

# Life on the Move: Bioarchaeological Contributions to the Study of Migration and Diaspora Communities in the Andes

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## INTRODUCTION

The study of ancient human migration has long been a notable aspect of anthropological research as scholars investigate why people opt, or are forced to move from their homeland to a new locale. Explanations vary widely, but according to Arutinov (2002: 89) the underlying motivation for most migrations, "including the most ancient ones, are...things are not going well for a people in their own homeland," leading people to seek a better life in another place. Similarly, individuals and families may be drawn to an urban center in pursuit of new economic, social, political, or other kinds of opportunities. The potential push and pull factors for migration highlight a key path of inquiry worth exploring in the archaeological record. Why are people moved, or why do they opt to leave a familiar landscape filled with known kith and kin to venture to an unknown locale, often filled with strangers and customs different from one's own? And how can researchers detect this movement in the archaeological record?

Archaeologists have made tremendous contributions in identifying ancient human migration patterns and diaspora communities through analyses of artifacts and architecture (Goldstein 2005; Janusek 2004; Owen 2005; Rattray 1990; Spence 1992). Bioarchaeological approaches can now contribute to these studies, providing additional lines of data to examine residential mobility. For example, biodistance analysis of skeletal and dental traits can document the biological relatedness among individuals within and between sites and regions (Blom 1999; Sutter 2000; Varela and Cocilovo 2000; Verano and DeNiro 1993).

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And studies of cranial modifications (Blom 2005; Hoshower et al. 1995; Torres-Rouff 2002) and bioarchaeological chemistry (Knudson et al. 2004; Price et al. 2001; Price et al. 1998; Price et al. 2000) can sometimes detect enclaves of people from distant lands. In this way, archaeologists are beginning to identify colonizing communities, migrants to urban centers, displaced people, and perhaps even sojourners.

In this chapter, I discuss ways in which non-local (non-natal) individuals can be identified using data on skeletal morphology and the chemical composition of bones and teeth, and I discuss how they can be used to address questions about migration