportunities to teach, in 2007 Bebel developed a field school to run excavations and bioarchaological analysis at Marcajirca. Ibarra has five goals for bioarchaeological research at the site. These goals are to identity a tomb typology, understand

reoccupation of the tombs, create a chronology of the tombs, identify affinity and kinship between individuals, and ascertain evidence of war and violence. The goal of identifying affinity and kinship between individuals is based on information from historical records that a kinship organization such as the *ayllu* was in place at Marcajirca, and therefore the *chullpas* were utilized as familial or communal tombs (Ibarra 2013). As this had not yet been directly addressed at the site, it was agreed that I could help Bebel's project with that goal as a member of the 2012 field school.

Chapter Synopses

Chapter two provides background information regarding the beliefs and practices attributed to the Late Intermediate Period in the North Central Highlands of Peru. The following beliefs and practices are reviewed in order to better understand their interrelatedness and contextualize the research questions about Marcajirca: Andean social organization and the *ayllu,* the role *huacas* and *apus* played in the community and in rituals, and ancestor worship as exemplified by funerary practices and mortuary architecture. This chapter will provide an in-depth explanation as to how human remains within tombs and evidence of ancestor worship outside of tombs can lead to identifying the presence of *ayllu* organization.

Chapter three contains an overview of Marcajirca and how it fits into the contextual background from the previous chapter. This overview will include details about the location, dates, and layout of the site to show the general similarities to other regional sites as well as its uniqueness. Then a description of the mortuary structures and context at the site will give insight into the prominence of its mortuary features and how this fits into common Late Intermediate Period practices. The chapter concludes with a description of mortuary remains found at the site and their general condition that will show some of the difficulties surrounding analysis.

Chapter four covers the materials and methods utilized in answering the research question. It describes the skeletal sample as well as a rationale for employing non-metric trait analysis to look at relatedness. It also discusses the effects of age, sex, and cranial modification on the analysis. Then it presents the process of scoring, trait selection, and data recording. The chapter finishes with a synopsis of the most common statistical approaches to calculating biodistance, a rationale for why other methods were chosen, and a description of these methods.

Chapter five summarizes the results of the univariate and multivariate statistical analysis and provides basic interpretation of these results as they apply to relatedness at Marcajirca. Chapter six is a discussion of the implications of the research, offering insights into mortuary practices at Marcajirca. I then present possible interpretations of the site in relation to overarching practices and cultural norms in the Late Intermediate Period. This chapter concludes with descriptions of future research that would greatly enrich archaeological studies in the North Central Highlands of Peru.

Chapter 2. Ayllus, Ancestors, and Huacas

The purpose of this chapter is to describe general Andean concepts that pertain to the research questions and focus those concepts to how they are applied to the Ancash region of Peru. The basic questions that need to be addressed for this thesis are what the mortuary archaeology at the site of Marcajirca reveals about the practice of ancestor worship as well as how those mortuary practices fit into the overall Andean traditions of *ayllu* organization. Does Marcajirca exhibit the general practices attributed to the Late Intermediate Period created by historical records? Was *ayllu* organization present? Were sacred mountains and spaces used for burials? Was ancestor worship practiced? To answer these questions, certain aspects of Andean culture need to be reviewed: *ayllu* organization, *huacas*, and ancestor worship. These aspects of Andean culture appear inseparable as historical records indicate that the living interacted with their deceased ancestors regularly through forms of ancestor worship which helped to uphold *ayllu* organization. This chapter also includes a brief summary of the changes over time in the Ancash highlands in how people disposed of their dead, the material evidence of these practices, and the mortuary architecture that is pertinent to the analysis.

Social Organization and *Ayllus*

A key component of pre-hispanic Andean social organization is the *ayllu*. The most basic and generic definition of an *ayllu* is a community (Weismantel 2006). One definition that is of particular importance to this study was given by Isbell (1997) which defines the *ayllu* as a group that makes up the basic social organization found in the Andes with special emphasis that it is established around a dead ancestor. To the extent that the *ayllu* was based on real descent from that founding ancestor is debated (Salomon 1995; Isbell 1997). Instead, many authors state

that it can be based on real or imagined descent from an ancestor and focus on the economic functions of an *ayllu.* They claim that the *ayllu* is a coalition that collaborates to manage land and other resources (Guamán Poma de Ayala 1980; Salomon 1995). In particular, Salomon (1995) explains that the importance of *ayllu* organization is that the term could be applied to a small group of kindred connected by a recently dead person or a larger group which was focused around a founding ancestor so distant there may not be an actual descent connection. This explanation allows the *ayllu* organization to be applied to various sized units with various levels of connection to their founding ancestors and the resources they share. The small local *ayllu* units were more likely to be based on real descent, while the wider *ayllu* groups shared the adoration of a mythical ancestor.

Due to the extensive study of *ayllus* by anthropologists, many archaeologists assume that *ayllu* social organization dominated Andean tradition for thousands of years and automatically incorporate this into their interpretations of data (Dillehay 1995; Moseley 2001; Guamán Poma de Ayala 1980). However, Isbell (1997) argues against processual evolutionism and its assumption of an elemental Andean origin of the *ayllu* in response to environmental challenges. He also argues that a contingent historical approach must be taken when considering scenarios of prehistoric change. He concludes that the *ayllu* is a more recent development in the Andean tradition based on ancestor worship and resistance to state organization during the Early Intermediate Period. Whether the *ayllu* is a deeply engrained form of social organization or a more recent development, it is commonly adopted into interpretations of social organization in much of the Andes during the Late Intermediate Period and Late Horizon (Buikstra 1995; Ibarra 2013; Isbell 1997; Leon Gomez 2003; Mantha 2009; Martiarena 2014; Salomon 1995).

Many historical writings describe the death rituals of the Inka in a way that make it seem as though *ayllus* and ancestor veneration were inherently connected throughout the Andes (Cobo 1990; Guaman Poma de Ayala 1980). This connection between *ayllus* and ancestor veneration has been applied by many Andean archaeologists (Epstein 2016; Ibarra 2013; Isbell 1997; Moore 2004; Orsini 2014) Isbell (1997) claims the evidence of an *ayllu* based social organization is heavily dependent on mortuary practices and architecture due to the *ayllu's* connection to ancestor veneration. Specifically, Isbell (1997) argues that *ayllu* organization can be identified archaeologically by identifying ancestor mummies and open sepulchers. This is because the open sepulcher would allow constant access to the mummy for rituals, a place for offerings, and shelter from rapid decay, all of which are required for the *ayllu* to reinforce the group on a regular basis. Bawden (2000) disagrees with Isbell's generalization that the presence of the open sepulcher is indicative of *ayllu* organization on a pan Andean level. He argues that this generalization is completely contradictory to Isbell's intent of avoiding evolutionary perspectives that produce a generic Andean solution. Bawden (2000) does applaud Isbell's extensive presentation of mortuary monuments and even agrees that the open sepulcher can be an essential part of local *ayllu* organization. However, he argues that the presence of *ayllu* organization must still be identified on an individual and local basis.

There have been a few archaeological and anthropological studies that attempt to test the connection between open sepulchers and *ayllu* organization. Salomon (1995) noted that each *ayllu* had a local ceremonial center which housed sacred objects including founding ancestors. Baca et al. (2012) tested to find if *ayllus* did impact mortuary practices by determining whether an open tomb type called *chullpas* served as *ayllu* family graves. They used mtDNA analysis to show that the Tompullo 2 site in the southern highlands of Peru was organized into extended

family groups that were buried in different open tombs. Epstein (2016) agrees that *ayllus* and ancestor veneration are related in his study of Chachapoya in the northern highlands of Peru. Despite having commingled remains in the tombs, there is clear visibility and accessibility of tombs on the landscape. He also argues that the constant presence of the deceased is used to maintain *ayllu* group relationships. However, this connection between the *ayllu* and open sepulchers does not necessarily apply to the coast as shown by Moore (2004) in his comparison of funerary landscapes and social order between the Inka and Chimu. These arguments show that regional variability must be taken into consideration rather than asserting a universal association of *ayllus.*

The consideration of the *ayllu* as a basic form of social organization is key to the research questions in this study. Although the connections within an *ayllu* may not literally be based on lineage at all levels, it can be applied to a small kin group related to a recently dead ancestor. Ancestor veneration and *ayllu* structure are connected in many regions and contexts in the Andes, but it is important not to assume that connection a priori. There are many historical records that point to an *ayllu* organization in the North Central Highlands and this will be discussed below.

Ayllus in the North Central Highlands

There is evidence from various colonial records of the use of *ayllu* organization in the North Central Highlands, specifically in the Conchucos region east of the Cordillera Blanca (Leon Gomez 2003; Espinoza Soriano 1981). Various manuscripts and records from 16th and 17th century discuss the ethnic groups and social organization of Conchucos during that time, which was after the arrival of the Spanish. Leon Gomez (2003) identifies five groups within the Conchucos region: Huari (which could be divided into right and left Huari), Pincos, Piscobamba,

Conchucos and Siguas. The division of the Huari into two groups was known as early as 1540 from an encomienda registry (Cook 1977). According to Espinoza Soriano (1981) the ethnic groups in this area were called *pachacas*, otherwise known as *ayllus. Pachacas* is an Inka administrative designation and suggests that the Inkas may have been reconfiguring local social organization for their own ends. Records generated by the campaign against idolatry note that during the early Colonial Period, *ayllus* were the basic form of social organization in Conchucos (Duviols 1973). These records also claimed that each *ayllu* venerated a brother ancestor who originated either locally or from Lake Titicaca near the Inka heartland. The Inka words and places used in these records show the potential influence the Inka had in the area, which further puts into question the existence of the *ayllu* prior to Inka times.

Although the colonial records of *ayllu* organization in the Conchucos region refer to the early Colonial Period after the Inka expansion, these forms of *ayllu* organization could still be applicable to the Late Intermediate Period. Lane and Lujan (2011) argue that the archaeological information available in the Conchucos region shows that rather than reorganizing settlements like other areas near Cuzco, the presence and permanence of the local Late Intermediate Period tradition was dominant. The Inka influence appears as an overarching structure that was diplomatic in nature with infrastructure such as taxing centers, agricultural controls, and roads created in the area, but had less effect on local settlement patterns or social organization (Ibarra in press). However, it is difficult to know if the local settlement patterns existed prior to the Inka division into Pachacas. An Inka administrative center was placed within each of the Huari's and Pinco's territories near the largest LIP settlements (Ibarra in press; Orsini 2014). This shows the possibility that the Inka incorporated the pre-existing *ayllu* organization rather than reorganizing

social boundaries, allowing the assumption that these *ayllu* social divisions existed during the Late Intermediate Period.

There is also some archaeological evidence of open sepulchers and ancestor veneration across the Conchucos region (Ibarra 2006, 2013; Mantha 2009; Martiarena 2014; Lau 2002, 2015). Mantha (2009) found that in the Rapayan Valley, southeast of Conchucos, small and large open sepulchers were likely used for the veneration of ancestors and employed as territorial markers for various levels of lineage groups. Martiarena (2014) found that the most common type of tomb during the Late Intermediate Period in Conchucos is an open sepulcher *chullpa* with an area outside for the performance of ancestor veneration rituals. She also concluded that the dead contained in these open sepulchers were a pivotal part of the socio-political organization of the living communities.

Although there is regional variability in the practices associated with ancestor worship and the use of open sepulchers in relation to *ayllu* organization, those practices do appear to be present in many sites in the North Central Highlands during the Late Intermediate Period. This is the case for large ethnic groups connected by a mythical ancestor as well as small local family based *ayllus*. A*yllu* organization and ancestor veneration do appear to be fundamentally connected as the veneration of ancestors reinforced the social community. There are certain locations and beliefs that were important to *ayllus* in their daily practice, especially related to ancestor worship, and these will be discussed further below.

Sacred *Huacas* and *Apus*

Considering the regional and temporal variability across the Andes it is difficult to identify Pan-Andean beliefs and practices. Due to the focus on culture areas at the time, Bennett (1948) wrote about a Pan-Andean tradition saying that archaeologically visible practices across

the Andes included ancestor worship, elaborate grave goods, mummy bundles, and pilgrimage centers. The Spanish chroniclers also generalized about Inka religion, including the worship of the sun, the earth, the moon and stars, the mountains, and ancestors (Cobo 1990; de la Vega 1976). Rather than generalizing about Pan-Andean practices, current scholarship recognizes the variability in practices across the Andes and instead focuses on concepts that have been observed to be widespread. For example, Allen (2015) expounds on the many varied practices involved in worshipping the earth known as *pacha.* She defines *pacha* as a spatial and temporal concept for the world in which we live that contains not only matter, but a moral order. Similarly, Astvaldsson (2004) also identifies variety in the ritual practices throughout the Andes, but emphasizes how these practices are often involved with the term and concept of a *huaca.* It is important to recognize that even though *huacas, pachas, apus,* and other beliefs can be found throughout the Andes, the practices surrounding them varied spatially and temporally.

According to what the chroniclers wrote about the way in which the Andean people worshipped the earth, mountains, and other natural phenomena, it appears as though animism was a Pan-Andean tradition. This is a system where the gods and spirits inhabit and are represented in the landscape and world (Lane 2011). The whole Andean material universe was filled with life, spirit and power. All of these gods and spirits originated from *pacarinas* or sacred origin sources such as lakes, springs, caves, or mountain peaks (Doyle 1988). Allen (2015) argues that it should not quite be considered animism as it is not that a separate entity fills latent objects, rather places in the landscape and objects have intrinsic power and agency as founders or ancestors. According to beliefs in the Andes, objects, mountains, springs and other natural phenomena do not just symbolize persons, they are people. These people participated in the daily lives and rituals connected with the beliefs of the community.

A key element of Andean beliefs and ritual practice is the *huaca*. The most commonly used overarching definition of *huaca* comes from the writings of the native chronicler Inca Garcilaso de la Vega (1976) who interpreted *huaca* as "*cosa sagrada"* or sacred thing with emphasis that it provided an advantage to the community. This definition is based on the attempts of Spaniards to understand the concept. He cites a long list of what the Spaniards and natives saw as *huacas* which includes effigies, idols, temples, tombs, mummies, mountains, springs, rocks, outstandingly beautiful or ugly specimens, and twins. He also mentions that these were not necessarily worshipped as gods, but rather venerated for the good that they could do for a community. As *huacas* was used as an umbrella term for anything considered "sacred" each sacred place or thing had its own native word to signify its sacred status. A few examples are *apus* or mountain gods, *mallquis* or founding ancestors, *pacarinas* or origin sources, *huancas* or stone images, and *machays* or tombs. Going beyond this list of what could be considered a *huaca,* Salomon (1995) used the term to refer to superhuman beings who inhabited these effigies, mountains, or other sacred objects which could include the founders of *ayllus* or *mallquis,* an Aymara term.

The semantics of *huaca* have changed over time and many employ it as stated above as "the sacred," but a few authors do not accept this overarching interpretation of *huaca.* Astvaldsson (2004) brings up the argument that the term "sacred" may not entail the same meaning to indigenous Andeans as it does in Western Judeo-Christian thought. The first Spanish chroniclers used *huaca* to refer to concrete objects, places or structures. Then later chroniclers expanded the term to include meteorological phenomenon, bodies of water, tombs and the dead within them that held supernatural powers. In Judeo-Christian thinking, the spiritual is separate from the natural world. However, Astvaldsson (2004) shows that these supernatural powers

form an integral part of Andean beliefs especially related to nature and society. In a similar argument Bray (2015) maintains that sacred in this context does not mean the abstract sacred of the Western world; rather the sacred are concrete, material phenomena that were physical embodiments of power, not representations of other worldly beings. These *huacas* assume their own personhood capable of communication and influence on the community. Bray qualifies *huacas* as being "superlative in its class, possessed of special power, and having personhood." Using linguistic analysis of Quechua, Mannehim and Salas Carreno (2015) come to a similar conclusion that *huacas* are not a separate sacred object, nor a spiritual essence. The contextualization of *huacas* is an integral part of Andean ontology. This helps us to understand that tombs, abandoned sites, mummies, and even natural parts of the landscape such as springs, rocks, and mountains, were at times considered more than important objects of veneration and part of their beliefs. These *huacas* were members of a working, living community.

Knowing that *huacas* could be considered part of the living community informs the mortuary context in terms of ancestor worship and mortuary practices. Lane (2011) explains that in death a person could become a beneficial intercessor with the spirits, becoming a *huaca* him or herself. The belief in the ability to become a *huaca* shapes the treatment and location of the dead as the community continued to interact with deceased persons. In addition to keeping their deceased in close proximity to living communities for veneration, mountain spirits or *apus* or *wamanis* were also worshipped as mediators between these community forefathers and the celestial deities (Bastien 1985; Castro and Aldunate 2003; Leoni 2005; Reinhard 1985) This relationship between *apus* and the deceased emphasizes the need for proximity to mountains, particularly in the highlands, to include them in their community.

The *apus* or mountain deities were some of the most prominent and influential *huacas* in the Andes. Besom (2000) describes the different roles and conceptions of mountain *huacas* throughout the Andes as including oracles, origin places, and as founding fathers that protect and provide. Each sacred mountain served different roles to its local devotees, creating regional diversity throughout the Andes. Favre (1966) argues that many ethnic groups were formed prior to the Inka conquest based on a shared devotion to a sacred mountain deity or *apu.* These groups of people, or *ayllus* would consider themselves related to this father figure *apu* (Lane and Herrera 2005). Ceremonies were often performed on the peaks of these *apus* either for the *apu* itself or for other celestial deities. Other rituals for the *apus* were performed in sites with clear visibility of the mountain peak (Cobo 1990; Salomon et al. 1991). These ceremonial rituals were part of a two sided relationship with the *apu*, as the *ayllu* devotees expected to receive fertility, good weather, and protection from them in return for their devotions (Besom 2000; Reinhard 1985). Not only was ancestor veneration an inherent part of the *ayllu* organization, but the connection and relationship with an *apu* was often also a part of the larger *ayllu* organization.

As many of the ethnic groups throughout the Andes believed these mountains to be founders and origin places, they also believed that they were locations to which they returned after death (Besom 2000; Reinhard 1985). Often time the entrances of *chullpas* were oriented towards the various sacred mountains visible on the horizon, in order to allow the dead to return to its summit (Bastien 1985). According to Polo (1916) and Murua (1964) it was common during the Early Colonial Period for native Andeans to remove the bodies of their deceased from churchyards and re-inter them in the mountains with their ancestors. Another reason given for these disinterments was that the ancestors buried underground were suffocating and needed to be free and able to be with the other ancestors (Gose 2008). A different early colonial writer, Jesuita

Anonimo (1918) noted that among high peaks he found caves spattered with the blood of sacrificial animals that contained multiple squatting mummies, each placed with their own food. These burial practices provided unification with *apus* during the Early Colonial Period in order to continue the traditions of the past, sidestepping the forced Christian practices. What may have appeared simply as mountain worship, was additionally a link between ancestors and their founders and *pacarinas*.

Andean Ancestor Worship and Funerary Traditions

Ancestor worship is not a religion as a whole, rather it is a religious practice with certain rites, rituals and beliefs. The beliefs and practices of ancestor worship are centered on specific deceased kin that allow for the active participation of that deceased ancestor in the affairs of the living (DeLeonardis and Lau 2004; Hardacre 2005; Nielsen 2008). Oftentimes the terms ancestor worship, ancestor veneration, and ancestor cult are used interchangeably (DeLeonardis and Lau 2004; Lau 2002; Ibarra and Landeck 2008; Mantha 2009; Nielson 2008; Salomon 1995). There is some distinction between the three as worship generally denotes the deification or the endowment of supernatural abilities to an ancestor (Hardacre 2005) while veneration implies rites of commemoration beyond burial to appease ancestors (Lau 2015). Salomon (1995) claims that the minimal element of an ancestor cult was the veneration of at least one dead person as the source of entitlement among a group of people who shared rights or identity. All of these terms are applicable at various levels in the Andean region, which allows the use of all the terms in their appropriate contexts.

In order to identify ancestor worship or veneration in any given context, there must be ancestors that are the object of worship or veneration. Hill and Hageman (2016) argue for three components needed in order to properly study ancestors: “ancestors” must be properly defined,

ancestorhood must be recognized to haves regional variability as to who achieves this status, and veneration rites must be distinguishable from burial rites. In the study of Andean ancestors, Kaulicke (2001) argues that the status of ancestor only refers to a sacred dead, and that not all dead reach that status. This is in disagreement with Isbell's (1997) generalized use of the term ancestor to include any dead. I agree with Martiarena (2014) that "ancestor" can be used for all the dead in the Andean context as long as a distinction is acknowledged among types of ancestors such as deity *apu* ancestors, *mallquis* (mummified progenitor *ayllu* ancestors), community ancestors, and family ancestors. This application of the word ancestor is similar to how the *ayllu* is applied to various levels of organization, so that the word ancestor can be applied to various levels of the dead.

Becoming an ancestor in the Andes may not have been as simple as passing from this life to the next. As previously discussed, *apus* are the sacred founding father mountains, that are living members of the community. Each *apu* has its own story of how it came to be, what town or people it founded, and those that are related to it that deserve its protection (Bastien 1985; Ibarra 2014; Reinhard 1985; Salomon et al. 1991). *Mallquis* or progenitor ancestors also have unique stories of their origins from *pacarinas* (Doyle 1988). The origin stories of *mallquis* were often used to delineate *ayllu* boundaries and denote sacred locations. Other community or family deceased became venerated ancestors through behavior in life and the completion of rites repeated by their direct descendants that kept these ancestors active in their lives (DeLeonardis and Lau 2004). It is the active worship and veneration of all of these ancestors by the living that bestow upon them this sacred ancestorhood.

All of the rites and rituals performed as part of ancestor worship helped to reinforce the politics of *ayllu* organization. Doyle (1988) claims that the ancestor cult in the Andes was based

on the ancestral creators of local, regional, and ethnic sociopolitical units (*ayllus*) and this gave the basic direction for all communal interaction. Each *ayllu* had one or more *mallquis* that were the focus of the group's veneration and because many of these *mallquis* were related, there was cross adoration at certain festivals in the year, and this also linked different *ayllu* groups. *Mallquis* of the larger unit *ayllu* were hierarchically superior and revered by all of the *ayllus* and lineages, whereas more local ones were revered by only their local group (Doyle 1988). Additionally, the myths that accompanied the *apus* and *mallquis* dictated territory and sacred landscapes. Similarly, Gil Garcia (2002) claims that ancestor worship created a reciprocal relationship that sustained the community economy and legitimized their territory. DeLeonardis and Lau (2004) argue that ancestor veneration was also used for group cohesion within the *ayllu* as well as political leadership and resource entitlement. The social and economic interactions within an *ayllu,* including transmission of resources and authority after death, were reinforced through these ancestor veneration ceremonies (Dillehay 1995; Lau 2008; Salomon 1995). It was ancestor worship that acted as the structural adhesive for the organization of the *ayllu.*

The practice of ancestor veneration implies that the ancestors impacted the daily lives of the descendants. Throughout the historical and ethnographical documents is a general belief that the deceased could provide their descendants with wisdom and continue to influence their health, crops, and fertility (Alvarez 1998; Cobo 1990; Doyle 1988; Reinhard 1985). Conversely, bad weather and harsh conditions could be the results of uncovering or removing the ancestors from their resting places in the mountains (Kaulicke 2001; Reinhard 1985). *Mallquis* of each *ayllu* were specifically believed to be involved in all important stages of life: birth, naming, fertility, marriage, and new households, as well as protection and agricultural cycles (Doyle 1988). *Ayllus* and families also kept curated materials of the ancestors including bones, bundles of hair,

masks, figurines, and stone monoliths (Guamán Poma de Ayala 1980; Nielsen 2008; Salomon 1995.) Landscapes and sepulchers themselves could also hold their ancestral powers. These relics and places were preserved in order keep the memory of the deceased alive and present in their daily lives (Nielsen 2008).

Rituals and offerings performed at the time of death and later also increased the positive impact of the dead on their descendants, and their remnants can be used as evidence of ancestor worship in the archaeological record. The *pacaricuc*, or five day ritual, was the most commonly known death ritual in the provincial Andes during Inka times (Duviols 1986; Doyle 1988; Salomon 1991). This ritual included five days of mourning, drinking, sacrifices of large animals, feasting, processions, extended burial practices, libations, rituals to preserve the body, and the making and use of ancestor effigies. It was not until the year anniversary that the dead were said to have joined their ancestors. At this point further rituals were performed including taking the body from its repository, redressing it with new clothes and providing offerings of *chicha* (a corn alcohol), blood, and burned food at the entrances and doorways of their tombs. Ancestors were also involved in many cyclical rites and ceremonies when planting or harvesting which would include offerings such as *chicha*, coca leaves, maize, slaughtered sheep or llamas (Alvarez 1998; Cobo 1990; Guamán Poma de Ayala 1980; Salomon 1995). All of these rituals could provide rich archaeological evidence for ancestor worship.

A key aspect of ancestor veneration was to keep the deceased near or in sight of residences and accessible to the descendants, so that the ancestors could participate in the daily lives of their descendants. *Machay* is a Quechua word for grave, tomb, or burial chamber often used in Spanish writings (Doyle 1988). Early Colonial Period records indicate that all people placed in a *machay* became part of the "*antepasados*", "*awilus*", or forefathers and were part of

ancestor veneration on different occasions during the year (Doyle 1988; Duviols 1986; Guaman Poma de Ayala 1980; Salomon 1995). All *machays* were sacred whether or not they contained a *mallqui*, as these tombs were considered *huacas*. Doyle (1988) notes that many historical records stated that the descendants of *mallquis* were buried with their corresponding *ayllus* and *mallquis*. This suggests that the tombs in which apical ancestors were buried, would be filled with related family members. As mentioned previously, Baca et al. (2012) used mtDNA analysis to show that *chullpas* (above ground open tombs) at a site in southern Peru were filled with extended family groups. The tombs and open sepulchers that housed the ancestors will be discussed in further detail below.

Ancestor worship in the North Central Highlands of Peru involved many beliefs, rituals, and practices that centered on specific deceased kin. Colonial records indicate that different practices and rituals were associated with different *apus*, *mallquis*, or familial deceased to help perpetuate their status of ancestor and keep them active in their communities (Doyle 1988; Duviols 1986; Guaman Poma de Ayala 1980; Salomon 1995). Many of these rituals and offerings occurred in and around their sacred tombs and as such, have left evidence of where these rituals took place that can be found in the archaeological record (Ibarra 2006, 2013; Mantha 2009; Martiarena 2014; Lau 2002, 2015). It appears as though these ancestor worship rituals were a key adhesive component of *ayllu* organization in this area of the Andes. If evidence of ancestor worship, *ayllus*, and *huacas* can be identified together in the archaeological record in any given site, it would further the idea that they are interrelated and essential components of the history of that site.

Changes in Mortuary Practices in the Northern Highlands

Now that the interconnections among *ayllus*, ancestor worship, *huacas* have been described, we can put into context the practices found in the North Central Highlands of Peru and how they changed through time. Dillehay (1995) reiterates that throughout time, especially in the Andes, death was a very powerful event that shaped the actions of Andean societies. Practices such as preserving the dead or even just parts of the dead while keeping them present in the communities had a long history in the Andes before the records written about the Inka (Buikstra 1995; Doyle 1988; Verano 1995). Secondary burials were very common in the highlands as part of funerary rituals connected with ancestor veneration (Gamboa 2009). Another collective similarity in the highlands was interring the dead in places that are physically durable, avoiding wet or unstable locations (Lau 2015). However, depending on the nature of the death and the region they were in, the bodies were treated in a variety of ways, some buried incomplete, some disinterred and reburied in other locations, or some never reaching a cemetery at all (Verano 1995). What follows is a summary of the extant literature on mortuary practices in the North Central Highlands. This summary includes Recuay, Wari and the Middle Horizon, Late Intermediate Period groups, Inka, and the early Colonial Period.

The Recuay is a culture from the Early Intermediate Period (1-700 A.D.) that is known for its funerary traditions. The Recuay had diverse burial practices over time starting with various types of subterranean tombs (DeLeonardis and Lau 2004; Gamboa 2009; Ibarra 2013; Lau 2015) which likely predate the use of above ground *chullpas* or funerary structures. *Chullpas* came to this region during the decline of Recuay around 600 A.D. (Lau 2015). Both the subterranean tombs and *chullpas* could be small and simple or very large with multiple chambers, but always allowing multiple individuals in the tombs. Both also allowed for

visitation of the deceased as the *chullpas* had easy access and the subterranean tombs were not often closed in, rather, they included doorways covered by large stone slabs which allowed for reentry and possibly various forms of ancestor veneration (DeLeonardis and Lau 2004; Ibarra 2013). These tombs are also often found built into natural features on the landscape such as caves, at times with walls built into them (DeLeonardis and Lau 2004; Gamboa 2009). The Recuay culture is also known for stone sculptures and ceramics that were associated with their funerary practices. These sculptures show the dead in flexed positions, although no real evidence exists to confirm that they were used as effigies of real persons (Gamboa 2009). Overall, Recuay funerary traditions became increasingly elaborate over time with growing emphasis on group interments and larger constructions including the appearance of *chullpas* as the Wari Empire grew.

Archaeologists argue over the extent of the presence and influence of the Wari on the North Central Highlands of Peru during the Middle Horizon, especially pertaining to mortuary practices. According to Isbell's (2004) tomb typology, the elite Wari burials appear to be the only ones that included above ground structures to house the subterranean pit tombs. These tombs could be re-opened, but they weren't very accessible. He links the complexity of the burials to the hierarchical social organization of the Wari. Valdez (2006) points out that Isbell (2004) did not include many sites from the Wari heartland excavated by himself or other academics or CRM firms. He concluded that ancestor worship seemed likely, but only the ancestors as a group were worshipped and variability in worship was due to ethnic groups, rather than social hierarchy. As far as the Wari influence in the North Central highlands is concerned, Isbell (1997) believes the spread of *chullpas* was a way for local groups to consolidate during the expansion of Wari elites by marking the territory of *ayllus*. This may have been the case in the

Callejon de Huaylas (Ibarra 2014; Lau 2002; Paredes et al. 2000), as large prominent *chullpas* appeared in Wari centers in that valley during the later period of Wari expansion. This does not seem to be the case in Conchucos, east of the Cordillera Blanca. Ibarra (2014) claims that there are insufficient Wari artifacts, architecture, or new sites in the Conchucos to suggest a permanent occupation. However, Lau (2015) and Paredes et al. (2000) argue that even in the Callejon de Huaylas, Wari did not cause major transformations in local ceremony but did influence burial structure trends. Although the Wari did expand into parts of the North Central Highlands, their influence appears minimal east of the Cordillera Blanca.

During the Late Intermediate Period, about 900-1440 A.D., mortuary traditions in the North Central Highlands became much more visible on the landscape. Martiarena (2014) claims that as the large polities (Wari and Tiwanaku) of the Middle Horizon collapsed, the land in the Callejon de Huaylas and Conchucos was divided by ethnic groups that shared common beliefs, language, and ways of life. Leon Gomez (2003) disagrees, arguing that even though they did all have a similar basic social organization, the ethnic groups maintained political autonomy with independent territories, languages, etc. Despite potential differences in territories and languages, similar mortuary practices appear widespread in the region. Stanish (2012) argues that the new political groups that emerged after empire collapse were able to use the chullpas and ancestor worship to validate alliances and exchange systems. During this time period it was prevalent to entomb dead in above ground structures of various sizes made of stone or clay, known as *chullpas*. These also generally had open doors which allowed for access to the ancestors, whether to participate in rituals or leave offering in order to preserve the memory of the dead (Rowe 1995). Mantha (2009) claims that the presence of *chullpas* in groups next to residential sectors in LIP sites from the Conchucos region indicate social boundaries within and between sites and kin

groups. She specifically argues that multi-story *chullpas* were the possible residence of *mallquis* of the *ayllus*. Martiarena (2014) disagrees with Mantha's (2009) argument as the number of multi-storied buildings in some sites is too great for all to have been filled by such apical ancestors. It is important to recognize that during this time period, the use of *chullpas* in conjunction with ancestor veneration appears to be widespread in the North Central Highland; however, the use of these tombs was regionally varied.

Despite the spread of the Inka Empire after 1440 A.D., the regional practices discussed above persisted during the Late Horizon. The Spanish chronicles describe the mortuary practices of Chinchaysuyu, or the northern part of the Empire (Cobo 1990; Doyle 1988; Guaman Poma de Ayala 1980; Salomon 1991). Guamán Poma de Ayala (1980) wrote that in the northern Andes outside of the capital, they performed the *pacarícuc*, the five-day burial ritual mentioned previously, and kept those ancestors in an open sepulcher to keep them accessible to the community. It is difficult to say whether these exact practices existed in the region before Inka influence. However, the *chullpas*, caves, and subterranean cists found previously persisted during this time period, so it could be possible that the ritual practices had not changed considerably (Lau 2015; Martiarena 2014). There are Inka administrative centers throughout the North Central Highlands as well as small centers for taxing purposes (Ibarra in press). The Inka presence in the North Central highland did not strongly affect settlement patterns although there is some evidence of Inka style plazas, tomb architecture, and ceramics in various sites during the Late Horizon. So although there was some social reorganization in some areas of the North Central Highlands, there is not much evidence that the Inka impacted the mortuary practices of ethnic groups.

Although the spread of the Inka Empire didn't change the mortuary practices much in the North Central Highlands, the arrival of the Spanish in 1532, and eventually the extirpation of idolatries, caused fundamental changes. The Spaniards insisted on the underground burial of both anciently and newly deceased people, (Cobo 1990; Dean 2010; Gose 2008), preferably under newly built churches. The evangelization of natives taught them that even if their relatives were baptized and "Christian" if they were buried in an improper way, such as in their above ground tombs, they would be lost (Alvarez 1998). If cemeteries were used, the distance between residential areas and cemeteries was increased, and they were separated to detach the people from their ancestors and their idolatries (Lau 2015). Steps were even taken to prevent idolatrous forms of ancestor veneration, trying to enforce only one day of mourning and rituals as well as not allowing food or other offerings to be left at the graves (Martiarena 2014). However, even after the removal of many of the ancestors' remains, the *chullpas* themselves often continued being used for commemorative practices (Nielsen 2008). Due to these practices there were orders to destroy tombs and *huacas*, many of which were looted and dismantled (Martiarena 2014; Ramos 2010).

Mortuary practices in the North Central Highlands of Peru have been a pivotal part of life since the Early Intermediate Period, but they changed through time. The Early Intermediate Period and the Recuay culture was the beginning of open sepulchers either below ground or the occasional above ground tomb in conjunction with evidence of ancestor veneration. During the Middle Horizon the impact of the Wari Empire on mortuary practices in the North Central Highlands is uncertain, but there was an increased use of above ground *chullpas.* The Late Intermediate Period was dominated by the use of *chullpas* and other generally visible and accessible tombs as *ayllus* vied for land and resources. The presence of the Inka empire in the

area did not appear to make any significant changes to mortuary practices, but the Spaniards tried to change everything in an attempt to wipe out all ideology contrary to their own beliefs. Identifying these types of mortuary architecture in the archaeological record has the potential to inform the presence of ancestor worship and *ayllu* organization. The characteristics of the primary forms of mortuary architecture found in the North Central Highlands during the Late Intermediate Period are discussed further below.

Mortuary Architecture in the North Central Highlands

In the Andes there is a wide variety of mortuary architecture. Mortuary architecture can be considered any place set aside to hold, preserve, sustain, and even connect with deceased ancestors (Lau 2015), and is generally referred to as a *machay* in extirpation documents (Doyle 1988). Throughout the Andes one can find a wide variety of above ground structures or below ground tombs, and researchers have recorded these on a regional scale since the middle of the 20th century (Bennett 1944; Tello 1956). More recently, tomb typologies have been created by Isbell (2004) and Valdez (2006) for the Wari Empire which include eight or more different types of tombs. In the highlands of Ancash, Valverde (2008), Martiarena (2014), and Lau (2015) have all created typologies that categorize the tombs differently and describe changes through time for the region. Others (Castro and Aldunate 2003; DeLeonardis & Lau 2004; Dillehay 1995; Gamboa 2009; Gil Garcia 2010; Ibarra 2013; Kurin 2012; Laurencich 2001; Stanish 2012; Tschauner 2003,) write about these tomb types without the aim of creating a typology. Lau (2015) presents seven types for the central highlands including stone lined cists, caves, rock shelters, galleries, multi-chambered subterranean pits, deep stone lined pits, above ground *chullpas,* and Christian underground burials. For the purpose of this study, caves and modified caves, *chullpas,* and Christian subterranean tombs will be further explored.

Different forms and modifications of caves were used throughout the Andes to hold the deceased, and these were also prevalent in the Ancash highlands. Caves with no modification, whether just small rock outcrops, or larger caves found in hillsides, or in cliffs, have been used for an extended period of time in the highlands (Ibarra 2013; Lau 2015). These caves could also have small walls built up inside them to create divisions between places for the dead (Kurin 2012). In addition, sometimes overhanging boulders were employed in connection with constructed exterior walls to take advantage of the natural landscape while creating separate spaces for the deceased (Gamboa 2009; Valverde 2008). Many caves show evidence of being sealed with boulders, and some also have areas within or just outside with evidence of feasting (Kurin 2012). In some documents, (Duviols 1986; Guaman Poma de Ayala 1990; Salomon 1995) the term *machay* was only applied to caves, rather than generalized for all tombs. These caves could also serve as territory markers due to their location on the edge of a supernatural place within the stones of a mountain and were said to hold the remains of the apical ancestor of lineages or *mallquis* (Kurin 2012; Martiarena 2014). Although there is a great deal of variability in the use and construction of caves, they are pivotal for understanding mortuary architecture in the Ancash region. As the different uses of caves can be identified, there is the potential to better understand the importance of being buried within a supernatural place and the social divisions between apical ancestors and community members.

The most visible form of mortuary architecture in the Andes, but in particular the Ancash region, is the *chullpa*. The term c*hullpa* has generally been accepted, despite arguments about its historical accuracy (Isbell 1997; Martiarena 2014), to mean above ground structures made to house deceased people. What is accepted as a *chullpa* varies widely across the Andes from small one room structures built of simple stones, to large multi-story buildings with many chambers

made of large stone, or tall multi-storied, silo-like structures of stone or adobe (Gil Garcia 2010; Lau 2015; Martiarena 2014). Early archaeologists studying the *chullpas* of the Inka thought they were reserved for elites, but were also thought to be used to store goods and serve as landmarks (Bennett 1944; Hyslop 1977). Castro (2003) argues that *chullpas* are not always used as actual places for interment, but rather for ceremonies linking the dead and the mountains. Although appearing earlier than the Middle Horizon, the use of *chullpas* did not proliferate until after that time in the Ancash highlands (Gamboa 2009; Lau 2015; Stanish 2012). While some might claim the influence of Wari on the spread of *chullpas* (Bennett 1944; Herrera 2005; Isbell 1997; Paredes et al. 2000), Tschauner (2003) argues that some locations in Ancash that were contemporaneous with Wari expansion utilized the *chullpa* structure while not showing any evidence of Wari influence. This shows that the use of *chullpas* was already a widely spread phenomena with unique forms and applications that varied by region.

Even c*hullpas* within the region of Ancash differ between the region of Conchucos on the eastern side of the Cordillera Blanca and the Callejon de Huaylas on the western side. In the Callejon de Huaylas, some of the largest, most elaborate multi-chambered *chullpas* are found in important large sites from the Middle Horizon, yet they held no human remains by the time of excavation (Ibarra 2013; Martiarena 2014). The *chullpas* found in Conchucos, or even later during the Late Intermediate Period in Huaylas, are simpler, having only one or two chambers, with one level but possibly two stories high. They were constructed with rocks joined with mud mortar and roofed by large flat stones (Ibarra 201; Lau 2015). Many of these smaller *chullpas* contained more human remains than could have been in there in mummy bundles all at one time (Ibarra 2013). This shows use over time, because as the bundles and bones began to break apart, they could then fit new bundles into the structure. This allowed access to the more recently

deceased to be included in veneration offerings and rituals, while still allowing the ancestors of a lineage to be housed together.

The type of subterranean tombs that are of interest to this analysis are burials that occurred under the influence of Christianity during the Early Colonial Period. During the extirpation of idolatries, native Andeans were taught and often times forced to bury their dead in cemeteries or under churches, following Christian interment rituals (Doyle 1988; Duviols 1986). After these mandates from the Spanish, the native Andeans had to hide their *huacas* so they would not be destroyed. For many years, they utilized their *huacas* as places where they could still do their sacrifices and keep their dead hidden (Alvarez 1998). Also, it was common for native Andeans to remove the bodies of their deceased from the churchyards and re-inter them in the mountains near their ancestors. Gose (2008) explains that after the effects of many initial extirpation efforts were unsuccessful, local leaders were ordered to ensure that the dead were buried in the ground within view of the settlements, even if not at the church.

The use of these various forms of *machays* can be connected to ancestor worship and *ayllu* organization. According to Duviols (1979), the common dead were buried in caves, or as he called them, *machays*, whereas the important dead, like leaders, were placed in *chullpas*. In contrast, Dillehay (1995) argues that caves were exclusively used to house *mallquis*. Alternatively, Kurin (2012) concludes that in the Andahuaylas region, *machays* were not reserved for only male *mallquis*, rather all the descendants of that *mallquis* were also placed with them, creating a lineage burial, but perhaps separated by dividing walls. This is in agreement with many colonial documents (Alvarez 1998; Doyle 1988) that cite familial usage of *chullpas* and tombs. It is the increase in *chullpas* during the Late Intermediate Period which appear to prioritize the accessibility of the dead due to their placement on the landscape. The above

ground placement and the doorways show increased interaction with the dead (Ibarra 2005). These mortuary structures are often linked with evidence of libations, food, changes of wrappings and other ritual activities (Ibarra 2013; Lau 2015).

Conclusion

Many archaeologists have concluded that the *ayllu* was the basic form of social organization during the Late Intermediate Period and Late Horizon in the North Central Highlands of Ancash (Ibarra 2006, 2013; Lane and Lujan 2011; Lau 2002, 2015; Mantha 2009; Martiarena 2014; Orsini 2014). This conclusion is primarily based on historical records and the use of open sepulchers and ancestor worship. Their findings and conclusions can be summarized as follows. Larger scale *ayllus* were connected through the shared worship of mythical ancestors, often in the form of *apus* or *pacarinas* (Ibarra in press; Orsini 2014). On a large scale, formal rituals were performed for the mythical ancestors of these *ayllus* to gain protection and favor in agriculture. An entire community could be descended from one or more *mallquis* who came from these *pacarinas* and who would also be recipients of ancestor worship, receive offerings, and participate in the community (Doyle 1988). Many of the local *ayllus* were said to be connected directly through real familial descent from an apical ancestor. After death, family members were placed in familial tombs of either caves or *chullpas* and were also recipients of veneration and offerings (Baca et al. 2012; Doyle 1988).

Archaeological and historical evidence suggests that tombs containing ancestors and sacred mountains were used by *ayllus* for burials and ceremonies connecting groups together (Besom 2000; Doyle 1988; Reinhard 1985). *Chullpas* and caves, often considered *huacas*, were living and participating members of the community, in addition to the ancestors that resided inside of them (Allen 2015). Sacred mountain a*pus* were founding fathers and protectors of their

descendent *ayllus* (Ibarra 2013). Archaeologists and historical records indicate that native Andeans in the North Central Highlands were placed in tombs in proximity to their ancestors as well as within view of their *apus* (Besom 2000; Bastien 1985; Gose 2008; Murua 1964; Polo 1916; Reinhard 1985). This allowed for the basic *ayllu* groups such as families, up to larger community sized *ayllus* to have access to their ancestors, real and mythical, for regular worship and veneration.

Evidence suggests that ancestor worship was a regular practice in the North Central Highlands during the Late Intermediate Period (Ibarra 2006, 2013; Lane and Lujan 2011; Lau 2002, 2015; Mantha 2009; Martiarena 2014; Orsini 2014). Rituals were associated with worship and veneration of *apus, mallquis,* or other specific deceased kin. This helped perpetuate their status as ancestor and keep them active in their communities. Many of these rituals and offerings occurred in and around their sacred tombs. These rituals have left evidence in the archaeological record. These ancestor worship rituals were a key adhesive component of *ayllu* organization in this area of the Andes, but regional variation must be taken into account.

Ancestor worship, *ayllus*, and *huacas* cannot properly be discussed as separate entities as the historical records generally show these to all be interrelated. The presence of *ayllu* organization in the archaeological record has previously been based on the presence of open sepulchers as evidence of ancestor worship and the assumption that this equals *ayllu* organization. In order to identify these in the archaeological record, I argue that it is better to take a more complete approach and find many lines of evidence for ancestor worship. This would include many lines of evidence that point to *ayllus*, ancestor worship and *huacas*. Historical documents are preferred to identify possible *ayllu* groups that existed as well as local rituals during the Early Colonial Period, especially if reference to prior times was discussed. The

proximity and visibility of founding ancestors such as *apus* or *pacarinas* show the links to larger *ayllu* organization. The accessibility of funerary caves and *chullpas* that could be daily participants in the community and used for rituals and offerings show ancestor veneration. The use of these tombs as familial burials can be used to connect *ayllu* organization and ancestor worship of specific deceased kin. All of these lines of evidence are interrelated and are needed to help identify these practices in the context of the North Central Highlands.

Chapter 3. An Overview of Marcajirca

This chapter is an overview of Marcajirca, a prominent site in the highlands of Ancash with a particularly large mortuary component that was occupied from approximately 1020 to 1640 A.D. Marcajirca has been excavated since 2007 by the *Proyecto Arqueologico Huari-Ancash* at Marcajirca, under the direction of Bebel Ibarra. Ibarra (2009) states that, "the general goals of the project are to reveal the chronology, function, and the role the presence of the dead in the development of the site, including aspects related to ancestral worship."

This chapter will review pertinent evidence discovered during the excavations at Marcajirca. It will begin with details about the site. Then a description of the mortuary structures and other features will provide insight into the overwhelming presence of mortuary practices and evidence suggestive of ancestor worship unique to the site. This will be followed by a description of the mortuary remains found at the site and their general condition.

Site location

The site of Marcajirca is located in the region of Conchucos on the eastern slope of the Cordillera Blanca in the department of Ancash (Fig. 3.1 and Fig. 3.2). The site is situated at 3800 meters above sea level on a ridge top, as was common in the Late Intermediate Period in the Ancash highlands. Due to its high position above the Puccha River Valley, all of the cardinal points can be seen on the horizon (Ibarra 2003b, 2013; Ibarra and Landeck 2008). This location is around 1,500 km from Cuzco and 500 km from Lima which became the Spanish capitol. The distance and rough terrain made Conchucos far removed spatially and culturally from the Inka Empire, which was often the focus of historical records that are commonly used to describe pre-hispanic Andean culture.

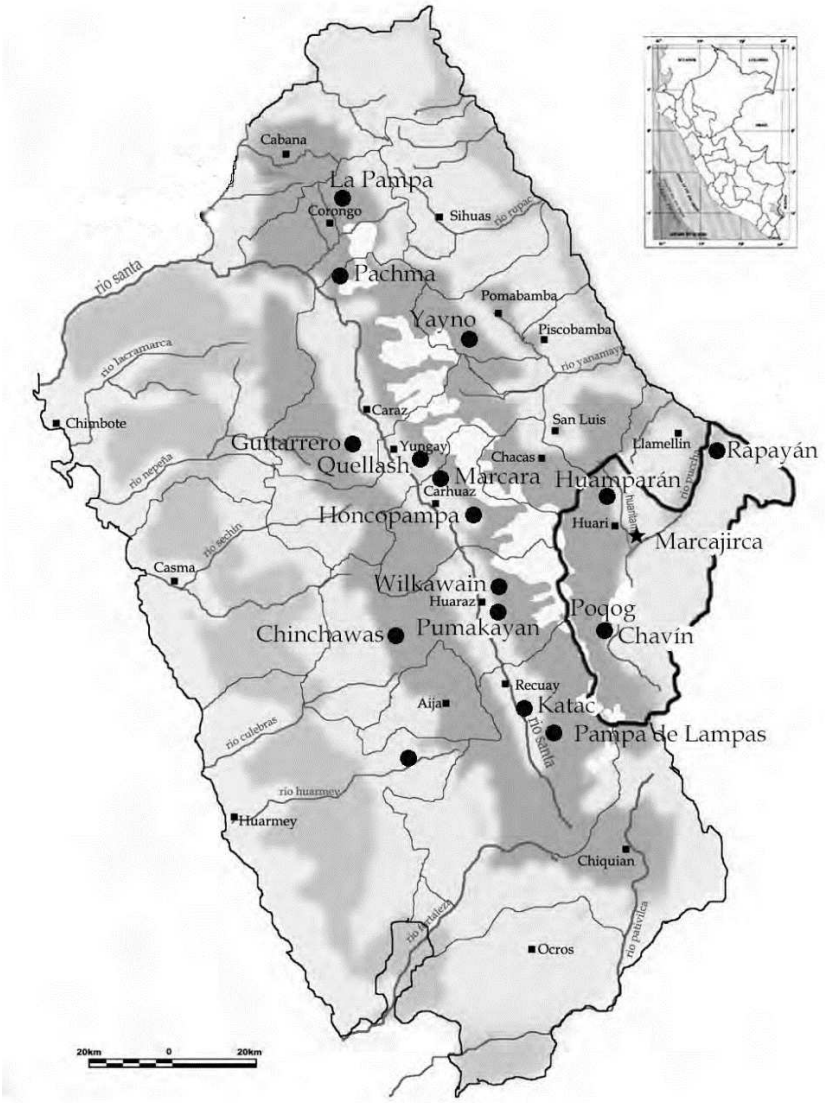

Figure 3.1 Map of the Department of Ancash with location of Marcajirca and other notable sites (adapted from Ibarra 2014).

Figure 3.2. Panoramic photo of the Cordillera Blanca facing south and west from the residential sector.

Marcajirca is a place name with special reference to its location and function. *Marca* is a local word for town that generally has varied architectural components (Ibarra in press). *Jirca* is a word that in general refers to a hill, but in the zone of Huari, can be equivalent to the word *huaca* used throughout the Andes (Ibarra 2014, in press). Given this place name, we know that Marcajirca is placed to some degree on a sacred site or that the site itself was a sacred place. The ridge top on which it resides is south of and beneath the summit of Mt. Llamoq, currently considered an *apu* and one of a group of five sacred mountain tops in the area (Ibarra 2003; Ibarra and Landeck 2008). Most importantly, Llamoq is considered the *apu* of the entire province; it is their local founding ancestor, the protector of the people and protector of the harvest and Marcajirca is the closest Late Intermediate Period site (Ibarra 2014). There are actually two peaks of Mt. Llamoq. The primary peak has an elevation of about 4215 meters, is approximately 3 km from Marcajirca (Fig. 3.3) and is connected by a prehispanic road (Ibarra in press). No excavations have been done at the peak of Llamoq, however a series of five prehispanic concentric walls are present and auger tests have revealed painted ceramics (Ibarra in

Figure 3.3. Photo of Mt Llamoq from northern edge of Marcajirca facing north with a view of the two peaks of Mt Llamoq.

press, 2014). The western peak of Llamoq that is visible from the town of Huari also has an altar and cross. This is still a destination for pilgrimages, especially during the festival of the cross in September (Ibarra 2006, 2014).

In the simplest of terms, Marcajirca is a set of residential and public structures with its own unique characteristics due to the large quantity of mortuary architecture. The principal part of the site now covers almost seven acres and probably reached about twenty acres during its use (Ibarra 2009). Structures were constructed on both slopes of the divide although the majority are concentrated on the eastern slope (Fig. 3.4). Ibarra (2009, 2013) divides the site into three main sectors: residential, public, and mortuary. These sectors are not necessarily exclusive; however, they do represent the general clustering of building types at the site. These sectors can be seen on the site plan map in Figure 3.5. There is also a line of cliffs running north-south on

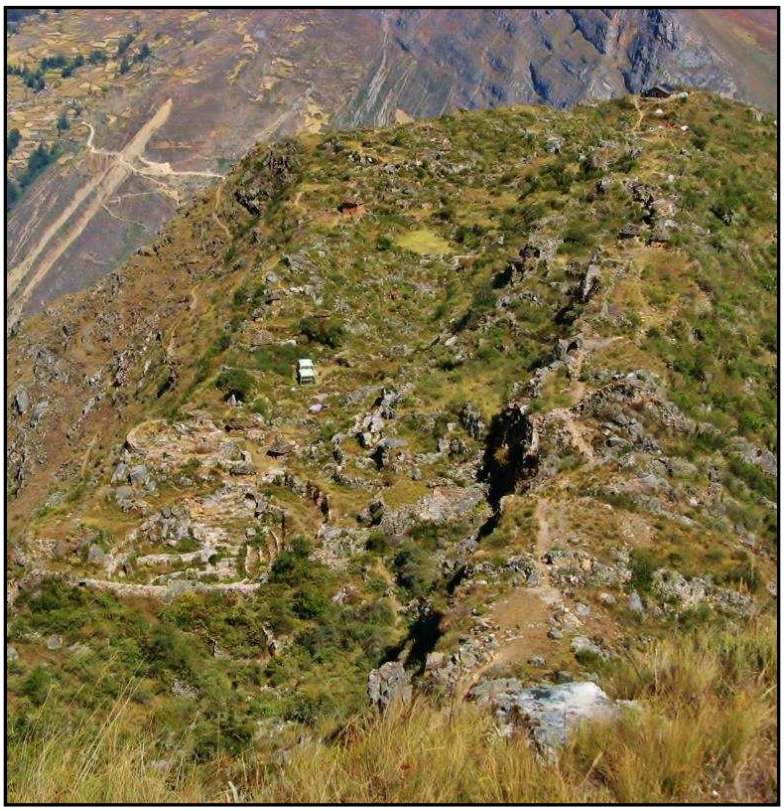

Figure 3.4. View of Marcajirca facing south from up the hillside above the site. Shows the distribution of structures along the ridge and the north-south cliff.

Figure 3.5. Site map of Marcajirca updated prior to the 2012 field season (created by Ibarra).

the western half of the site that separates the main sectors already mentioned from an additional higher altitude sector that has not been the focus of excavations at this point in time. There is also a series of roads that extend towards the north as well as the south below the site. These roads likely connected to the Inka trail during the site's later occupations (Ibarra et al. 2010). Each of these main sectors have distinct structures and purposes discussed further below.

Organization of the Site

The residential sector of Marcajirca is clustered on the southernmost portion of the site with features typical of residences in Late Intermediate Period villages in the Conchucos region. There are approximately 50 homes, and almost all are circular structures around three to four meters in diameter with walls reaching up to two meters in height. The construction is made of rock and mud mortar, and although there is no remaining evidence of roofs they are assumed to have been made of straw. The total estimated population that could be housed at one time in this sector is three hundred individuals (Ibarra 2009). Household artifacts recovered in the residential sector include pots with traces of soot, ceramics, bone needles, burned animal bones with traces of cutting, and grinding tools, all of which confirm the use of these structures as residences (Ibarra 2009, in press). There are paths between the houses and open public plazas, but unlike many sites in the area (Ibarra 2014, in press) there is no apparent pattern to the distribution of houses, or to the orientation of the doors.

The public sector, which includes plazas scattered throughout the site, has distinct public ceremonial structures concentrated on the northern end of the site. These public structures are adjacent to a low defensive wall on that northern border, very typical of Late Intermediate Period sites in Conchucos. Aside from common plazas and courts found spread throughout the site, the northern end also includes a tower and an "amphitheater" (Fig. 3.6). The tower is mostly

Figure 3.6. View facing south of the public sector at Marcajirca with the defensive wall, amphitheater and the tower.

circular, approximately 15m wide and 13m long with portions of the wall being 4m thick, leaving a circular inner enclosure about 5.3m in diameter. The western wall rises around 3m in height, creating a tall protruding feature reminiscent of a tower. Ibarra (in press) believes that the function of the tower was ritual as it appeared that it was well cared for and kept clean. The amphitheater abuts the northern defensive wall measuring 26 m long east-west. The plan view of the amphitheater is semi-oval extending south 27m in two or three tiers of terraced concentric half circles on the eastern and western portion. The center atrium or court of the amphitheater is 12.5m long with seating located on the southern portion between the terraced tiers (Ibarra 2009; Ibarra et al. 2010). Several *chullpas* and caves are found within close proximity to these public ceremonial structures as seen in the site map (Fig. 3.5), indicating the closeness between rituals for the living and for the dead.

The mortuary sector plays a dominant role in the layout of Marcajirca as there is a concentration of mortuary structures in the middle of the site, but isolated mortuary caves and *chullpas* are also scattered throughout (Ibarra et al. 2010). The types of mortuary structures at Marcajirca include a pair of underground burials, caves, and *chullpas* or above ground funerary structures. To date, 22 caves and 35 *chullpas* have been identified (Titelbaum et al. 2015). Human remains have been found in most of these structures, and given the large amount of vegetation at the site, it is highly possible that the total number of mortuary structures could increase with further investigation (Ibarra and Landeck 2008). Most of these structures are in a poor state of preservation. Further description of the mortuary structures will be provided below.

Radiocarbon Dates

The site of Marcajirca has been dated to 1020 to 1640 A.D., with the majority of the dates within the Late Intermediate Period between 1200-1460 A.D. Ibarra (2003) believes that Marcajirca likely was continuously occupied through the Late Intermediate Period and Late Horizon. These dates were provided from radio carbon samples gathered from a random sample of human dentition and a few bits of wood or straw used in the construction of some structures. A summary of the radio carbon results can be found in Table 3.1. These dates show occupation over a long time period, but not a clear chronological pattern of use. For example, multiple samples taken from Cave 19 show early dates, from 1040-1090 A.D., and later dates, from 1260-1330 A.D. Chullpa 10 was dated earlier to 1020-1230 A.D. while Cave 7B dated much later to 1260-1400 A.D. The underground structure burials were dated much later, to 1440-1640 A.D. (Titelbaum et al. 2015). Even though the dates for the underground structure appear later, certain caves and *chullpas* were used contemporaneously. In order to more completely understand the use of the site over time a sample would be needed from a larger number structures.

Table 3.1. Radiocarbon dates collected and analyzed by the University of Salento, Italy.

Radiocarbon Dates from the Archaeological Project Huari Ancash				
Year of Sample	Sample Number	Calibrated age and Standard deviation	Approximate date range	Sample details
Marcajirca (2007)	LTL2623A	669 ± 45 BP	AD 1260-1400	49F/Cave 7B/1 Sample taken from molar that comes from a crania with annular erect deformation.
Marcajirca (2007)	LTL2624A	891 ± 45 BP	AD 1020-1230	49A/Ch10-1/3-04 Vegetable Carbon sample from the part in front of Chullpa 10
Marcajirca (2007)	LTL2625A	701 ± 50 BP	AD 1220-1330	49A/III-2A/09 Vegetables Carbon sample from the base of a drainage or canal
Marcajirca (2007)	LTL2626A	361 ± 50 BP	AD 1440-1640	49F/VII-1/2-05 Tooth that comes from a crania found in the intrusive Structure 7
Marcajirca (2008)	LTL3850A	599 ± 40 BP	AD 1290-1420	Muestra6/49F/Cave 18/BlockB1/5 Mandibular Tooth
Marcajirca (2008)	LTL3851A	708 ± 30 BP	AD 1250-1310	Muestra7/49/Cave19/BlockH2/1. Tooth from crania with annular oblique deformation
Marcajirca (2008)	LTL3851A	668 ± 40 BP	AD 1260-1330	Muestra8/49/Cave19/BlockC2/1. Tooth from crania with annular erect deformation
Marcajirca (2008)	LTL3853A	840 ± 40 BP	AD 1040-1090	Muestra9/49/Cave19/BlockB2/1. Tooth from a crania with trepanation
Marcajirca (2011)	LTL8165A	432 ± 40 BP	AD 1478-1558	Muestra 49F. Chulpa 1.VT. Sample from beam from roof of Chullpa 1

Dates were calibrated using Ox Cal V3.10 and all with a 95% probability (adapted from Ibarra 2013).

Although it is apparent that Marcajirca is a Late Intermediate Period site, there are multiple problems with finding a clear site occupation pattern based on dates from the funeral structures. The dates show that the remains within any given tomb can vary by as much as 200 years, which shows use over time. However, due to poor preservation, there is a lack of organic material that could be found in the buildings themselves to find at what point the structures were erected. Some straw could be found on remnants of stucco applied to the exterior of the tombs, but due to the annual rainy seasons, buildings were likely re-stuccoed over time, again obscuring the original date of construction. For example, the most prominent mortuary structure on the site, Chullpa 1, was dated from a wooden beam to 1420-1490 A.D. This represents a fairly late date in the occupation and could have been caused by repair of the structure (Ibarra 2013) or it could have been constructed later under Inka imperial influence (Ibarra in press). In addition to

this, because many of the caves used to inter the dead lack structural modifications, it is difficult to know at what point they began to be utilized without testing every individual. This shows that although carbon dates have been established for the site, it is still difficult to identify a temporal pattern of use and occupation.

Mortuary Structures

There are more mortuary structures at Marcajirca than at any other site in the Puccha valley system, showing the unique emphasis on mortuary practices at this site (Ibarra 2003). The location of the primary mortuary sector between the residential sector and the public ceremonial structures shows the interaction that the living must have had with the dead on a regular basis. There are three main types of interment at the site: *chullpas*, caves, and underground burials. The following section will discuss the presence of each of those interment types and their construction, emphasizing the accessibility of those tombs. Open and accessible tombs have been linked to the practice of ancestor worship as well as *ayllu* social organization (Isbell 1997). There are also artifacts found within and directly outside many tombs that point towards the practice of ancestor worship and potential social stratification. A review of the distribution of human remains in terms of age, gender, health, and cranial modification helps assess possible social stratification at the site. Not all of the mortuary structures still contained human remains at the time of excavation, which raises questions about their use and the effects of looting.

There is some variation in the 35 *chullpas* at Marcajirca in terms of stone type, height, roof design, and location in the site, while they all follow an open sepulcher pattern. The *chullpas* at Marcajirca are the most well preserved structures at the site, having deteriorated less than the buildings in the residential sector. Although this is partly because of the use of stone roofing to protect the *chullpas*, it also shows the care taken in their construction (Ibarra and

Landeck 2008). In general the *chullpas* are quadrangular in shape, averaging 1.2 by 1.5 meters (Ibarra 2013). They are constructed of medium sized rocks, some of which exhibit polishing and are more finely worked than others. The rocks are joined with a mortar of mud and straw. The roofs are made of stacked slender rocks, creating a sort of conical shape. They have a small entrance, usually 40 x 50 cm, located in the middle of the front facade, above floor level and have no evidence of coverings. These entrances do not all face one direction, rather most face the plazas they surround. Figure 3.7 shows an example of two typical *chullpas* at Marcajirca. Some *chullpas* have remnants of plaster or stucco on the exterior walls. Evidence of red or white painted designs is also found on some of the exteriors and interiors of the *chullpas*. On the interior of the *chullpas* there are some protruding rocks, creating ledges, and in some cases there are niches. There is one *chullpa* that is larger and more prominent than the rest, reaching almost 3.5m excluding the roof, as it has caved in (Fig 3.8). This *chullpa* is one of a few that had no human remains left in it at the time of excavation (Ibarra 2009, 2013; Ibarra and Landeck 2008). Despite the variety of *chullpas* at Marcajirca, they all have open entrances, were easily accessed, and would have been seen on a daily basis

Figure 3.7. View facing south of the exteriors of Chullpas 20 and 21, showing typical construction style and mixed orientation

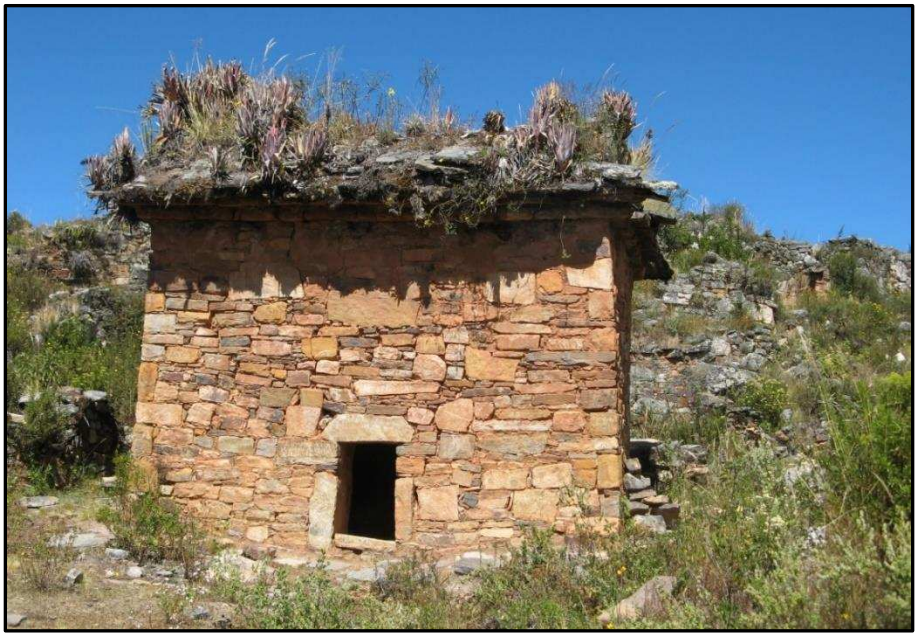

Figure 3.8. View facing southwest of Chullpa 1 with its unique size and construction.

The funerary caves at Marcajirca are spread throughout the site and vary greatly in size, shape, and modification, but all still had some degree of accessibility. Some of the caves utilized at Marcajirca are completely natural with no modification at all. Other caves have stone entrances built at the front that appear to replicate the entrances of the *chullpas.* Some caves included walls on the interior to subdivide the areas inside. In some instances, exterior walls and an entrance were constructed underneath a large outcropping boulder to create a cave environment (Fig. 3.9) (Ibarra and Landeck 2008). In general, the interior size of the caves ranged from 1.5m^2 up to 6m^2 and 1.2 m high, but there is great variability found throughout the site (Ibarra 2003). There has been no evidence as of yet to indicate social stratification based on type of burial or that caves were only used a final resting place after the *chullpas* were full. Similar to the *chullpas*, the caves all have open entrances, were easily accessed and although they are more scattered throughout the site, would still have been seen on a regular basis.

Figure 3.9. View facing northwest of Cave 7B exterior showing the man made exterior walls and roofing built into boulder. Photo from Bebel Ibarra.

There are two excavated underground interments at Marcajirca that show the exception to this open sepulcher pattern. Structure 7 was found buried partially below a few large boulders on the northeastern portion of the site on the outer edge of the amphitheater near the tower. It contained mostly articulated remains of 12 individuals. Structure 10 is located beneath a small semicircular plaza and contained 34 individuals that were also mostly articulated (Fig. 3.10). The plaza that contains Structure 10 is between a *chullpa* to the east and another funerary cave on the northwest. The placement of this underground burial emphasizes the importance of being buried between two locations of ancestors. Both of the underground burial structures were initially thought to be ossuaries, however, after excavation and analysis it appears that they contained individual mummies sequentially buried underground (Ibarra 2011). Structure 7 has been dated to a later time 1480-1640 A.D., likely after the Spanish conquest (Ibarra 2011). Ibarra (2011) hypothesizes that these are intrusive burials, likely placed during the extirpation of idolatries during early Colonial times. This would be in order to satisfy Christian standards of inhumation while still being placed near their ancestors in mummy bundles.

Figure 3.10. View facing north of underground burial Structure 10 level 7. Some of the vertebral and long bone articulations are visible.

The material culture found at Marcajirca is suggestive of ancestor worship. The areas directly in front of the entrances to a few caves and *chullpas* have been excavated for the purpose of identifying practices associated with ancestor worship. Ritual evidence found in these areas include traces of fires and burned food, animal carvings, and pottery (Ibarra 2009). All of these remnants have been identified as used in individual offerings to the ancestors as well as *pacaricuc* rituals that took place after death and the first year anniversary of death as noted in colonial documents (Alvarez 1588; Doyle 1988). These sort of artifacts were found directly outside the entrances of two thirds of the excavated *chullpa* exteriors (Ibarra 2006). However, the site is extremely disturbed by modern agriculture and looting. These activities would affect the archaeological remains on the exposed surface and possibly obscure further evidence of ancestor worship activities. Ceramics, textiles, tools, spondylus shells, and animal bone offerings with some exhibiting evidence of burning, were also found within some of the caves and *chullpas* (Ibarra and Landeck 2008). These burial goods were not found equally distributed

between the tombs excavated at the time. Since not all of the mortuary structures have been fully excavated at this time and the extent of looting is unknown at the site, it is still difficult to confidently identify social stratification based on burial goods. Despite the lack of clear social differentiation, the burial goods within and outside most of the tombs at Marcajirca do point towards rituals and practices connected to ancestor worship.

Human Remains and Context

The mortuary remains recovered from Marcajirca consist of a large quantity of individuals representing all ages with varied skeletal characteristics. Only about one third of the caves and *chullpas* at the site have been excavated and over 440 individuals have been identified. Almost all of the tombs contain a minimum number of individuals of over twenty individuals, usually based on long bones. The MNI for each tomb excavated can be found in Table 3.2. These individuals are comprised of adult men and women, sub-adults, infants, and some fetal bones all mixed within any given structure with no clear pattern based on age or gender. Two individuals found within Chullpa 26 exhibited a rare hereditary development abnormality of the wrist (Titelbaum et al. 2015). These suggests that tombs could have been used for familial burials suggestive of *ayllu* structure. In depth osteological analysis of the skeletal remains of three tombs (Ibarra and Landeck 2008) could not identify any specific social differences between the tombs based on the presence of various diseases, trauma, and stature. Nearly all of the remains in the caves and *chullpas* were found in a fragmented co-mingled state (Fig.3.11).

Table 3.2. Minimum number of individuals for the excavated caves and chullpas at Marcajirca including the year they were excavated (adapted from Ibarra 2013).

Funeral Structure	MNI	Funeral Structure	MNI	Funeral Structure	MNI
Cave 1 (2007)	14	Chullpa 3 (2007)	30	Structure 7 (2008-9)	12
Cave 2 (2007)	68	Chullpa 8 (2009)	20	Structure 10 (2009)	34
Cave 3(2008-9)	72	Chullpa 14(2010-11) 70%	28	Chullpa 9(2010)	1
Cave 18 (2008)	9	Chullpa 26 (2009)	28	Chullpa 6 (2010)	33
Cave 19 (2008-9)	30	Chullpa 15 (2010)	NA	Chullpa 7 (2010-11) 50%	36
Cave 7B (2010)	25	**Total Individuals 440**			

However, as seen in Figure 3.12, there were some that still had mummified articulated joints, wrappings, and rope to indicate that it was customary to inter in a flexed position such as a mummy bundle (Ibarra and Landeck 2008).

Figure 3.11. Interior view of Chullpa 14 showing typical comingled state of the remains. Photo from Bebel Ibarra.

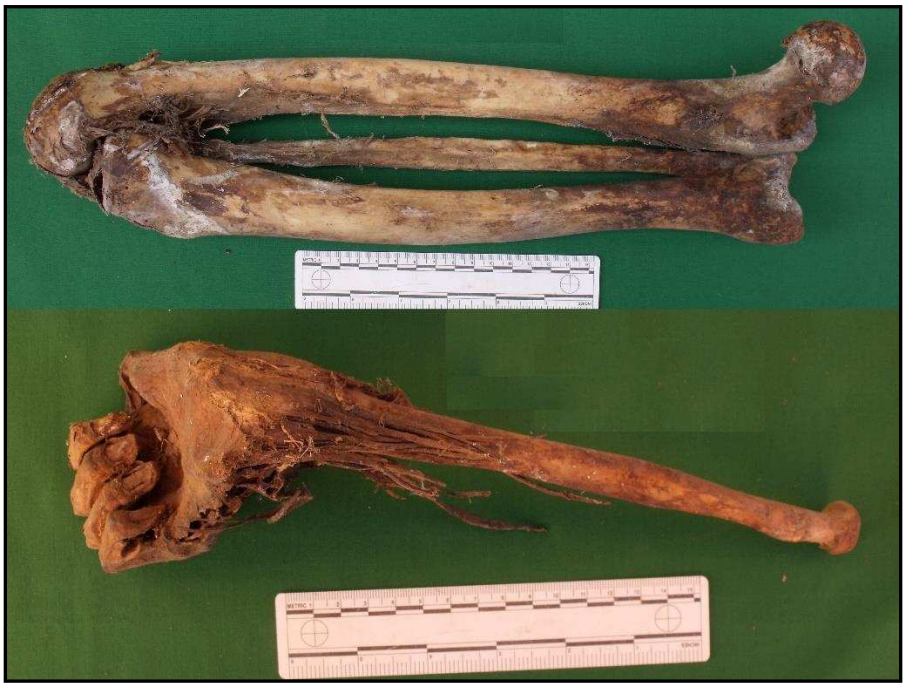

Figure 3.12. Example of articulated remains indicating a flexed position and mummification found in Chullpa 14. Photo from Bebel Ibarra

There are over 24 individuals exhibiting intentional cranial deformation found at Marcajirca. Another 14 crania exhibit unintentional flattening of the occipital bone. The annular oblique and annular recta forms of modification are most prominent. Modification was generally performed in the Andes as an ethnic or status marker (Ibarra 2013; Verano 1997). Of the modified crania there were nine males, nine females, and six that were indeterminable due tofragmentation. This even distribution of cranial modification by sex makes it difficult to explain the presence of modification due to exogenous relationships. All but three of the skulls displaying these kinds of intentional modification were found in caves rather than *chullpas* as seen in Figure 3.13 of Cave 19. Although this seems like a clear division of social groups, this distribution of modification is not exclusive as crania with different types of modification or no modification are found together in the same tombs. This makes it difficult to assess the social distinctions at Marcajirca based solely on cranial modification.

Figure 3.13. Cave 19 interior showing amount of modified crania as well as paint on interior walls.

Nearly all of the remains within *chullpas* and caves at Marcajirca are in a comingled fragmentary state. It is difficult to say if the comingled condition of the remains is due entirely to looting or the ritual patterns involved in their interment. It is clear by the average 1.2 by 1.5m interior of *chullpas* and caves that 20 or more full sized flexed individuals would not be expected to fit at one time. This would likely indicate that over time, as the bundles began to deteriorate, their bones would be set aside to allow for the placement of more recently deceased individuals (Ibarra 2013). However, there is no direct evidence to indicate a specific funerary ritual involving the decomposition of the body before being placed in the *chullpas,* or if the *chullpas* were used as a first place of interment while the caves were used to place the deteriorated remains from the *chullpas*. The only exception to the comingled and fragmented condition of the mortuary remains are the two underground burials. The individuals are complete skeletons and were placed in a flexed, seated position. This is likely due to the fact that these burials were intrusive to the site, made underground, and not re-accessed after inhumation.

Even if the disturbance of the remains in caves and *chullpas* was not an intentional part of the interment rituals, the remains have been clearly altered since their original placements. The number of crania in the sample that was used for my analysis was 106. The sample only included adult crania that were at least 75% complete with most of the cranial vault being visible. Although this number did not include juveniles, this is still a small portion of the 440 minimum number of individuals calculated for the site. This shows that a large proportion of the skulls have been removed from the site (Ibarra 2013). The location of Marcajirca is known to locals in all of the surrounding communities due to its proximity to Mt. Llamoq, the site of annual pilgrimages. This area was also accessed and used by local agriculturalists over the past few hundred years which leads to disturbance of the ground surface as well as possibilities for

looting and other detrimental activities despite a local taboo against disturbing the ancestors on the sacred mountain.

Conclusion

Marcajirca is a Late Intermediate Period site located a long distance from the centers of the Inka Empire and Spanish colonies over rough terrain. This distance means that Marcajirca is spatially and temporally distinct from the historical records often applied to the LIP. This indicates that historical records alone cannot be applied for the interpretation of the site, rather further testing and excavation must be done in order to assess the information in historical records. Marcajirca sits on top of a ridge, which is common to settlements of the LIP. However, Marcajirca is on a ridge that is an extension of a local sacred *apu*, Mt. Llamoq. Llamoq is known by the locals as the founding ancestor and their protector. As discussed in the previous chapters it was common in the Ancash highlands for people to desire to be returned to their ancestors after death. The proximity of Marcajirca to Mt. Llamoq is important in the interpretation for the large amount of mortuary structures.

The prominence of mortuary structures with open entrances and their spatial position in the center of the site, as well as throughout the site appears to be unique in the region. The spatial positioning suggests that the dead could have been interacted with on a daily basis at Marcajirca. The remnants of offerings found within and directly outside many of the tombs suggest that ancestor worship rituals as recognized from historical records likely could have been performed at the site. However, the evidence of these rituals are not consistently found outside every tomb. Whether the practice of ancestor worship was widespread at Marcajirca, or if it was only practiced by a select few or those of a different social status, is unknown at this point. Given the disparities in the evidence for social stratification based on health, social markers, and

grave goods, it is difficult at this time to ascertain a specific pattern of social stratification at Marcajirca.

What is left in question is the presence of an *ayllu* structured social organization at Marcajirca. There are undoubtedly open tombs and some evidence of ancestor worship being performed throughout the site. This is enough evidence to suggest an *ayllu* organization according to Isbell (1997). What could further answer this question is to know if the *chullpas* and caves were used as family burials. The remains are distributed evenly in regards to age and gender, which could suggest family burials, but does not confirm this. The further evidence of the wrist abnormalities (Titelbaum et al. 2015) is also suggestive of family burials. Another way to test for familial relationships within the tombs is to find the biodistance of the people within them. This leads to the goal of the nonmetric trait cranial analysis addressed in this thesis. The analysis of crania to test for biological relatedness has limitations due to the poor preservation and presence of looters over time. The human remains within the tombs are so comingled, fragmented, and looted that although there is a large MNI for the site, only a fraction of that can be used for analysis. Despite the limitations with the sample, such an analysis will still help to offer insight into tomb use at Marcajirca and its possible *ayllu* organization.

Chapter 4. Materials and Methods

This chapter provides an explanation and discussion of the materials and methods utilized to assess group affinity and relatedness between tombs at Marcajirca. There is a description of the sample from Marcajirca including considerations of age and sex. Many of the crania in the sample display cranial modification so there will be a brief discussion of these crania along with an evaluation of the effect of deformation on non-metric analysis. Then I describe why non-metric analysis was chosen for this study, which traits were selected, as well as the process of recording the data. This is followed by an explanation of the tomb groupings into which the crania were divided for analytical purposes. I then review the methodological approaches common in addressing group affinity, or biodistance, as well as the procedures I chose for the analysis.

Materials

There were approximately 440 individuals interred at Marcajirca from the sixteen tombs excavated at the time this study took place. Despite the large number of individuals, only a little over 150 crania could be uniquely identified. Due to the fragmented nature of the remains, only crania that were approximately 75% complete or more were included in the sample. Juvenile crania were excluded from the sample as age can be a factor in the full development and presence of some non-metric traits (Hauser and DeStefano 1989). This resulted in the sample size of 106 adult crania and 129 mandibles from 15 different tombs.

Age and Sex

Age and sex have generally been found to have inconsistent effects on the frequency of appearance of epigenetic or non-metric traits (Hauser and DeStefano 1989). Age of the

individual was considered only for the purpose of excluding juvenile crania as previously stated which followed the standards set by Buikstra and Ubelaker (1994). Recording the sex of the crania was attempted following the standards outlined in Buikstra and Ubelaker (1994) for relying on sexually dimorphic features in cranial morphology. Due to the fragmented nature of the sample, many of the dimorphic features could not be scored on all of the crania, resulting in many individuals of indistinguishable sex. Considering the uncertainty of the sex determinations within this sample and the inconsistent correlation and effects sex has on non-metric traits, (Hauser and DeStefano 1989) analysis regarding the distribution of traits by sex was only considered to avoid possible sex related correlation with traits.

Cranial Modification

Cranial deformation was a common practice in Andean South America (Blom 2005; MacCurdy 1923; Verano 1997) that alters the shape and measurements of the skull. Modification of the crania at Marcajirca was previously observed and recorded by Ibarra and Landeck (2008). There are a total of 38 crania exhibiting some cranial modification. Of those 38, 24 appear to be intentional forms of either erect or oblique annular deformation, while the other 14 exhibit flattening of the occipital bone or lambdoid region which was likely unintentional. Cranial deformation creates obvious effects on the measurements taken for craniometrics and morphometrics (Perez 2007), and it causes biodistance analysis based on metric measurements to be biased. It is less obvious if cranial deformation similarly affects non-metric traits.

Many studies have been done in order to evaluate the possibility of cranial deformation affecting non-metric traits, and the results show that it does affect the expression of these traits. Konigsberg et al. (1993), O'Loughlin (2004), and Del Papa and Perez (2007) all studied the effect that cranial vault modification has on non-metric traits. They all concluded that cranial

vault wormian bones are the most influenced by deformation because these sutural bones continue developing post-natally and are near areas of maximum growth altered by the deformation. Other traits were also noted to be affected such as an increase in the occurrence of open foramina spinosum and tympanic dehiscence associated with lambdoid flattening. Annular deformation was also associated with a decrease of epipteric bones and increases of parietal notch bones and masto-occipital ossicles (Konigsberg et al. 1993). Despite these effects on trait frequency, the researchers found that the overall effect on the assessment of population distance was negligible. Given their conclusions, it would be improbable that population relationship studies using non-metric traits would be hindered by the presence of cranial deformation as long as the potentially affected traits were used in distance calculations with many other traits.

Non-Metric Trait Selection

In order to assess the affinity and relatedness of groups, traits must be chosen that reflect the genetic makeup of a group. DNA analysis would be the most direct way to assess such relatedness, however, due to the costliness and destructive methods of such analysis, it was not an option. Epigenetic traits are not a direct measurement of the genotype, rather a measure of the phenotype (Hauser and De Stefano 1989), but because the phenotype is determined, in part, by genetic makeup, it can represent genetic relatedness. Analysis of traits shown to have a high degree of heritability can be utilized to reflect the genotype. Metric measurements were not chosen for this study because of the fragmentation of the remains and the presence of cranial modification within the sample. The use of non-metric traits was chosen because of its versatility in fragmented and poorly preserved samples. In addition, the effects of cranial modification could be controlled, and non-metric traits reflect genetic relationships while not being as costly or destructive as DNA analysis.

The selection and scoring of non-metric traits to be analyzed was based on standards proposed by Buikstra and Ubelaker (1994) as well as Hauser and DeStefano (1989). Traits selected for the study were based on high heritability, low inter- and intra-observer error, and ease of observation. Traits were scored by comparison with the visuals found in Hauser and DeStefano (1989). A total of 29 cranial traits and four mandibular traits were scored and a list of these traits, their abbreviations, and what was considered present during the scoring process can be found in Table 4.1.

Bilateral traits were scored independently for each side and recorded as a separate trait to allow for a complete representation of traits present (Buikstra and Ubelaker 1994; Lane and Sublett 1972). The occurrence of bilateral traits within an individual tends to be highly correlated. This is not a perfect correlation and at times asymmetry is attributed to random disruptions rather than independent expression of genes (Tyrrell 2000). As there is a high level of asymmetrical expression of traits in this sample, all of the bilateral traits will be analyzed separately in a univariate trait frequency analysis by tomb type. For the multivariate analysis, a method to account for probable correlation due to symmetry needs to be employed. In other words, the bilateral traits need to be reduced to one expression for the trait as a whole. I chose to apply the individual count method (Buikstra 1972; Jahnka 2009; Sutter and Mertz 2004; Turner and Scott 1977) in which the greatest level of expression is used. If on one side a trait was scored as present, whether the other side was not present or not recordable, the trait was counted as present. This method ignores asymmetry on the assumption that a single genotype is responsible for any given trait's expression. It is also a good method to use in order to maximize sample sizes without taking away the individual as the basis of analysis. Konigsberg (1987) argues it may produce lower frequencies than in reality if there is excessive missing data.

Table 4.1 Non-Metric Traits used in the analysis and what constitutes present

Cranial Non-Metric Traits	Abbreviation	Present = 1
Metopic Suture	MetSut	Complete
Supraorbital Notch	SupNot	Present
Supraorbital Foramen	SupFor	Present
Zygo-matico Facial Foramina	ZygFacFor	>1 Present
Parietal Foramen	ParFor	Present
Sutural Bones	SutBon	Any Present
Epipteric Bone	EpiBon	Present
Coronal Ossicles	CorOss	Present
Bregmatic Bone	BreBon	Present
Sagittal Ossicle	SagOss	Present
Apical Bone	ApiBon	Present
Lambdoid Ossicle	LamOss	Present
Asterionic Bone	AstBon	Present
Occipito-mastoid Ossicle	OccMasOss	Present
Parietal Notch Bone	ParNotBon	Present
Inca Bone	IncBon	Present
Condylar Canal	ConCan	Open
Divided Hypoglossal Canal	DivHypCan	Complete Division
Foramen Ovale Incomplete	ForOvaInc	Open
Foramen Spinosum Incomplete	ForSpiInc	Open
Tympanic Dehiscence	TymDeh	Present
Auditory Exostosis	AudExo	Present
Mastoid Foramen	MasFor	Present
Double Occipital Condylar Facet	DouOccConFac	≥ Partial Division
Accessory Lesser Palatine Foramina	AccLesPalFor	Present
Palatine Torus	PalTor	Present
Maxillary Torus	MaxTor	Present
Divided Parietal Bone	DivParBon	Complete
Frontal Grooves	FroGro	Present
Mandibular Non-Metric Traits		
Mental Foramen	MenFor	Present
Mandibular Torus	ManTor	Present
Mylohyoid Bridge	MylBri	Complete
Double Mandibular Condyle	DouManCon	≥ Partial Division

Due to the comingled nature of the remains, the majority of the mandibles were not associated with a particular cranium. This would force the mandibles to be analyzed independently. Since there are only four non-metric traits located on the mandible, the 129

mandibles scored were not used for this analysis. This reduced the traits used in the univariate analysis to 50 (including the separate occurrence by side) from a sample of 106 crania.

Following previously established procedures, multivariate analysis requires a list of traits that includes only data that would be informative to the analysis (Harris and Sjovold 2004; Jahnke 2009; Sutter 1997; Sutter and Mertz 2004). As previously discussed, the bilateral traits were combined using the individual count method to represent the individual's greatest expression of a trait. The category "sutural bones" was dropped from the analysis as I created it as an umbrella category to easily identify individuals who had any excess cranial ossicles. Auditory exostosis and divided parietal bone were dropped from the analysis as there were none observed in the entire sample. Bregmatic Bone and Foramen Ovale Incomplete were also dropped from the analysis as they only appeared once on one side, not resulting in any sort of comparable measure. This trait reduction left 24 traits to be analyzed from a sample of 106 crania.

Data Recording

The data was recorded by hand in a notebook since much of the analysis was performed at the site and electricity was lacking. The data recorded included tomb type, tomb number, cranium number (if already recorded or it was assigned a number), age and sex estimates, and the cranial non-metric trait observations. Photographs of all planes of the crania were also taken, as well as of specific non-metric traits. The data were later transferred to an Excel spreadsheet. Although most traits appear in various strengths and could be scored on a continuum, a dichotomous system of scoring was used in accordance with accepted protocol (Berry and Berry 1967; Hauser and DeStefano 1989; Lane and Sublet 1972). This dichotomous scoring system was chosen to decrease inter-observer error as well as for statistical analysis. Traits that were

present were coded as “1” and absent traits were coded as “0”. At the time of recording, unobservable traits were recoded as N/A, which was later changed to 999 when added to Excel in order to be used in statistical analysis.

Grouping of Data

As the cranial data came from sixteen different tombs, ideally there would have been a sufficient sample size from each tomb to test relatedness within individual tombs. However, the sample sizes from individual tombs were small and uneven (see Table 4.2), making statistical analysis of such samples inaccurate if applied. To create more robust sample sizes for statistical analysis, the tombs were grouped into a tomb type categories (see Table 4.3). Three of these categories are architecturally distinct: chullpas, caves, and underground structures (referred to as structures). A fourth group was created by analyzing Cave 19 as its own group. Cave 19 is spatially distinct, as it is located farther south than the residential sector and beyond what is shown on the site map. Cave 19 is also culturally distinct as 83% of the crania display modification, which makes up 67% of the intentionally modified crania at the site. Consequently, it seemed reasonable to analyze Cave 19 as its own group, as it also had a large enough sample size.

In an attempt to get closer to analyzing the familial relations within an individual tomb, another set of tomb groupings was created for analysis. This set of groupings is based first on individual tombs. Then the tombs that presented insufficient numbers for individual analysis were grouped spatially. Cave 2, Cave 3, Cave 7, and Cave 19 were all used in the analysis separately, as most caves contained more than ten individuals. None of the *chullpas* produced sufficient number for individual analysis. By looking at the location of the *chullpas* in the site, I was able to clump most of them into two groups. *Chullpas* 6, 7, and 8 are all located near each

other in the heart of the funerary sector and were designated as *Chullpa* 6. *Chullpas* 13, 14, and 15 are all located on the edge of the public sector and were designated at *Chullpa* 13. For this analysis the rest of the caves and structures are represented by the tomb number as seen in Table 4.4. The tomb type grouping and the tomb location grouping will be used to test the frequency of non-metric traits for the biodistance analysis.

Table 4.2 Number of crania analyzed from each tomb.

Tomb	# Crania	Tomb	# Crania	Tomb	# Crania
Chullpa 6	5	Chullpa 26	3	Structure 7	1
Chullpa 7	7	Cave 2	7	Structure 10	15
Chullpa 8	5	Cave 3	11		
Chullpa 13	7	Cave 7 (7.2 & 7.3)	15		
Chullpa 14	5	Cave 18	1		
Chullpa 15	1	Cave 19	23		

Table 4.3 Groups of crania by interment type.

Tomb Type	# Crania
1.Chullpas	33
2.Cave 19	23
3.Caves	34
4.Structures	16

Table 4.4 Groups of crania by tomb location.

Group	Tombs included	# Crania
2	Cave 2	7
3	Cave 3	11
6	Chullpas 6, 7, 8	17
7	Cave 7 (7.2 &7.3)	15
10	Structure 10	15
13	Chullpas 13,14,15	13
19	Cave 19	23

Common Statistical Approaches to Biodistance

There are common statistical approaches used in measuring the affinity and relationship, or biodistance between groups through the use of categorical data but they have limits that create problems with the data used in this study (Stojanowski and Schillaci 2006). Most biodistance

analyses employ univariate analyses first in order to check the significance of association between variables such as age, sex, inter-trait correlation, or random natural factors in order to exclude traits with underlying correlations or traits that are not discriminatory that would alter results. These univariate analyses are most often tested for significance by a Chi-square test (Irish 2010, Jahnka 2009, Sutter and Mertz 2004). However, a chi-square test is inadequate when sample sizes are small or the data are unequally distributed among the cells of the table. Due to these issues within the sample at Marcajirca, I chose to employ a Fisher's exact test initially to identify differences in the frequency of non-metric traits by tomb type. A Fisher's exact test is better employed for small unequal data cells as long as the rows or columns in the text are fixed. As most univariate analyses result in few to none of the traits showing significant differences alone, a multivariate analysis is needed to assess group affinity (Corruccini and Shimada 2002; McClelland 2003).

There are three multivariate analyses commonly applied after a series of univariate tests are used to reduce the number of traits considered. The Mean Measure of Divergence (MMD) is a common multivariate statistical analysis used to measure biological distances from the trait frequencies of a sample to show inter-sample phonetic affinity (Irish 2010; Lane and Sublett 1972). This measure has been criticized for many short comings including its inability to account for correlation between variables, which necessitates careful choice of variables. These issues have been addressed by many alterations to the equation and trait selection process (Irish 2010; Nikita 2015). Many argue that if applied correctly, it is a reliable approach that shows strong biological affinity (Irish 2010; Harris and Sjovold 2004; Larsen 2015). Similarly, the Mahalanobis D^2 is another multivariate distance analysis measuring divergence often used for biodistance with non-metric traits. Although the Mahalanobis D^2 has the potential to handle

small sample sizes, it doesn't calculate accurately with missing data (Irish 2010). A last approach to assessing group affinity is to find a coefficient of similarity or dissimilarity and then apply these numbers to cluster analysis.

Incomplete crania and small sample sizes can be problems for all of the previously mentioned statistical analyses. Although the crania scored in this analysis were at least 75% complete, many missing values were also scored. Only 19 individuals had all traits observable and were distributed unevenly between the tomb types, which is too small for meaningful analysis. If the sample is reduced to those missing only 10 or fewer traits, the sample would only be 50, which is still too small for meaningful analysis. Any deletion of individuals based on the amount of missing data would be decreasing sample size and not represent the population.

Univariate Analysis

The Fisher's Exact test was first employed to all of the bilateral traits separately, to observe general patterns of trait frequencies between the tombs types as well as asymmetrical variation between tomb types at the site. The application of the Fisher's Exact test indicates which of these trait frequencies differ more between the tombs than we would expect to see by chance. Additionally, the Fisher's Exact test was also employed to all of the traits after the individual count method was applied. This test allowed me to see the differences in the overall expression of trait frequency between tombs. These analyses were done in Stata statistical software (StataCorp 2015) with acceptable levels of difference for single traits resulting in $p < 0.05$.

Multiple steps of univariate analysis were employed in order to create a reduced traits list following procedures suggested for using the mean measure of divergence (Harris and Sjovold 2004; Irish 2010; Jahnka 2009; Sutter and Mertz 2004). First, cranial non-metric traits were

tested for possible sex correlations using a chi-square test. Since the sample sizes were large enough for testing each non-metric trait by sex, a chi-square test was sufficient to identify traits that presented correlations based on sex beyond that of random chance. Second, the traits were checked for inter-trait correlations. Inter-trait correlations occur when the presence of one trait seemed to mirror the presence of another trait which produces redundancy in data that could produce erroneous results. In order to ensure there was no inter-trait correlation in the reduced traits list, all of the traits were checked for their level of concordance. Finally, in order to complete the reduced traits list, I selected traits whose prevalence best differed across sites, as judged by Fisher's Exact test of combined bilateral traits.

Mean Measure of Divergence

The mean measure of divergence, or MMD, is the most commonly applied procedure for summarizing biological distance between samples based on binary traits (Harris and Sjovold 2004; Irish 2010; Jahnka 2009; Sjovold 1977) and as such, was chosen to be used in this study. The MMD is a formula that uses trait frequencies to form a numerical measure that represents dissimilarity between two groups. Various transformations to the trait frequencies such as the Freeman and Tukey or Anscombe have been shown to provide more accurate results in regards to certain sample problems (Green and Suchey 1976; Irish 2010; Jahnka 2009; Sjovold 1977). The MMD was chosen for this analysis because as the calculation has been adjusted in recent years, it has been shown to give consistent results despite the existence of problematic factors like correlated trait pairs, missing data, and small samples (Nitika 2015).

This analysis was done using the statistical package R with the AnthropMMD package. Given the fact that we saw so many variations in the MMD formula, the equation for MMD from Nikita (2015) was created in an Excel sheet and the MMD was also calculated in order to test the

validity of the R package. This was done for all pairs of tombs using the eight traits with the lowest *p* values as determined from the Fisher's Exact test. This was compared with the MMD values provided by the R package with the same eight traits, which resulted in the same values as were calculated from the equation generated in Excel. These analyses included the Freeman and Tukey frequency transformation which is useful for removing biases that result from small sample sizes (Irish 2010). The R-package includes an assessment of statistical significance of the MMD by a z test statistic, the standard deviation of each calculation, as well as a multi-dimensional scaling (MDS) plot to visualize the results.

Many studies using the MMD have employed a way to find a "standardized MMD" or sMMD. Raw MMD values are not very interpretable aside from their position between 0 and 1. Instead of having arbitrary MMD result numbers, the numbers from a standardized MMD are in proportion to the sample sizes used in the calculation (Johnson and Lovell 1995; Salter-Pederson 2001; Sjovold 1973; Sutter and Mertz 2004). The standardized MMD does not make up for the effects of the small sample sizes; however, the calculation helps to make the numbers more comparable between each other despite differing sample sizes. This is simply calculated by dividing the calculated Mean Measure of Divergence number by its standard deviation. This eliminates the effects of varying sample sizes and the results of this standardization are considered significant at a $p < 0.05$ if the resulting number exceeds two. This allows the sMMD to be more interpretable and comparable.

There are arguments concerning the effects of including as many traits as possible in multivariate analysis in contrast to a reduced traits list with no inter-trait correlation (Harris and Sjovold 2004; Hauser and DeStefano 1989; Jahnka 2009; McClelland 2003). Given the inconclusive nature of these arguments, the R-package for the MMD was run twice for the tomb

type groups. The first analysis included the reduced traits created by elimination of traits using the univariate tests explained previously. The second analysis included all of the 24 traits discussed above after the combination of bilateral traits, to provide a look at group affinity with less bias to the most divergent traits. Doing both of these analyses, and applying the standardized MMD allows one to have comparable numbers so that it is also possible to see the effect that including more, possibly correlated traits has on the MMD. The MMD was then run in the R-Package with the reduced traits list for the tomb location groups to try to see relationships between separate tombs, despite such small sample sizes.

The next chapter will present all the results of the analyses described in this chapter. The resulting data will be presented in the form of tables as well as multi-dimensional scaling (MDS) plots. The general patterns found from the results, tables and plots will be laid out in the order that they are explained in this chapter. Notable differences in frequencies of the non-metric traits will be summarized. The results of the mean measure of divergence and the multi-dimensional scaling will be presented with a discussion of the difference of results using all traits and a select few traits as well as the analysis of the separate tombs by location groups.

Chapter 5. Results of the Cranial Nonmetric Analysis

This chapter provides the results of the cranial nonmetric analysis. As discussed in the previous chapter, the non-metric traits were analyzed first with a univariate analysis to assess the significance of the trait frequencies by tomb type. I will discuss the general patterns found from the results of the univariate analysis in terms of trait frequencies and asymmetrical appearance of traits. The trait frequencies after applying the individual count method for bilateral trait correlation will be displayed and discussed in terms of trait deletion for the multivariate analysis. The results of the mean measure of divergence will be presented with a discussion of the difference of results between using all traits and a select few traits as well as the analysis of the separate tombs by location. Finally, the results will be summarized and related to the research question of this thesis.

Univariate Analysis and Trait Frequencies

The frequencies of all nonmetric traits are presented in Table 5.1 and separated by tomb type. The number present over the total number available for each trait as well as the *p* value from the Fisher's Exact test are also given. The analysis presented in this table was testing for the statistical significance of the distribution of the frequencies of each individual non-metric trait between each tomb type. The purpose of presenting these results is to initially identify patterns of the distribution of trait frequencies.

Very few of the individual nonmetric trait frequency differences are statistically significant. The frequencies of the coronal ossicle on the left and right side were both found to have statistically significant differences. In Cave 19 individuals exhibited 36-38% presence of the coronal ossicle while individuals interred in chullpas and other caves showed a lower

Table 5.1 Nonmetric trait frequencies of all scored traits by tomb with Fisher's Exact *p* values.

Trait	Tomb Type								*P*
	Chullpas		Cave 19		Other Caves		Under ground Structures		
	+/n	*%*	*+/n*	*%*	*+/n*	*%*	*+/n*	*%*	
MetSut	5/29	17.2	5/23	21.7	2/34	5.9	0/13	0	0.137
SupNot L	12/26	46.2	6/20	30.0	16/33	48.5	10/14	71.4	0.132
SupNot R	17/29	58.6	8/20	40.0	16/32	50.0	6/13	46.2	0.623
SupFor L	20/26	76.9	16/21	76.2	21/33	63.6	8/13	61.5	0.596
SupFor R	24/30	80.0	19/21	90.5	23/31	74.2	7/13	53.9	0.111
ZygFacFor L	19/22	86.4	11/14	78.6	17/24	70.8	6/10	60.0	0.384
ZygFacFor R	21/24	87.5	13/16	81.3	18/24	75.0	7/11	63.6	0.408
ParFor L	7/20	35.0	16/22	72.7	16/33	48.5	7/13	53.9	0.097
ParFor R	9/21	42.9	14/22	63.6	16/33	48.5	9/12	75.0	0.231
EpiBon L	2/20	10.0	0/19	0.0	4/32	12.5	0/8	0.0	0.483
EpiBon R	3/24	12.5	1/19	5.26	3/30	10.0	0/9	0.0	0.851
CorOss L	0/18	0.0	8/21	38.1	2/29	6.9	0/10	0.0	0.001*
CorOss R	2/20	10.0	8/22	36.4	3/30	10.0	0/11	0.0	0.025*
BreBon	0/18	0.0	1/22	4.55	0/32	0.0	0/11	0.0	0.614
SagOss	3/20	15.0	4/22	18.2	1/32	3.13	0/12	0.0	0.134
ApiBon	6/19	31.6	8/22	36.4	5/33	15.2	0/13	0.0	0.034*
LamOss L	12/19	63.2	14/22	63.6	15/30	50.0	1/12	8.3	0.008*
LamOss R	14/21	66.7	13/22	59.1	17/30	56.7	4/10	40	0.590
AstBon L	1/19	5.3	2/22	9.1	2/30	6.7	0/10	0.0	1.000
AstBon R	3/19	15.8	3/22	13.6	2/31	6.5	0/9	0.0	0.571
OccOss L	0/19	0.0	2/21	9.5	3/31	9.7	2/8	25.0	0.173
OccOss R	3/19	15.8	3/21	14.3	3/29	10.3	2/9	22.2	0.783
ParNotBon L	4/21	19.1	8/23	34.8	7/31	22.6	1/10	10.0	0.464
ParNotBon R	3/19	15.8	10/23	43.5	9/31	29.0	1/10	10.0	0.143
IncBon	1/21	4.8	1/22	4.6	1/33	3.0	0/14	0.0	1.000
ConCan L	15/20	75.0	13/19	68.4	19/30	63.3	6/8	75.0	0.848
ConCan R	16/20	80.0	12/19	63.2	23/31	74.2	10/12	83.3	0.598
DivHypCan L	5/20	25.0	3/15	20.0	11/29	37.9	3/12	25.0	0.621
DivHypCan R	4/21	19.1	1/16	6.25	6/30	20.0	1/13	7.69	0.550
ForOvaInc L	0/21	0.0	0/19	0.0	0/31	0.0	0/11	0.0	1.000
ForOvaInc R	0/24	0.0	0/18	0.0	1/32	3.13	0/9	0.0	1.000
ForSpiInc L	3/21	14.3	2/19	10.5	3/31	9.7	2/10	20.0	0.837
ForSpiInc R	2/22	9.1	2/18	11.1	6/32	18.8	3/11	27.3	0.547
TymDeh L	7/21	33.3	11/20	55.5	16/31	51.6	5/15	33.3	0.357
TymDeh R	10/21	47.6	12/30	60.0	15/29	51.7	6/14	42.9	0.792
MasFor L	15/20	75.0	14/22	63.6	23/32	71.9	8/13	61.5	0.778
MasFor R	13/21	61.9	16/23	69.6	22/31	70.9	8/14	57.1	0.790
DouOccConFac L	1/18	5.6	0/9	0.0	0/25	0.0	2/11	18.9	0.113
DouOccConFac R	1/19	5.3	1/9	11.1	0/25	0.0	1/12	8.3	0.285
AccLesPalFor L	6/22	27.3	3/8	37.5	7/25	28.0	3/7	42.9	0.834
AccLesPalFor R	8/22	36.4	1/10	10.0	8/26	30.8	2/7	28.6	0.538
PalTor	8/25	32.0	3/16	18.8	9/26	34.6	2/9	22.2	0.725
MaxTor	3/27	11.1	0/16	0.0	3/28	10.7	0/11	0.0	0.494
FroGro L	2/19	10.5	14/20	70.0	7/31	22.6	4/11	36.4	0.000*
FroGro R	4/20	20.0	13/21	61.9	6/30	20.0	4/11	36.6	0.009*

frequency of this ossicle (0-10%). In contrast individuals in the underground structures did not exhibit the coronal ossicle (0%). The apical bone also showed statistically significant differences between mortuary features. In this case individuals in chullpas and Cave 19 showed similar frequencies of the apical bone (31.6% and 36.4%) while it occurs in 15.2% of the crania recovered from other caves, and no individuals in the underground structures exhibited the apical bone. The left lambdoid ossicle also exhibited statistically significant differences between the mortuary features. Similar to the apical bone, the left lambdoid ossicle showed individuals buried in chullpas and Cave 19 to be similar with 63.2% and 63.6% presence, while in other caves only 50% of the individuals examined had the lambdoid ossicle. By contrast, only 8.3% of the crania in the underground structure had this feature. Finally, the left and right frontal grooves both displayed statistically significant differences among the mortuary features. The presence of the frontal grooves is similar to the coronal ossicle in that Cave 19 stands out (61-70% presence), while chullpas show only 10-20%, other caves show 20-22%, while 36% of individuals in underground structures exhibit this nonmetric feature. Although other traits do show variation in occurrence between tomb types, none reach statistical significance.

Although the occurrence of bilateral traits typically tends to be highly correlated within each individual crania we assume the same gene is responsible for phenotypic expressions on both sides. Despite this assumption, asymmetrical expression of cranial nonmetric traits was fairly common at Marcajirca. Table 5.2 shows the prevalence of bilateral traits that were found to be asymmetrically expressed. Crania were only included in this summary table if the trait was discernable on both sides, as symmetry would be unknown if one side was missing. As noted in the previous summary table, the frequency of the left lambdoid ossicle is statistically significant (p=0.008) while the occurrence of the right lambdoid was not statistically significant (p=0.590).

This difference highlights some of the asymmetrical expression of traits found on the crania. Further analysis of the potential reasons for such a high occurrence of asymmetry is beyond the scope of this thesis, but was included for other potential research.

Table 5.2 Prevalence of bilateral traits asymmetrically expressed.

Trait	Tomb Type								*Total*	
	Chullpas		Cave 19		Other Caves		Under ground Structures			
	+/*n*	*%*	+/*n*	*%*	+/*n*	*%*	+/*n*	*%*	+/*n*	*%*
SupNot LR	7/25	28.0	9/18	50.0	12/31	38.7	6/11	54.5	34/85	40.0
SupFor LR	5/25	20.0	6/20	30.0	12/34	35.3	5/11	45.5	28/90	31.1
ZygFacFor LR	2/20	10.0	2/13	15.4	3/20	15.0	3/7	42.9	10/60	16.7
ParFor LR	6/19	31.6	10/22	45.5	14/33	42.4	5/11	45.5	35/85	41.2
EpiBon LR	1/19	5.3	1/18	5.6	3/28	10.7	0/7	0.0	5/72	6.9
CorOss LR	1/18	5.6	1/20	5.0	4/27	14.8	0/9	0.0	6/74	8.1
LamOss LR	2/19	10.5	3/22	13.6	3/28	10.7	3/9	33.3	11/78	14.1
AstBon LR	2/17	11.8	1/22	4.5	0/28	0.0	0/8	0.0	3/75	4.0
OccOss LR	3/17	17.6	3/21	14.3	4/27	14.8	0/7	0.0	10/72	13.9
ParNotBon LR	4/19	21.1	5/23	21.7	3/28	10.7	0/8	0.0	12/78	15.4
ConCan LR	7/19	36.8	3/19	15.8	11/30	36.7	2/7	28.6	23/75	30.7
DivHypCan LR	5/20	25.0	3/15	20.0	11/29	37.9	2/11	18.1	21/75	28.0
ForSpiInc LR	1/19	5.3	2/18	11.0	2/30	6.7	1/8	12.5	6/75	8.0
TymDeh LR	3/19	15.8	2/19	10.5	4/27	14.8	1/13	7.7	10/78	12.8
MasFor LR	7/18	38.9	7/22	31.8	9/29	31.0	1/11	9.1	24/80	30.0
DouOccConF LR	0/17	0.0	1/8	12.5	0/23	0.0	0/9	0.0	1/57	1.8
AccLesPalFor LR	8/22	36.4	2/8	25.0	6/24	25.0	3/6	50.0	19/60	31.7
FroGro LR	3/17	17.6	3/20	15.0	3/29	10.3	2/10	20.0	11/76	14.5

An overall assessment of the univariate trait frequencies shows that Cave 19 has the greatest number of excess cranial ossicles and frontal grooves, and the occurrence of more non-metric traits in general. The percentages of trait frequency are often similar between Chullpas and other caves. The crania from other caves tend to be more similar to Cave 19, but Cave 19 has a few traits that exhibit a much higher frequency. Chullpas appear to be in the middle, with most traits appearing at least a few times. The underground structures have the clear distinction of having the lowest occurrence of non-metric traits in general.

Elimination of Rare Traits and Selection of Reduced Traits List

As mentioned in the previous chapter, some traits were dropped from the analysis because they occurred so rarely so they would have no power to detect differences. Auditory exostosis and divided parietal bone did not appear in the sample at all and were dropped from the analysis. As can be seen in Table 5.1 the bregmatic bone and foramen ovale incomplete only occurred once, in one tomb type. This would also have no power to detect differences and these two traits were therefore dropped from the analysis.

The application of the individual count method to account for potential bilateral trait correlation provided another opportunity to assess the difference in the expression of trait frequencies between tomb types. The individual count method is done by taking the greatest level of expression from either side of bilateral traits. Table 5.3 shows the summary of frequencies of traits after the individual count method separated by tomb type. The number of traits present over the total number of observable for each trait as well as the *p* value from the Fisher's Exact test are also given.

These combined traits were tested to identify if any sex-based correlations existed amongst the individuals whose sex could be estimated. Sex-based correlations were tested using a Pearson's Chi Square. This tests the difference in the distribution of any trait between sexes beyond what would occur by chance. Table 5.4 shows the summary of differences in the prevalence of traits between sexes. The number present over the total number of observable for each trait as well as the chi-square number and its *p*-value are also given. The results show that maxillary torus and frontal grooves both were identified as having significant sex associations at $p < 0.05$. Therefore, these traits were excluded from consideration for the reduced traits list.

Table 5.3 Nonmetric trait frequencies after individual count method to combine bilateral traits, divided by tomb type showing Fisher's Exact *p* values.

Trait	Tomb Type								*P*
	Chullpas		Cave 19		Other Caves		Under ground Structures		
	+/*n*	*%*	+/*n*	*%*	+/*n*	*%*	+/*n*	*%*	
MetSut	5/29	17.2	5/23	21.7	2/34	5.9	0/13	0.0	0.137
SupNot LR	20/30	66.7	13/22	59.1	23/34	67.7	12/15	80.0	0.653
SupFor LR	26/31	83.9	21/22	95.5	30/34	88.2	11/14	78.6	0.439
ZygFacFor LR	24/26	92.3	15/17	88.2	21/28	75.0	11/14	78.6	0.335
ParFor LR	12/22	54.6	20/22	90.9	23/33	69.7	11/13	84.6	0.039
EpiBon LR	4/25	16.0	1/20	5.0	6/34	17.7	0108	0.0	0.394
CorOss LR	2/20	10.0	9/23	39.1	5/32	15.6	0/11	0.0	0.026
SagOss	3/20	15.0	4/22	18.2	1/32	3.13	0/12	0.0	0.134
ApiBon	6/19	31.6	8/22	36.4	5/33	15.2	0/13	0.0	0.034
LamOss LR	15/21	71.4	15/22	68.2	19/32	59.4	4/12	33.3	0.166
AstBon LR	3/21	14.3	3/22	13.6	2/33	6.1	0/11	0.0	0.483
OccOss LR	3/21	14.3	4/21	19.1	5/33	15.2	2/10	20.0	0.930
ParNotBon LR	6/21	28.6	12/23	52.2	11/34	32.4	1/11	9.1	0.087
IncBon	1/21	4.8	1/22	4.6	1/33	3.0	0/14	0.0	1.000
ConCan LR	20/21	95.2	14/19	73.7	27/31	87.1	10/12	83.3	0.264
DivHypCan LR	7/21	33.3	4/16	25.0	14/30	46.7	3/13	23.1	0.372
ForSpiInc LR	3/24	12.5	3/19	15.8	6/33	18.2	3/12	25.0	0.799
TymDeh LR	11/23	47.8	13/21	61.9	19/33	57.6	6/15	40.0	0.529
MasFor LR	19/23	82.6	19/23	82.6	29/34	85.3	10/15	66.7	0.515
DouOccConF LR	1/20	5.0	1/10	10.0	0/27	0.0	2/13	15.4	0.120
AccLesPalFor LR	11/22	50.0	3/10	30.0	11/27	40.7	4/8	50.0	0.754
PalTor	8/25	32.0	3/16	18.8	9/26	34.6	2/9	22.2	0.725
MaxTor	3/27	11.1	0/16	0.0	3/28	10.7	0/11	0.0	0.494
FroGro LR	5/22	22.7	15/21	71.4	9/32	28.1	5/11	45.5	0.004

Inter-trait correlation was then assessed between all of the combined traits to ensure that redundant data were not included in the analysis. Inter-trait correlation was assessed by each traits' level of concordance with each other trait. All traits that exhibited over 70% concordance with any other trait could be problematic by producing redundancy in data that could yield erroneous results. Eight traits were found to exhibit over 70% concordance with 3-10 other traits. Therefore, double occipital condylar facet, epipteric bone, inca bone, asterionic bone, metopic suture, saggital ossicle, supraorbital foramen, and zygo-matico facial foramina were dropped from potential inclusion in the reduced traits list.

Table 5.4 Prevalence of nonmetric traits by sex showing chi-square and *p* values to assess correlation.

Trait	Sex				Chi-Square	*p*-value
	Male		Female			
	+/n	*%*	*+/n*	*%*		
MetSut	2/43	4.7	7/37	18.9	4.098	0.129
SupNot LR	34/44	77.3	24/37	64.9	4.81	0.09
SupFor LR	35/43	81.4	35/38	92.1	2.247	0.325
ZygFacFor LR	32/39	82.1	24/31	77.4	3.861	0.145
ParFor LR	26/40	65.0	31/36	86.1	5.012	0.082
EpiBon LR	5/39	12.8	5/36	13.9	0.437	0.804
CorOss LR	7/40	17.5	7/35	20.0	0.079	0.962
SagOss	4/38	10.5	3/35	8.6	0.168	0.919
ApiBon	8/38	21.1	8/35	22.9	0.036	0.982
LamOss LR	23/39	58.9	21/34	61.8	0.139	0.933
AstBon LR	5/39	12.8	2/34	5.9	1.131	0.568
OccOss LR	6/39	15.4	7/32	21.9	1.598	0.449
ParNotBon LR	11/41	26.8	15/34	44.1	2.682	0.2616
IncBon	2/42	4.8	1/34	2.9	0.765	0.682
ConCan LR	36/41	87.8	27/30	90.0	4.109	0.128
DivHypCan LR	14/40	35.0	9/28	32.1	0.335	0.846
ForSpiInc LR	6/40	15.0	6/33	18.2	0.241	0.886
TymDeh LR	18/44	40.9	21/34	61.8	5.541	0.063
MasFor LR	40/44	90.9	27/37	72.9	5.201	0.074
DouOccConF LR	2/38	5.3	2/21	9.5	1.247	0.536
AccLesPalFor LR	17/32	53.1	6/22	27.3	3.603	0.165
PalTor	9/34	26.5	5/25	20.0	3.786	0.151
MaxTor	0/37	0.0	3/28	10.7	6.072	0.048*
FroGro LR	10/40	25.0	17/33	51.5	6.63	0.036*

* values are statistically significant with $p < 0.05$.

After following procedures to eliminate traits exhibiting sex-based correlations and inter-trait correlation, the reduced traits list was finalized from the remaining traits. I selected traits whose prevalence best differed across sites, as judged by Fisher's Exact test of combined bilateral traits from Table 5.3. This resulted in the parietal foramen, apical bone, coronal ossicle, parietal notch bone, lambdoid ossicle, condylar canal, divided hypoglossal canal, and tympanic dehiscence being chosen for a reduced traits list.

Multivariate Analysis

The results for the mean measure of divergence with the reduced traits list of only eight traits is summarized in Table 5.5. The MMD values are in the upper diagonal while the standard

deviations appear in the lower diagonal. The MMD values are a measure of dissimilarity so that the values close to 0 show high similarity and the values close to 1 show a low similarity. However, the actual numbers are relative to the number of traits and sample size. The starred numbers indicate statistically significant differences between those tomb types at a $p < 0.05$ level based on a *z* test statistic. This MMD matrix table indicates that Cave 19 and the underground structures differ the most as they had an MMD value of 0.341 which was found to be statistically significant. Cave 19 differs from chullpas at 0.127 which was found to be statistically significant. Chullpas were also found to have a statistically significant difference from the underground structures with an MMD value of 0.172. However, there is also a negative value of the MMD in the comparison of chullpas and other caves. A negative value occurs when sample sizes are too small or the biological distance between the samples is too small. Although these results show statistical significance, the importance of that test should not to be overemphasized as the *z* test statistic assumes normal distribution which is likely not the case with these data.

The results of the standardized MMD (sMMD) that eliminates the effects of sample size variation are shown in Table 5.6. The standardized MMD is found by simply dividing the raw MMD value by its standard deviation. This allows the sMMD value to be in proportion to the sample size used in the calculation. This is useful to allow the resulting numbers to be more comparable within a sample despite different sample sizes. The same tomb relationships were found to be statistically significant with the sMMD and the raw MMD.

Some argue that using a full suite of traits is more indicative of biological relationship than a biased selection of traits (Harris and Sjovold 2004; Hauser and DeStefano 1989; Jahnka 2009; McClelland 2003). In order to address this issue the MMD was run again using all 24 traits that showed any variation. Again, the MMD values are a measure of dissimilarity so that the

Table 5.5 Mean Measure of Divergence using the reduced traits list by tomb type.

	Chullpas	Cave 19	Other Caves	Structures
Chullpas	-	0.127*	-0.016	0.172*
Cave 19	0.048	-	0.078	0.341*
Other Caves	0.039	0.040	-	0.086
Structures	0.064	0.065	0.056	-

*****Statistically significant at $p < 0.05$.

Table 5.6 Standardized Mean Measure of Divergence using the reduced traits list.

	Chullpas	Cave 19	Other Caves	Structures
Chullpas	-	2.65*	-0.41	2.69*
Cave 19		-	1.95	5.25*
Other Caves			-	1.54
Structures				-

*****Statistically significant at $p < 0.05$.

values close to 0 show high similarity and the values close to 1 show a low similarity. The results can be found in Table 5.7. Due to the larger number of traits included, the values are quite different from the first test. The greatest difference is that the *z* test statistic did not show the difference between Cave 19 and the chullpas to be statistically significant, but instead the difference between Cave 19 and the other caves was found to be statistically significant. Again, there is a negative value of the MMD in the comparison of chullpas and other caves. This could be caused by the sample not being fully representative of the population or the samples being drawn from the same population in so much as they do not differ biologically.

The standardized MMD results for all 24 traits are shown in Table 5.8. These results again show the same statistically significant relationships as the raw MMD. It is the comparison of the eight trait and 24 trait standardized MMD results that show the difference between using these different trait lists. All of the results from the sMMD of the eight traits show greater variance between tomb types than using all 24 traits. This result is understandable as the eight traits were chosen because of their greater divergence beyond that of chance. Despite the obvious reason why the values provided by the eight trait sMMD were larger than the 24 trait sMMD,

nearly all of the same relationships were found to be statistically significant and therefore validates the use of the eight trait list.

Table 5.7 Mean Measure of Divergence using all 24 observed traits.

	Chullpas	Cave 19	Other Caves	Structures
Chullpas	-	0.051	-0.021	0.075*
Cave 19	0.029	-	0.063*	0.123*
Other Caves	0.022	0.025	-	0.026
Structures	0.037	0.040	0.034	-

* Statistically significant at $p < 0.05$.

Table 5.8 Standardized MMD using all 24 observed traits.

	Chullpas	Cave 19	Other Caves	Structures
Chullpas	-	1.75	-0.954	2.03*
Cave 19		-	2.52*	3.075*
Other Caves			-	0.765
Structures				-

* Statistically significant at $p < 0.05$.

In an attempt to evaluate the relationships between the tombs independently, the MMD was run again using the reduced traits list for the groupings separated by location. The results of this analysis can be found in Table 5.9. This MMD matrix table shows that Cave 19 and Structure 10 differ the most, with an MMD value of 0.321 which was found to be a statistically significant difference. Cave 19 was also found to have a statistically significant MMD value with Chullpa 13 at 0.313. Chullpa 6 was also found to have a statistically significant MMD value with Structure 10 at 0.194. Many negative values for the MMD are present when comparing any tomb with Cave 2 and Cave 3. Again, a negative value occurs when sample sizes are too small or the biological distance between the samples is too small.

The standardized MMD results can be found in Table 5.10. This allows the standardized MMD value to be in proportion to the sample size used in the calculation, as previously explained. These results show the same number of statistically significant differences between tombs. The largest difference is between Cave 19 and Structure 10 with a standardized MMD

value of 4.72, showing the greatest biological distance. This value is very close to the value provided during the reduced trait test by tomb type which resulted in a sMMD of 5.25.

Table 5.9 Mean Measure of Divergence using reduced traits list by tomb location.

	Cave 2	Cave 3	Chullpa 6	Cave 7	Structure 10	Chullpa 13	Cave 19
Cave 2	-	-0.132	-0.084	-0.133	-0.007	-0.160	0.073
Cave 3	0.121	-	-0.052	-0.056	0.175	0.044	-0.014
Chullpa 6	0.109	0.087	-	-0.050	0.194*	-0.003	0.045
Cave 7	0.106	0.084	0.072	-	-0.017	0.005	0.032
Structure 10	0.115	0.094	0.082	0.079	-	0.049	0.321*
Chullpa 13	0.149	0.128	0.116	0.113	0.122	-	0.313*
Cave 19	0.096	0.074	0.062	0.059	0.068	0.102	-

*****Statistically significant at $p < 0.05$.

Table 5.10 Standardized MMD using reduced traits list by tomb location.

	Cave 2	Cave 3	Chullpa 6	Cave 7	Structure 10	Chullpa 13	Cave 19
Cave 2	-	-1.090	-.770	-1.255	-.061	-1.074	0.760
Cave 3		-	-.598	-.667	1.861	.343	-.851
Chullpa 6			-	-.694	2.366*	-.025	.726
Cave 7				-	-.215	.044	.542
Structure 10					-	.402	4.72*
Chullpa 13						-	3.069*
Cave 19							-

*****Statistically significant at $p < 0.05$.

The R statistical package for the Mean Measure of Divergence also provides a multidimensional scaling or MDS plot calculated from the MMD matrix. Many authors using the MMD also choose to use an MDS plot to discover underlying dimensions of differences and help visualize the results (Huffman 2014, Irish 2010, Jahnka 2009, Sutter and Mertz 2004) The MDS works by calculating inter-sample euclidean distances which are compared with those from the MMD matrix. Then MDS works as the distance values are assigned to arbitrary coordinates in as many dimensions as is necessary while trying to find the most concise fit. These coordinates are adjusted repeatedly until they reach the best possible fit for all the distances (Irish 2010). The resulting dimensions are arbitrary and it is simply the relative position of the

points in relation to each other that are important showing closer biological groups in closer proximity and vice versa.

Displaying both of the resulting plots is another good way to compare the differences between the two MMD analyses. Figure 5.1 shows the MDS for the reduced trait analysis, and Figure 5.2 shows the MDS for the 24 trait analysis. Figure 5.3 shows the MDS for the reduced trait analysis of the tomb location groupings. It is possible to interpret or explain the underlying dimensions of these MDS plots using the data already discussed in this chapter. Axis 1 on all of the MDS plots likely represents overall occurrence of non-metric traits. Through the univariate analysis, we found that Cave 19 has the highest occurrence of non-metric traits and underground structures have the clear distinction of having the lowest occurrence of non-metric traits in general. In Figure 5.3 Chullpa 13 is likely found on the low occurrence end of the axis 1 as it

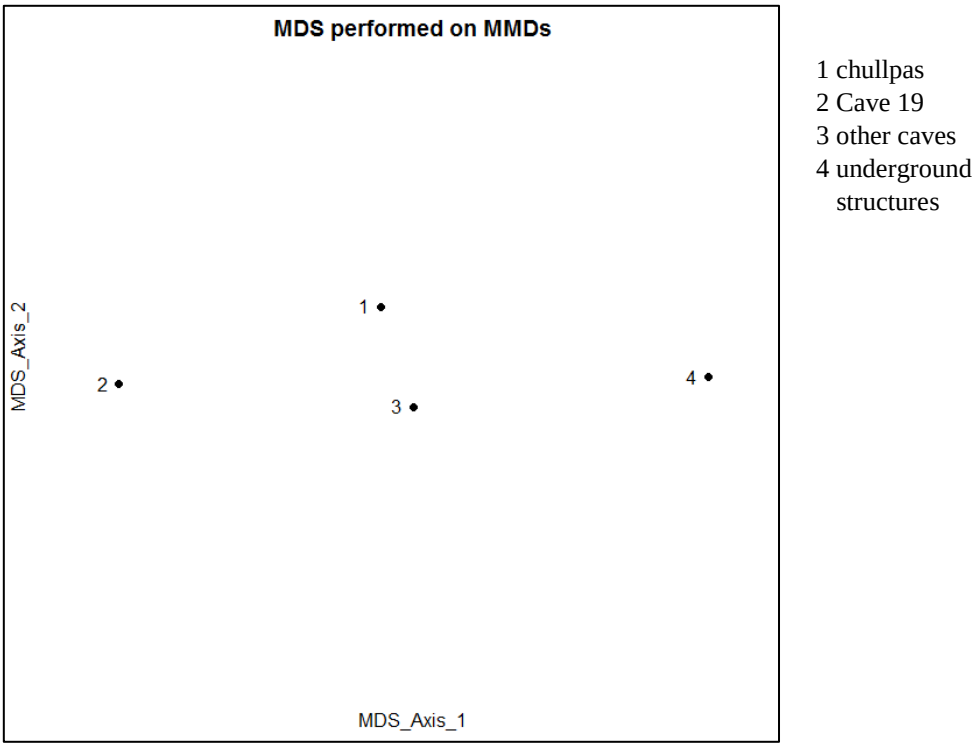

Figure 5.1 Two dimensional multidimensional scaling plot (MDS) of reduced trait list Mean Measure of Divergence distances.

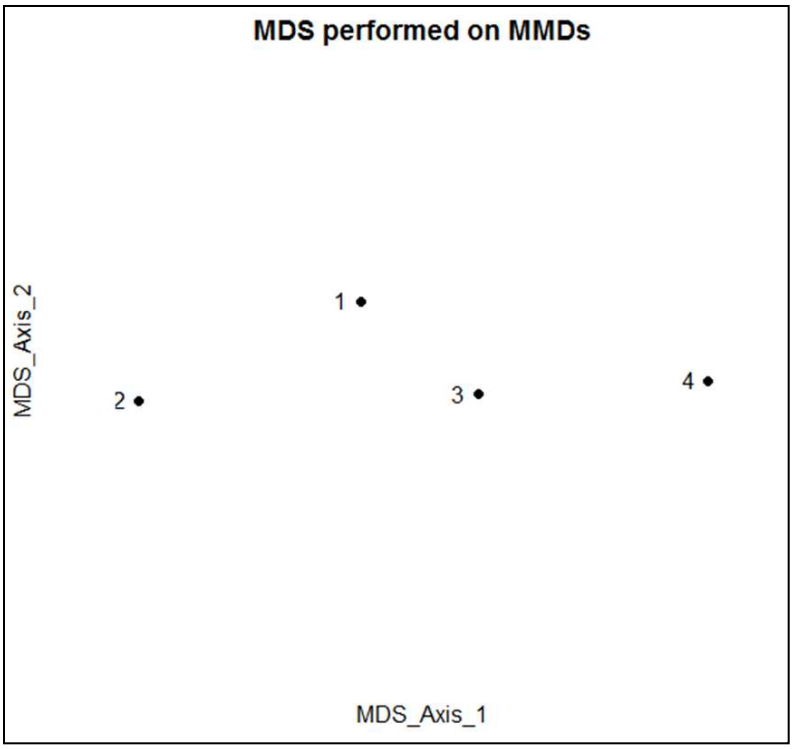

Figure 5.2 Two dimensional multidimensional scaling plot (MDS) of 24 trait Mean Measure of Divergence distances.

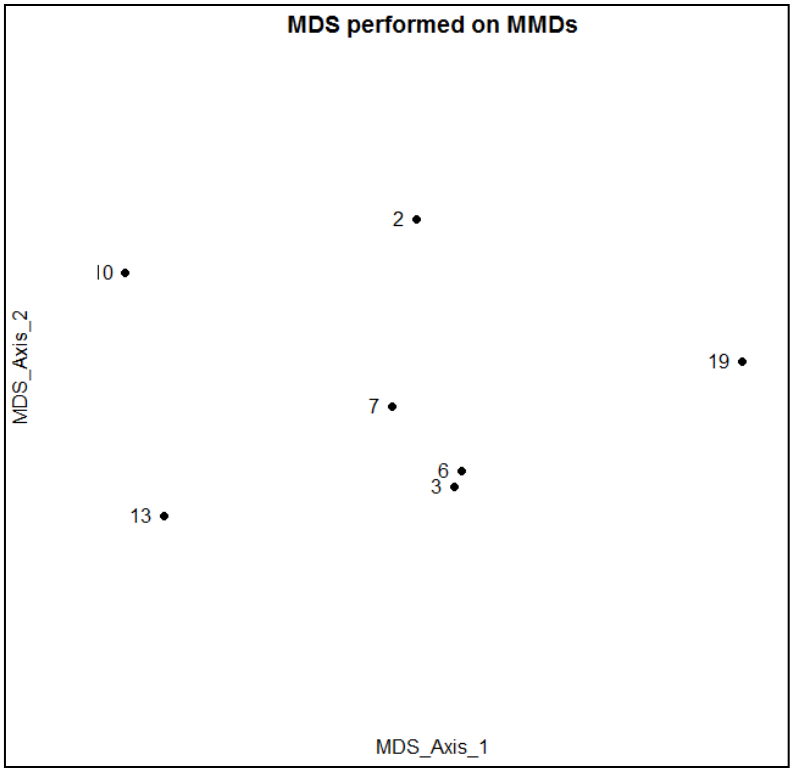

Figure 5.3 Two dimensional multidimensional scaling plot (MDS) of reduced traits by tomb location Mean Measure of Divergence distances.

has a relatively higher amount of missing data. Variation along axis 2 could represent types of traits or other differences in trait distribution.

Figure 5.1 and Figure 5.2 show essentially the same distances with regard to Cave 19, the other caves, and the underground structures. Cave 19 and the underground structures are the most dissimilar. Cave 19 and the other caves are the next furthest apart. In comparing Figures 5.1 and 5.2 the biggest difference is the location of the chullpas in relation to cave 19 and the other caves. From Figure 5.1 and the reduced trait analysis, chullpas group slightly closer to the other caves, whereas Figure 5.2 and the 24 trait analysis show that the chullpas have a slightly more divergent relationship with the other caves and slightly closer relationship to the underground structures. Basically, this is in agreement with the MMD results as the distance between cave 19 and the chullpas is statistically significant in the reduced trait analysis and not statistically significant in the 24 trait analysis. However, the difference in the first two figures vary to some extent from the MMD numbers as the 24 trait analysis indicated a relatively closer relationship between the chullpas and other caves, but they appear closer in the reduced trait Figure 5.1 than in the 24 trait Figure 5.2. Figure 5.3 shows similar relationships as when the tomb types are clumped together, although the position along axis 1 is reversed. Cave 19 again appears to the far right with Structure 10 on the far left. The two groups of chullpas are separated with Chullpa 13 on the far left and Chullpa 6 in the bottom middle, showing the greater distance Chulpa 6 has from Structure 10. The three other caves, Cave 2, Cave 3, and Cave 7 appear relatively spread out, despite the resulting negative MMD values.

Summary

There were three noticeable patterns among all of the results from the non-metric analyses at Marcajirca. Cave 19 exhibits the greatest number of cranial non-metric traits and

differs from almost all of the other tombs in at least one of the analyses, at statistically significant levels. Structure 10 appears on the opposite end of the spectrum from Cave 19, with the fewest number of cranial non-metric traits and it also differs from the chullpas at statistically significant levels. Caves 2, 3, and 7 and Chullpas 6 and 13 do not exhibit statistically significant differences between each other and often exhibit negative distance values. These negative values are caused by the sample not being fully representative of the population or the samples being drawn from the same population in so much as they do not differ biologically. The following chapter will present the possible factors that could contribute to the observed differences. Then I will discuss how these results relate to the research question and the supporting questions concerning the cultural practices attributed to the Late Intermediate Period.

Chapter 6. Discussion and Conclusion

The primary objective of this study was to assess affinity and kinship at the site of Marcajirca by testing whether the *chullpas* and caves were used as familial burials. In order to test this, I attempted to determine if the people in one tomb were significantly different biologically from the people found in other tombs based on the relative prevalence of heritable non-metric traits. Non-metric traits on crania from different tombs were scored and calculated to find biodistance. The mean measure of divergence was used to produce a numerical summary of the biological distance between groups of skeletal remains. There are various factors that influence the data, and these will be reviewed prior to discussing the results in the context of the archaeological and historical data.

Data Considerations

In order to evaluate the results of the multivariate analyses, one must consider the different factors that might influence those results. Some of the possible potentially confounding factors that directly affect the sample from Marcajirca include small sample sizes and missing data, the selection of traits, possible sex biases, cranial modification, temporal differences, and the overall disturbed condition of the site.

Small sample sizes complicate the ability to perform a meaningful non-metric trait analysis. If the sample size is too small, the raw frequencies are not always dependable (Harris and Sjovold 2004; Irish 2010; Nikita 2015). It is for this reason that the first analysis was done by tomb type rather than burial site, to create the most robust sample sizes possible. However; searching for biological differences by tomb type can only inform on whether higher level *ayllus* were divided in death by the type of tomb that was used rather than on a family level. That is

why the analysis was run again with groups by tomb location, in which all the caves were analyzed on an individual basis and the *chullpas* were put in two groups by location. Again, this is not the perfect technique for identifying familial tombs within the *chullpas,* but grouping them by their location at the site provides one way to look at affinity with sufficient sample sizes.

As seen in the variation of results between the 24 trait and reduced trait analyses, the selection of traits does affect the biodistance results. Harris and Sjovold (2004) argue that using as many traits as possible would create the most objective and repeatable results. In statistics, this level of selectiveness to choose only the most divergent traits can be seen as problematic. On the other hand, many authors using the MMD argue that the selection of a few traits, on the condition that that they are not highly correlated and provide good comparative information, produce more robust statistics while still being valid (Irish 2010; McClelland 2003; Nikita 2015). In the case of Marcajirca, the difference between these two analyses is the statistical significance of the difference between Cave 19 and the other caves in the 24 trait analysis while the difference between Cave 19 and the chullpas was found to be statistically significant in the reduced traits analysis. It is possible that the difference in these two analyses results from the amount of missing data, particularly from Chullpa 13, due to the fragmentation of the crania. The missing data would create a smaller sample size used in the MMD and could exaggerate the differences in the reduced trait analysis. This could also be contributing to the significant difference between Cave 19 and Chullpa 13 in the tomb location analysis.

Multivariate analyses separating remains based on sex were not run due to the fragmented nature of the sample and the inability to definitively identify sex from markers on all crania. The chi square tests to identify correlations based on sex associations only found two traits that did have sex based correlations at statistically significant levels. Also, from the crania

for which sex could be estimated, it appears as though both sexes were present in all of the tombs. This would indicate that no tomb excavated at Marcajirca was used exclusively for male leaders or *mallquis* as Dillehay (1995) had suggested. Instead, this agrees with Kurin (2012) and historic documents (Alvarez 1998; Doyle 1988) that *machay* were not reserved only for the male *mallquis*, rather all of the descendants of that *mallquis* were also placed with them, creating a lineage burial.

Cranial modification was previously recognized to cause an increase in the occurrence of wormian bones near the areas affected by the style of modification (Konigsberg et al. 1993; O'Loughlin 2004; Del Papa and Perez 2007). Five of the reduced traits selected for the multivariate analyses were noted to increase with the annular type of modification which is the primary form found at Marcajirca. This easily could have caused the results of the reduced trait analysis to differentiate Cave 19 more than the chullpas and underground structures. However, the 24 trait analysis has similar results with Cave 19 showing significantly different distances from the other caves and the structures. This result indicates that although the cranial modification may affect the frequency of nonmetric traits, the traits affected by annular modification, in this case, do not greatly affect the outcome of distance calculations.

Only four of the tombs included in this analysis from Marcajirca have been radio carbon dated. Change over time can alter the occurrence of non-metric traits through changes in marital patterns affecting gene flow or even just genetic drift (Hauser and DeStefano 1989). Although the dates that are available for Marcajirca point towards contemporaneous use of caves and *chullpas*, the range of dates is over 400 years. Without having multiple samples dated for each tomb, it is difficult to assess the use of Marcajirca tombs through time and the effects that might have had on the non-metric traits found on the crania. The intrusive underground burial at

Structure 10 is undated and assumed to date to the Early Colonial Period based on the dates from Structure 7. Under the current circumstances at Marcajirca, there is little possibility of controlling for temporal changes in this study.

One of the greatest challenges to skeletal analysis at Marcajirca is the obvious disturbance of the tombs and the fragmentation of the human remains. A large number of the skulls from Marcajirca have been removed from the site. This decreases the number of individuals that could be included in the analysis and could potentially distort the sample. If the removal of crania was a nonrandom practice by a particular group of descendants, the distribution of related crania could have been altered. Additionally, the fragmentation of the remains creates missing data that could otherwise be used in the analysis. This prevalence of fragmentation at Marcajirca is a challenge to non-metric analysis because of the effects it has on the number of individuals available for the analysis and the creation of missing data.

Group Affinity and Familial Burials

There were three noticeable patterns in the results from the non-metric analyses at Marcajirca. Cave 19 differs the most from almost all of the other tombs, these differences reaching statistically significant levels with comparison to Structure 10 and Chullpa 13. Structure 10 appears on the opposite end of the spectrum as Cave 19 and also differs from the *chullpas* at statistically significant levels. Caves 2, 3, and 7 and Chullpas 6 and 13 do not exhibit statistically significant differences and often exhibit negative distance values. As the tomb location analysis is more suitable to identifying actual familial use of tombs, and in general provides similar results to the tomb type analysis, the results of the tomb location analysis will be the primary results discussed further. These results do not provide enough information to

positively identify each tomb as a unique family burial, but may be more indicative of a wider *ayllu* group present at Marcajirca.

The only tomb from this analysis that appears to represent a biologically distinct group of people is Cave 19. In all of the analyses, Cave 19 is shown to have a statistically significant difference from at least two other sets of tombs. Cave 19 exhibits the shortest biodistance from Cave 3, while exhibiting positive distances from the other caves. Both males and females are found in Cave 19 and none of the traits used in the analysis showed any sex bias. Annular erect and annular oblique forms of cranial modification were present on 16 of the 23 crania in Cave 19. Although the cranial modification did not likely account for the biological differences that Cave 19 exhibited, it was used as a social identifier, and this group of people was different. Additionally, Cave 19 is located on the periphery of the site, further south than what appears on the plan map of Marcajirca. This could mean that Cave 19 was used as an interment for a group or family that was distinct from the majority of the population of Marcajirca.

The other tomb that appears to represent a biologically distinct group of people is Structure 10. On all of the MDS plots Structure 10 is found on the opposite end of the spectrum from Cave 19 and a good distance from the other caves and chullpas. The only statistically significant differences from Structure 10 in the location analysis are Cave 19, located on the periphery of the site, and Chullpa 6, located in the center of the funerary sector. Structure 10 is an intrusive underground burial found in the funerary sector that is likely dated to the Early Colonial Period. The observed differences in trait frequencies from the other tombs at Marcajirca could likely have been due to changes in trait frequency over time. However, not all of the relationships with other tombs show statistically significant differences, indicating that there are some biological similarities with the primary population at Marcajirca. This could indicate that

this group represents a descendant group from the people that inhabited Marcajirca during the Late Intermediate Period.

The human remains from the majority of the caves and chullpas at Marcajirca were not found to be significantly different; in fact many resulted in a negative MMD value. Caves 2, 3, and 7, as well as Chullpas 6 and 13 were not found to have biological differences. As most of the sample sizes were adequate, the many resulting negative values were likely due to the samples being drawn from the same population in so much as they do not differ biologically. Cave 3 and the Chullpa 6 group are all located within the center of the funerary sector. Cave 2 and Cave 7 are closer to the public ceremonial sector where Chullpa 13 group is found. The MDS of the separate tomb by location show Cave 3 and Chullpa 6 clumped together while Cave 2, Cave 7, and Chullpa 13 are spread out. This mimics the proximity of the locations of Cave 3 and Chullpa 6 in the funerary sector, while the others are located near the public sector. The overall negative values found between these tombs could indicate that the people in all these tombs in the heart of the site belonged to the same extended family or *ayllu* group and intermarried, keeping the biological variation between families at Marcajirca low.

Given the limitations with the missing data and sample sizes, it is difficult to determine if each individual tomb represented a distinct family group. The results of this analysis do show that the individuals in Cave 19 were likely distinct from the majority of the rest of the population at Marcajirca. The people interred in Structure 10 could represent a descendant group of the Late Intermediate Period population at Marcajirca as they do differ in trait frequencies, but do not differ significantly from most of the tombs. The rest of the tombs at Marcajirca could still have been utilized as family burials, however, the population as a whole is too biologically

related for these small samples to indicate distinct family groups with statistically significant differences.

Cultural Practices in the North Central Highlands

Historical records indicate that ancestor worship was practiced as part of *ayllu* organization in the Inka empire during the Late Horizon. This included the worship of mythical founding ancestors, often embodied in the landscape, such as *apus,* real or mythical founding ancestor of *ayllus* called *mallquis,* and the veneration of related ancestors. These practices often played a cohesive role in the *ayllu.* The information gathered about Marcajirca for this thesis and the results of the non-metric analysis suggest that practices described in historical documents were probably enacted in the Conchucos region during the Late Intermediate Period.

The presence of open tombs in conjunction with burial goods and continued offerings found by Ibarra (Ibarra and Landeck 2008) is congruent with the reports of ancestor worship in the historical records. All of the tombs in Marcajirca were easily accessible and many could have been considered *huacas*. Due to their concentration between residential areas and the ceremonial sector, the dead would have been involved in the community on a daily basis. Many of the skeletal remains at Marcajirca that were not completely co-mingled over time do show articulations and textiles that indicate the use of mummy bundles, another practice mentioned in historical records. Evidence of rituals found in the areas directly outside tomb entrances include traces of fires and burned food, animal carvings, and pottery (Ibarra 2009). Additionally, other similar offerings inside the tombs correspond to descriptions of *pacaricuc* rituals indicating ancestor worship. Even though the results from the non-metric analysis do not provide robust support for the use of familial tombs, they also do not negate that interpretation. Cave 19 is likely a family group distinct from the rest of Marcajirca. The use of the tombs at Marcajirca for

family based burials has also been suggested by the presence of two individuals exhibiting the same rare hereditary abnormality of the wrist found within a single tomb (Titelbaum et al. 2015). The abundance of tombs in addition to the evidence of ritual offerings remains suggestive of ancestor worship and the results of this analysis do not contradict that interpretation.

The historical records do indicate that two major *ayllu* groups were in place in this area of the Conchucos region, namely the Huari and the Pincos. The area inhabited by the Huari includes the location of Marcajirca. As ancestor worship has been recognized to be a pivotal part of *ayllu* cohesion, the presence of ancestor worship at Marcajirca, supports the ascription of *ayllus* in the area. Furthermore, the results of the non-metric analysis show that most of the groups of individuals within the tombs at Marcajirca were not significantly different from each other. Cave 19 was the only contemporary tomb that presented statistically significant differences from the other tombs. This could indicate that the population at Marcajirca represented an extended family *ayllu* group that participated in endogamous relations within that larger *ayllu*, and Cave 19 was not part of the principal population from Marcajirca. I argue that it is reasonable to attribute *ayllu* organization to the Late Intermediate Period at Marcajirca, as was described in the historical records.

Additionally, it is no coincidence that Marajirca is located in proximity to the *apu* Llamoq with clear visibility of its peaks. Llamoq was said to be the founder and protector of the province and the founding ancestor of the people in that area (Ibarra in press, 2013). Marcajirca is the closest site to the peaks of Mt. Llamoq, which allowed it to be seen and participate daily with the community in addition to its ease of access for ceremonies. The location of Marcajirca in relation to the *apu* Llamoq would have made Marcajirca a special place for the *ayllu* that considered Llamoq as its founder. The historical records indicate that native Andeans believed

the mountains were locations to which they returned after death (Besom 2000; Reinhard 1985). The large quantity of mortuary architecture at Marcajirca more than any other site in the area and its connection to Llamoq support these records. Even the placement of Structure 10 at the site of Marcajirca, is consistent with historical records of people burying their dead near the ancestors and especially the mountain ancestors.

Due to its proximity to the local *apu* Llamoq, Marcajirca could have been used as a burial location for residents of a larger *ayllu* group, consisting of multiple towns that also considered Llamoq as their a*pu*. Also due to the strong practice of ancestor worship, if multiple groups of people beyond the local residents of the town buried their dead at Marcajirca, different tombs would have been employed by different groups and families. This could have been the case for Cave 19. It is spatially distinct from the majority of the mortuary complex, as it resides on the outer limits of the site. The biological relationships found from the analysis of non-metric traits and the distinctive cranial modification found in Cave 19 could indicate that it contained one of these outsider groups that still considered Llamoq its founding ancestor.

The information provided from previous research at Marcajirca, along with the added knowledge from the results of the non-metric analysis do support the notion that the practices described in historical records were also conducted at the site. It does appear as though ancestor worship of the mythical ancestor Llamoq, as well as the worship of their local ancestors, was practiced at Marcajirca. Although the results from the non-metric analysis did not provide sufficient data to identify distinct family units within each tomb, it did show one burial that was different from the rest. This could be indicative of Marcajirca being the center of a larger *ayllu* group. However, the use of historic documents as the basis for interpretation of archaeological research from sites dated to the Late Intermediate Period still need to be addressed in a similar

case by case study to check the validity of the claims made in those documents in relation to each individual site.

Future Research

Further archaeological investigation and the recovery of more skeletal and cranial remains at Marcajirca will contribute to the ability to identify kin relationships. It is clear that DNA studies would be the most effective means to identify affinity and kin at Marcajirca, but considering the cost and destructive nature of such tests, this is an unlikely option. As sample size is one of the biggest challenges to biodistance studies, the excavation and recovery of more crania from more tombs would allow for a more complete picture of family burials at the site. The excavation of other caves located on the periphery of the site, similar to Cave 19, could also potentially help in determining if other outside groups used Marcajirca as a burial place. Another option to for assessing biodistance at Marcajirca would be the scoring of non-metric mandibular dental traits. The use of non-metric dental traits would result in larger sample sizes as the number available is greater than that of the crania. Dental non-metric traits have been found to be a reliable and accurate method to find biodistance (Corruccini et al 2002; Huffman 2014; McClelland 2013) and would also test the group affinity and use of familial tombs. Further dating of the tombs themselves would also lead to a greater ability to account for and understand change in tomb use over time and how that could affect the frequencies of traits.

Another possibility for further research involves identifying affinity on the regional level. The historical records identified two major groups in the immediate area around Marcajirca, the Huari and the Pincos, in addition to other groups in the Conchucos region (Ibarra 2003; Leon Gomez 2003). Intersite biodistance analysis could be used to determine if there was a real biological distinction between the various *ayllus* reported to exist in the Conchucos Region. This

would require analysis of skeletal collections from sites across Conchucos, as well as the recovery of more remains from sites within the Pincos area. These kinds of analyses would also help to identify the levels of endogamy or exogamy that occurred within and between *ayllus* in the Conchucos region. In a similar vein, the comparison of forms of intentional cranial deformation between sites in the Conchucos region would also help to understand the presence of deformation at Marcajirca as well as group identity and social organizational patterns in the region.

An additional area of interest and opportunity involves the excavation of the ceremonial sites atop Llamoq and its Pincos counterpart, Winaj. Auger testing has been done at Llamoq and has revealed the presence of painted ceramics, suggesting the performance of ceremonies. Similar architectural features found at Llamoq are also found atop Winaj, (Ibarra in press) and excavation at both of these mountain *apus* could greatly enhance the understanding of the roles of *apus* in this area and their connection to their *ayllus* and ancestor worship.

Conclusion

This thesis focused on assessing whether ancestor worship was practiced at Marcajirca as part of an *ayllu* organization. These cultural practices were interpreted based on historical records that were far removed temporally and spatially from the site of Marcajirca in the Conchucos region of Ancash during the Late Intermediate Period. It is important for the researchers of any site so far removed from the historical records to be cautious when using these records for the interpretation of archaeological record. Specific evidence must be found to support the claims made by those documents.

In the case of Marcajirca, it does appear as though many of these records can be applied to the archaeological interpretations of this site. Open tombs, ritual offerings, and the presence

of mummy bundles are suggestive of the practice of ancestor worship. Although the findings of the non-metric analysis in this study could not confirm the use of the tombs at Marcajirca for family burials, it does not contradict that possibility. The overall population at Marcajirca, possibly due to the small sample sizes and missing data, was too similar to identify significant differences in the non-metric trait frequencies between tombs. Only Cave 19 represented a likely distinct group, possibly from an outlying community that considered itself as part of the larger *ayllu* linked by their belief in Llamoq as its founding ancestor. These results do not, however, deny that the tombs were used for family burials. Rather the study indicates that the population as a whole at Marcajirca were more interrelated, indicating endogamous relationships within the *ayllu*. The findings of this study do indicate that an *ayllu* organization was likely in place at Marcajirca, that it was centered on its founding *apu* Llamoq, and that the inhabitants there participated in ancestor worship.

References Cited

Allen, Catherine J.

2015 The Whole World is Watching: New perspectives on Andean Animism. In T*he Archaeology of Wak'as: Explorations of the Sacred in the Pre-Columbian Andes*. Ed. T.L. Bray pp.23-46 Boulder: University Press of Colorado.

Alvarez, Bartolome

1998 [1588] Cronicas y Memorias. *De las costumbres y conversion de los indios del Peru*. Memorial a Filipe II. Edicion: Ma del Carmen Martin Rubio, Juan J.R. Villarias Robles, Fermin del Pino Diaz. Madrid.

Astvaldsson, Astvuldar

2004 El flujo de la vida humana: el significado del termino-concepto de Huaca en los Andes. *Hueso humero* 44:89-112.

Baca, Mateusz, Karolina Doan, Maciej Sobczyk, Anna Stankovic and Piotr Weglenski

2012 Ancient DNA reveals kinship burial patterns of a pre-Columbian Andean community. *BMC Genetics* 13:30.

Bastien, Joseph William

1985 *Mountain of the condor: metaphor and ritual in an Andean ayllu*. Waveland Press.

1995 The mountain/body metaphor expressed in Kaatan funeral. In T. Dillehay (Ed.), *Tombs for the living: Andean mortuary practices*. Pp. 355-378 Washington, D.C.

Bawden, Garth

2000 Burial: The Deus Ex Machina of Social Transformation? *Current Anthropology*, 41(1):145-147.

Bennett, Wendell C.

1944 The North Highlands of Peru. Excavation in the Callejon de Huaylas and Chavin de Hantar. *Anthropological Papers of the American Museum of Natural History* 39(1).

1948 The Peruvian Co-Tradition. *Memoirs of the Society for American Archaeology: A Reappraisal of Peruvian Archaeology* 4:1-7.

Berry, A. Caroline and R.J. Berry

1967 Epigenetic Variation in the Human Cranium. *Journal of Anatomy* 101(2):361-379.

Besom, John Thomas

2000 *Mummies, Mountains, and Immolations: strategies for unifying the Inka Empire's Southern Quarters*. Ph.D. Dissertation. Binghamton University State University of New York.

Binford, Lewis R.
1971 Mortuary practices: their study and their potential. *Memoirs of the Society for American Archaeology*. *Approaches to the Social Dimensions of Mortuary Practices* 25:6-29.

Bloch, Maurice and Jonathan Parry
1982 *Death and the regeneration of life*. Cambridge University Press.

Blom, Debra
2005 Embodying borders: human body modification and diversity in Tiwanaku society. *Journal of Anthropological Archaeology* 24:1-14.

Bray, T. L.
2015 *The Archaeology of Wak'as: Explorations of the Sacred in the Pre-Columbian Andes*. Boulder: University Press of Colorado.

Brown, James A.
1995 Andean Mortuary Practices in Perspective. In T. Dillehay (Ed.), *Tombs for the living: Andean mortuary practices*. Pp. 391-405. Washington, D.C.

Buikstra, Jane E.
1995 Tombs for the living … or … for the dead: The Osmore ancestors. In T. Dillehay (Ed.), *Tombs for the living: Andean mortuary practices*. Pp. 229-280 Washington, D.C.

Buikstra, Jane E., and Douglas H. Ubelaker Eds.
1994 *Standards for Data Collection from Human Skeletal Remains: proceedings of a seminar at the Field Museum of Natural History*. Arkansas Archaeology Research Series 44. Fayetteville Arkansas Archaeological Survey.

Buikstra, Jane E. and Kenneth C. Nystrom
2015 Ancestors and Social Memory: A Southern American Example of Dead Body Politics. *Living with the dead in the Andes*. J. Fitzsimmons & I Shimada (eds.) Pp. 245-266 Tucson: University of Arizona Press

Castro, Victoria and Carlos Aldunate
2003 Sacred Mountains in the Highlands of the South-Central Andes. *Mountain Research and Development* 23(1):73-79.

Chase, Zachary J.
2015 What is a Wak'a? When is a Wak'a? in T*he Archaeology of Wak'as: Explorations of the Sacred in the Pre-Columbian Andes*. Ed. T.L. Bray pp.75-126 Boulder: University Press of Colorado.

Cobo, Bernabe
1990 [1653] *Inca Religion and Customs* University of Texas Press

Contreras, Daniala A.
2010 Landscape and Environment: Insights from the Prehispanic Central Andes. *Journal of Archaeological Research* 18(3):241-288.

2014 (Re)constructing the sacred: landscape geoarchaeology at Chavin de Huanter, Peru. *Archaeological Anthropology Sciences*, 1-13.

Cook, Anita G.
2015 The Shape of Things to Come: The Genesis of Wari Wak'as. In *The Archaeology of Wak'as: Explorations of the Sacred in the Pre-Columbian Andes*. Ed. T.L. Bray pp.295-334 Boulder: University Press of Colorado.

Cook, Noble David
1977 La visita de Conchucos por Cristobal Ponce de Leon. 1543. En: *Historia y Cultura.* N 10. Revista del Museo Nacional de Historia. Lima.

Corruccini, Robert S. and Izumi Shimada
2002 Dental Relatedness Corresponding to Mortuary Patterning at Huaca Loro, Peru. In *American Journal of Physical Anthropology*. 117:113-121.

Dean, C.
2010 The after-life of Inka rulers: Andean death before and after Spanish colonization. *HIOL: Hispanic Issues On Line*, (7), 27-54.

DeLeonardis, L. and G.F. Lau
2004 Life, death and ancestors. In *Andean Archaeology* ed H. Silverman. Oxford: Blackwell, 77-115.

De la Vega, Inca Garcilaso
1976 [1609] Comentarios Reales Tomo I, XLIV + 275 Fundación Biblioteca Ayacucho

Del Papa, Mariano C. and S. Ivan Perez
2007 The Influence of Artificial Cranial Vault Deformation on the Expression of Cranial Nonmetric Traits: Its Importance in the Study of Evolutionary Relationships. *American Journal of Physical Anthropology.* 134:251-262.

Dillehay, Tom D.
1995 *Tombs for the Living: Andean Mortuary Practices*. Washington, D.C.: Dumbarton Oaks.

Doyle, M.E.
1988 *The ancestor cult and burial ritual in seventeenth and eighteenth century Central Peru*. Ph.D. disseration, University of California.

Duviols, Pierre
1973 Huari y Llacuaz. En: *Revista del Museo Nacional*, n 39. Pp153-191. Lima.

1986 *Cultura andina y repression: Procesos y visitas de idolatrias y hechicerias, Cajatamo, siglo* XVII. Centro de Investigaciones Rurales Andinos, Archivos de Historia Andina 5. Cuzco.

Epstein Lori and J. Marla Toyne
2016 When space is limited: A spatial exploration of pre-hispanic Chachapoya mortuary and ritual microlandscape. In *Theoretical Approaches to Analysis and Interpretation of Commingled Human Remains, Bioarchaeology and Social Theory*. A.J. Osterholtz ed. Springer International Publishing pp.97-124.

Espinoza Soriano, Waldemar
1981 El fundamento territorial del ayllu serrano. Siglo XV y XVI *En : Etnohistoria y Antropología Andina.* Segunda Jornada del Museo Nacional de Historia. Lima.

Favre, Henri
1966 Tayta Wamani: Le culte des montagnas dans le centre sud des Andes Peruviennes. *Colloque d'etudes Peruviennes* 61:121-140. Aix-en-Proence, France.

Fitzsimmons, J., & Shimada, I. (Eds.).
2015 *Living with the dead in the Andes*. Tucson: University of Arizona Press

Gamboa Velásquez, Jorge
2009 Diversidad formal y cronológica de las prácticas funerarias Recuay. In *Kullpi: investigaciones culturales en la provinicia de Huaral y Norte Chico*. Vol.4, edited by P.D. van Dalen Luna and J. Bernabé Romero, pp. 35-75. Lima

Gil Garcia, Francisco M.
2002 Donde los muertos no mueren. Culto a los antepasados y reproduccion social en el mundo andino. Una discussion orientada a los manejos del tiempo y el espacio. *ANALES del Museo de America* 10:59-83.

2010 Dentro y fuera parando el umbral: construyendo la monumentalidad chullparia, elementos de tensión espacial para una arqueología del culto a los antepasados en el altiplano andino. Diálogo andino 35:25-46.

Glowacki, Mary and Michael Malpass
2003 Water, Huacas and Ancestor Worship: Traces of a Sacred Wari Landscape. *Latin American Antiquity* 14(4):431-448.

Gose, Peter
2008 *Invaders as ancestors: on the intercultural making and unmaking of Spanish colonialism in the Andes.* University of Toronto Press.

Green, Richard F, and Judy Myers Suchey
1976 The use of inverse sine transformations in the analysis of non-metric cranial data. *American Journal of Physical Anthropology* 45(1):61-68.

Guamán Poma de Ayala, Felipe, John Murra, and Rolena Adorno
1980 [1615]. *Primer nueva coronica y buen gobierno*. Mexico: Siglo XXI Editores

Guchte, Maarten J.D. van de,
1990 *Carving the World: Inca Monumental Sculpture and Landscape.* Tesis doctoral, Universidad de Illinois, Urbana-Champaign,

Guillen, Sonia E.
2003 De Chincorro a Chiribaya: Los ancestros de los Mallquis Chachapoya-Inca. *Boletin de Arquesologia* PUCP 7:287-303.

Hardacre, Helen
2005 Ancestors: Ancestor Worship in L. Jones (ed). *Encyclopedia of Religion*. 2nd ed. Pp320-325 Detriot Thomson Gale.

Harris, Edward F. and Torstein Sjovold
2004 Calculation of Smith's Mean Measure of Divergence for Intergroup Comparisons Using Nonmetric Data. *Dental Anthropology* 17(3):83-93.

Hauser, G. and De Stefano G.F.
1989 *Epigenetic Variants of the Human Skull.* Stuttgart, Germany: E. Schweizerbart'sche Verlagsbuchhandlung.

Herrera Wassilowsky, Alexander Charles
2003 Patrones de asentamiento y cambios en las estrategias de ocupacion en la Cuenca sur del rio yanamayo, Callejon de Conchucos. In *Arqueología de la Sierra de Ancash: Propuestas y Perspectivas* Segunda Edición. Bebel Ibarra Asencios Ed. Instituto cultural RVNA: Lima, Peru.

2005 *Territory and Identity in the pre-Columbian Andes of Northern Peru.* Ph.D. Dissertation, Department of Anthropology, University of Cambridge, Cambridge.

Herrera, Alexander and Kevin Lane
2004 Issues in Andean Highland Archaeology: The Cambridge Round Table on Ancash Sierra Archaeology. *Antiquity* 78(301).

Herrera, Alexander - Amaya, Alejandro - Aguilar, Miguel
2012 Una aproximación tipológica y funcional a la arquitectura indígena de los siglos IX al XVI en la Sierra de Ancash, en Lane K. - Lujan M. (eds.), *Arquitectura prehispánica tardía: construcción y poder en los Andes centrales*, Universidad Cátolica Sedes Sapientiae, Fondo
Editorial, Lima, p. 165-218.

Hill, Erica and Jon B Hageman
2016 The Archaeology of Ancestors in *Archaeology of Ancestors.* Erica Hill and Jon B Hageman eds. Pp. 42- 80. University of Florida Press.

Hodder, Ian and Scott Hutson
1986 *Reading the past: Current approaches to interpretation in archaeology* Cambridge: Cambridge University Press.

Holtorf, Cornelius and Howard Williams
2006 Landscapes and memories. In *The Cambridge Companion to Historical Archaeology,* edited by D. Hicks and M.C. Beaudry, pp. 235-254. Cambridge: Cambridge University Press.

Huffman, Michaela Marie
2014 *Biological Variation in South American Populations using dental non-metric traits: Assessment of isolation by time and distance.* Ph.D. Dissertation. Ohio State University.

Hyslop, John
1977 Chulpas of the Lupaca Zone of the Peruvian High Plateau. *Journal of Field Archaeology* 4(2):149-170

Ibarra Acencios, Bebel
2003a *Arqueología de la sierra de Ancash: propuestas y perspectivas*. Lima: Instituto Cultural Rvna.

2003b Arqueología del Valle del Puchca: Economía, Cosmovisión, y Secuencia Estilística. In *Arqueología de la Sierra de Ancash: Propuestas y Perspectivas* Segunda Edición. Bebel Ibarra Asencios Ed. Instituto cultural RVNA: Lima, Peru. Applicata del Castello Sforzeno-Raccolte Extraeuropee. Milan, Italy.

2005 Ancestros y muerte durante la época prehispánica en la Sierra de Ancash: buscando nuestros antepasados. In *La Complejidad Social en la Sierra de Ancash*. Alex Herrera, Carolina Orsini, and Kevin Lane eds. Civiche Raccolte d'Arte

2006 Ancestros y muerte durante la epoca prehispanica en la sierra de Ancash: Buscando nuestro antepasados. En *La complejidad social en la Sierra de Ancash: ensayos sobre paisaje, economia y continuidades culturales*. A. Herrera and K. Lane eds. Milan. Civiche Raccolte d'Arte Aplicada de Castello Sforzesco
2009 *Historia Prehispanica de Huari: Desde Chavin hasta los Inkas 3000 Años de historia*. Bebel Ibarra Asencio ed. Huari: Instituto de Estudios Huarinos.

2013 *Mortuary Practices in Peruvian Northern Highlands: An Approach From Marcajirca Site in Huari-Ancash*. Huari: Instituto de Estudios Huarinos.

2014 *Cien Anos de la Arqueologia en la Sierra de Ancash*. Instituto de Estudios Huarinos SAC, Huari, Peru.

In Press Estrategias de Ocupacion Inca en la Sierra de Ancash: Centros Administrativos y Sistemas de Almacenamiento y su rol en la definicion de grupos etnicos. *Arqueología de la Sierra de Ancash 2: Cronología y Espacio.* Instittuto de Estudios Huarinos. Lima. Peru.

Ibarra Asencios, Bebel and Jillian Landeck

2008 *The Bioarchaeology of Health and Social Organization at Marcajirca, North-Central Highlands, Peru*. Manuscript on file, Instituto cultural RVNA. Lima, Peru.

Ibarra Asecncios, Bebel, Carolina Orsini, Cristian Vizconde Garcia, Sonia Rios Villar, and Bach, Fernando Gutierrez Honores.

2010 *Proyecto Arqueologico Huari-Ancash Informe Final de Labores*. Presentado al instituto nacional de cultura temporada 2008-2010. Provincia de Huari, Ancash. RDN 1411 and RDN 226.

Ibarra Asencios, Bebel and Stephan Naji

2011 First Peruvian Christian Mummies? A bioarchaeological analysis of the transitional funerary site of Marcajirca, Huari-Peru. *American Journal of Physical Anthropology Abstracts of AAPA Poster and Podium Presentations*. Pp 172.

Insoll, Timothy, ed.

2011 Ancestor Cults *The Oxford Handbook of the Archaeology of Ritual and Religion*. Oxford: Oxford University Press.

Irish, Joel D.

2010 The Mean Measure of Divergence: Its Utility in Model-Free and Model-Bound Analyses Relative to the Mahaloanobis D2 Distance for Nonmetric Traits. *American Journal of Human Biology 22*:378-395.

Isbell, William Harris

1997 *Mummies and mortuary monuments: a postprocessual prehistory of central Andean social organization*. Austin: University of Texas Press.

2004 Mortuary Preference: a Wari culture case study from Middle Horizon Peru. *Latin American Antiquity* 15(1):3-32.

Jahnka, Lori M.

2009 *Human Biological Variation and Cemetery Distribution in the Huara Valley, Peru*. Ph.D. Dissertation. Tulane University.

Jesuita Anonimo
1918 [1613] Mision de las provinvias de los Huachos y Yauyos. Reprinted in Carlos Romero. *Idolatries de los indios Huachos y Yauyos.* Revista historica, 8:180-197. Lima, Peru. Insistuto Historico del Peru.

Johnson, Andrew L., and Nancy C. Lovell
1995 Dental Morphological Evidence for Biological Continuity between the a-Group and the C-Group Periods in Lower Nubia. *International Journal of Osteoarchaeology*. 5:368-376.

Kaulicke, Peter
1997 La Muerte en el Antiguo Peru Contextos y conceptos funerarios: una introduccion. *Boletin de Arqueologia* PUCP 1:7-54.

2001 Vivir con los ancestros. En La memoria de los ancestros. Eds Millones, Luis and Wilfredo Kapsoli Escudero. Pp. 25-62. Universidad Ricardo Palma Lima, Peru.

2013 The powerful dead of the Inca. In *The Oxford Handbook of the Archaeology of Death and Burial*, edited by S. Tarlow and L. Nilsson Stutz, pp. 391-404. Oxford: Oxford University Press.

Konigsberg, Lyle W.
1987 *Population genetics models for interpreting prehistoric intra-cemetery biological variation*. Ph.D. Dissertation. Northwestern University.

Konigsberg, Lyle W., Luci A.P. Kohn and James M. Cheverud
1993 Cranial Deformation and Nonmetric Trait Variation. *American Journal of Physical Anthropology* 90:35-48.

Kroeber, A.L.
1927 Disposal of the Dead. *American Anthropologist* 29(3):308-315.

Kurin, Danielle Shawn
2012 *The bioarchaeology of collapse: ethnogenesis and ethnocide in post-imperial Andahuaylas, Peru (AD 900-1250*). PhD. Dissertation Vanderbilt University Nashville, Tennessee.

Lane, Kevin
2011 Inca. *The Oxford Handbook of the Archaeology of Ritual and Religion*. Oxford: Oxford University Press.

Lane, Kevin and Alexander Herrera
2005 Archaeology, landscapes and dreams: science, sacred offerings, and the practice of archaeology. *Archaeological Review from Cambridge* 20(1):111-128.

Lane, Kevin J. and Milton Lujan D. eds
2011 *Arquitectura prehispanica tardia: construccion y poder en los Andes centrales*. Universidad Católica Sedes Sapientiae, Fondo Editorial. Lima.

Lane, Rebecca A. and Audrey J. Sublett
1972 Osteology of Social Organization: Residence Pattern. *American Antiquity* 37(2):186-201.

Larsen, Clark Spencer
2015 *Bioarchaeology: Interpreting Behavior from the Human Skeleton. Second Edition*. Cambridge University Press. Cambridge.

Lau, George F.
2002 Feasting and Ancestor Veneration at Chinchawas, North Highlands of Ancash, Peru *Latin American Antiquity*, 13(3):279-304.

2004 The Recuay Culture of Peru's North-Central Highlands: A Reappraisal of Chronology and Its Implications. *Journal of Field Archaeology*. 29(1/2):177-202.

2008 Ancestor images in the Andes. In *Handbook of South American Archaeology*, Edited by H. Silverman and W.H. Isbell, pp. 1025-1043. New York: Springer.

2010 House forms and Recuay culture: Residential compounds at Yayno (Ancash, Peru), a fortified hilltop town, Ad 400-800. *Journal of Anthropological Archaeology* 29: 327-351.

2015 The dead and the *longue durée* in Peru's north highlands. In *Living with the Dead in the Andes*, edited by I. Shimada. Pp. 200-244 Tucson: University of Arizona Press.

Laurencich-Minelli L., A Minelli, & C. Orsini
2001 Una ciudadela estilo Recuay en el valle de Chacas (Peru) El sitio Pinchay-Riway: una nota preliminar. *Journal de la Societe des Americanistes* 87:325-338. Musee de L 'Homme. Paris.

Leon Gomez, Miguel
2003 Espacio geográfico y organización social de los grupos etnicos del Callejón de Conchucos: durante los siglos XVI y XVII. In *Arqueología de la sierra de Ancash: propuestas y perspectivas*, edited by B. Ibarra Asencios, pp. 457-467. Lima: Instituto Cultural Rvna.

Leoni, Juan B.
2005 La veneracion de montanas en los andes preincaicos: el caso de Nawinpukyo (Ayacucho, Peru) en el Periodo Intermedio Temprano. *Chungara, Revista de Antropologia Chilena* 37:151-164.

MacCormack, Sabine
1991 *Religion in the Andes: Vision and Imagination in Early Colonial Peru.* Princeton University Press.

MacCurdy, George Grant
1923 Human Skeletal Remains from the Highlands of Peru. *American Journal of Physical Anthropology* 6(3):217-330.

Malville, J. M.
2011 Astronomy and ceremony at Chankillo: an Andean perspective. *Proceedings of The International Astronomical Union, 7*(S278), 154-161.

Mannheim, Bruce and Guillermo Salas Carreno
2015 Wak'as: Entifications of the Andean Sacred. In *The Archaeology of Wak'as: Explorations of the Sacred in the Pre-Columbian Andes*. Ed. T.L. Bray pp.47-74 Boulder: University Press of Colorado.

Mantha, Alexis
2006 Late prehispanic social complexity in the Rapayán valley, Upper Marañón drainage, central Andes of Peru. In *La Complejidad Social en la Sierra de Ancash*, 35-62.

2009 Territoriality, social boundaries and ancestor veneration in the central Andes of Peru. *Journal of Anthropological Archaeology* 28:158-176.

Martiarena, L. M.
2014 *The Social Life of Death: Mortuary Practices in the North-Central Andes, 11th-18th Centuries* (Doctoral dissertation, University of East Anglia).

Marzal, M. M.
1993 Andean religion at the time of the conquest. *South and Meso-American Native Spirtuality: From the Cult of the Feathered Serpant to the Theology of Liberation*, 86-115.

McClelland, John Alan
2003 *Refining the resolution of biological distance studies based on the analysis of dental morphology: detecting subpopulations at Grasshopper Pueblo.* Ph.D. Dissertation University of Arizona.

Moore, Jerry D.
1996 The Archaeology of Plazas and the Proxemics of Ritual: Three Andean Traditions. *American Anthropologist, New Series* 98(4):789-802.

2004 The Social Basis of Sacred Spaces in the Prehispanic Andes: Ritual Landscapes of the Dead in Chimu and Inka Societies. *Journal of Archaeological Method and Theory* 11(1):83-124.

Moseley, Michael E.
2001 *The Incas and their Ancestors: The Archaeology of Peru*. Revised Edition. Thames and Hudson, New York.

Murua, Martin de
1964 [1590] *Historia general del Peru*. Bibliotheca Americana vetus, volume II. Madrid, Spain: Instituto Gonzalo Ferndandez de Oviedo.

Nielsen, A. E.
2008 The materiality of ancestors: Chullpas and social memory in the late prehispanic history of the South Andes. In *Memory work: Archaeologies of Material Practice,* edited by B.J. Mills and W.H. Walker, pp. 207-232. Santa Fe: School for Advanced Research Press.

Nikita, Efthymia
2015 A Critical Review of the Mean Measure of Divergence and Mahalanobis Distances Using Artificial Data and New Approaches to the Estimation of Biodistance Employing Nonmetric Traits. *American Journal of Physical Anthropology* 157:284-294.

Noel Espinoza, Arturo – Escobar Silva, Carlos
2006 El camino real inka o Capac Ñan de Huari, en Ibarra Asencios, B. (ed.), *Historia Prehispánica de Huari, 3000 años de historia desde Chavín hasta los Incas*, IDEH, p. 171-191.

Olinda, Celestino
1997 Tranformaciones religiosas en los Andes peruanos. 1 ciclos miticos y rituals. *Gazeta de Antropologia* 13. http://hdl.handle.net/10481/13567.

O'Loughlin, Valerie Dean
2004 Effects of Different Kinds of Cranial Deformation on the Incidence of Wormian Bones. *American Journal of Physical Anthropology* 123:146-155.

Orsini, Carolina
2014 *Arqueologia de Chacas: Comunidades, asentamientos y paisaje en un valle de los Andes Centrales del Peru.* Edizioni Pendragon. Bologna, Italy.

Parker Pearson, Mike
2003 *The Archaeology of Death and Burial*. Stroud: Sutton.

Paredes, Juan, Berenice Quintana and Moisés Linares
2000 Tumbas de la época Wari en el Callejón de Huaylas, Ancash. In *Huari y Tiwanaku: modelos vs. evidencias, primera parte*, edited by P. Kaulicke and W. Isbell, pp. 253- 288. Boletín de Arqueología PUCP 4, Lima: Pontificia de la Universidad Católica del Perú.

Parsons, Jeffrey R. Charles M. Hastings and Ramiro Matos M.
1997 Rebuilding the State in Highland Peru: Cultivator-Cultivator Interaction during the Late Intermediate Period in the Tarama-Chinchaycocha Region. *Latin American Antiquity* 8(4):317-341.

Perales Munguia, Manuel F.
2004 Ancestros y muerte en las sociedades prehispanicas tardias del alto Ricran, sierra central del Peru: Una aproximacion arqueologica, en s, *Imagen de la muerte. Primer Congreso Latinoamericano de Ciencias Sociales y Humanidades* N. Leonardini, D. Rodriguez - V. Cabanillas ed. pp. 49-57, Universidad Nacional Mayor Fondo Editorial, Lima.

Perez, S. Ivan.
2007 Artifical cranial deformation in South America: a geometric morphometics approximation. *Journal of Archaeological Science*. 34: 1649-1658.

Polo de Ondegardo, Juan
1916 [1567] Instrucion contra las ceremonias y ritos que usan los indios conforme al tiempo de su infidelidad. *Colección de libros y documentos referentes a la historia del Peru*, serie I, tomo III: 45-188. Edited by Horacio Urteaga and Carlos Romero. Lima, Peru: Sanmartí y Cía.

Rakita, Gordon F.M. and Jane E Buikstra
2005 Introduction. In G.F.M. Rakita, J. E. Buikstra, L.A. Beck, and S.R. Williams (Eds.), *Interacting with the dead. Perspectives on mortuary archaeology for the new millennium*. Pp. 1-11. Gainsville: University Press of Florida.

Rakita, Gordon F.M., Jane E. Buikstra, Lane A. Beck and Sloan R. Williams, eds.
2005 *Interacting with the Dead: Perspectives on Mortuary Archaeology for the New Millenium.* Gainesville: University Press of Florida.

Ramos, Gabriela
2010 *Death and Conversion in the Andes: Lima and Cuzco*, 1532-1670. Notra Dame, Indiana: University of Notre Dame Press.

Reinhard, Johan
1985 Sacred Mountains: An ethno-Archaeological Study of High Andean Ruins. *Mountain Research and Development* 5(4):299-317.

1992 Sacred Peaks of the Andes *National Geographic* 181(3):85-111.

Reinhard, John and Constanza Ceruti
2005 Sacred Mountains, Ceremonial Sites, and Human Sacrifice Among the Incas. *Archaeoastronomy* 19:1-43.

Rostworowski, M.
1998 Pachacamac and El Senor de los Milagros in E. Hill Boone and T. Cummins (eds), *Native traditions in Postconquest World: A symposium at Dumbarton Oaks, 2nd through 4th October 1992*. Washington D.C.: Dumbarton Oaks Research Library and Collection.

Rowe, J. H.
1995 Behavior and belief in ancient Peruvian mortuary practice. In T. Dillehay (Ed.), *Tombs for the living: Andean mortuary practices.* Washington, D.C.: Dumbarton Oaks Research Library and Collection.

Salomon, Frank, George Urioste, and Francisco de Avila
1991 (1573-1647) The Huarochirí manuscript : a testament of ancient and colonial Andean religion by Francisco de Avila translation from the Quechua by Frank Salomon and George L. Urioste; annotations and introductory essay by Frank Salomon ; transcription by George L. Urioste. University of Texas Press.

Salomon, Frank
1995 "The beautiful grandparents": Andean ancestor shrines and mortuary ritual as seen through colonial records. In *Tombs for the living: Andean mortuary practices*, edited by T. Dillehay, pp.315-353. Washington D.C. Dumbarton Oaks Research Library and Collection.

2015 Turbulent tombs. In *Living with the Dead in the Andes*, edited by I. Shimada & J.L. Fitzsimmons. Pp.329-347 Tucson: University of Arizona Press.

Salter-Pederson, Ellen
2001 *Rinconada Alta: Biological Anthropology of Inca Imperialism in the Rimac Valley, Peru*. Ph.D. Dissertation Indiana University.

Scott, Amy B.
2011 Sacred Politics: An Examination of Inca Huacas and their use for political and Social Organization. *Totem: The University of Western Ontario Journal of Anthropology 17(1):23-36.*

Silverman, H., & Small, D. B. (Eds.).
2002 The space and place of death, *Archaeological Papers of the American Anthropological Association.* Number 11.

Shimada, Izumi.
1986 Batan Grande and cosmological unity in the prehistoric central Andes. *Andean Archaeology: papers in memory of Clifford Evans* 163-188.

Sjovold, Torstein
1973 The occurrence of minor non-metrical variants in the skeleton and their quantitative treatment for population comparisons. *Homo- Journal of Comparative Human Biology* 24:204-233.

1977 *Non-metrical divergence between skeletal populations: the theoretical foundation and biological importance of CAB Smith's mean measure of divergence*. Ph.D. Dissertation. University of Stockholm.

Spalding, Karen
2008 Consultando a los ancestros. In *Adivinación y oráculos en el mundo andino antiguo*, edited by M. Curatola Petrocchi and M.S. Ziólkowski, pp. 273-292. Lima: Instituto Francés de Estudios Andinos and Fondo Editorial Pontificia Universidad Católica del Perú.

Staller, J. E.
2008 Dimensions of place: The significance of centers to the development of Andean civilization: An exploration of the Ushnu concept. In*Pre-Columbian landscapes of creation and origin* (pp. 269-313). Springer New York.

Stanish, Charles
2012 Above-ground tombs in the circum-Titicaca basin in *Advances in Titicaca Basin archaeology III*, eds. A. Vranich, EA Klarich & C. Stanish. Memoirs of the Museum of Antrhopology, University of Michigan 203-220. Ann Arbor, MI

Starn, Orin
1999 *Nightwatch: The politics of protest in the Andes.* Duke University Press.

StataCorp.
2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.

Stojanowski, Christopher M. and Michael A. Schillaci
2006 Phenotypic Approaches for Understanding Patterns of Intracemetery Biological Variation. *Yearbook of Physical Anthropology* 26:49-88.

Sutter, Richard and Lisa Mertz
2004 Nonmetric Cranial trait Variation and Prehistoric Biocultural Change in the Azapa Valley, Chile. *American Journal of Physical Anthropology.* 123:130-145.

Tello, Julio C.
1956 *Arqueología del valle de Casma: Culturas Chavín, Santa o Huaylas Yunga y Sub-Chimu: informe de los trabajos de la expedición arqueológica al Marañón de 1937*. Lima: Editorial San Marcos.

Trever, Lisa
2011 Idols, mountains, and metaphysics in Guaman Poma's pictures of huacas. Anthropology and Aesthetics 59/60:39-59.

Tschauner, H.
2003 "Honco Pampa: arquitectura de elite del Horizonte Medio en el callejón de Huaylas". En: *Arqueología de la sierra de Ancash: propuestas y perspectivas* (Ibarra, B. ed.): 193-220. Instituto Cultural Runa. Lima.

Turner, C.G. and G. R. Scott
1977 Dentition of Easter Island. In *Orofacial Growth and Development*, edited by A. A. Dahlberg and T.M. Graber, Pp.229-250. Mouton Publishers, Chicago.

Tyrrell, Andrew
2000 Skeletal non-metric traits and the assessment of inter- and intra- population diversity: part problems and future potential. In *Human Osteology In Archaeology and Forensic Science.* Margaret Cox & Simon Mays eds. Greenwich Medical Media Ltd. London.

Weismantel, M.
2006 Ayllu: real and imagined communities in the Andes. In *The seductions of community: emancipations, oppressions, quandaries*, edited by Gerald W. Creed, pp. 77-100. School for Advanced Research Press.

Williams, Patrick Ryan and Donna J Nash
2006 Sighting the apu: GIS analysis of Wari imperialism and the worship of mountain peaks in *World Archaeology* 38(3):455-468.

Valdez, Lidio M., Katrina J. Bettcher, and J. Ernesto Valdez
2002 New Wari Mortuary Structures in the Ayacucho Valley, Peru. *Journal of Antrhopological Research* 58(3):389-407.

Valdez, Lidio M., Katrina J. Bettcher, Jose A. Ochatoma, and J. Ernesto Valdez
2006 Mortuary Preferences and Selected References: A Comment on Middle Horizon Wari Burials. World Archaeology 38(4):672-689.

Valverde Barbosa, Alejandra María
2008 *¿Dónde están los ancestros? Estructuras funerarias de la Cordillera Blanca, Perú*. Unpublished M.A. dissertation, Bogotá, Universidad de los Andes.

Van de Guchte, Maarten J.D.
1990 *Carving the World: Inca Monumental Sculpture and Landscape.* Ph.D. dissertation. University of Illinois at Urbana-Champaign.

Verano, John

1995 Where do they rest? The treatment of Human Offerings and Trophies in Ancient Peru. In T. Dillehay (Ed.), *Tombs for the living: Andean mortuary practices.* Pp.189-227. Washington, D.C.

1997 Advances in the Paleopathology of Andean South America. *Journal of World Prehistory* 11(20):237-268.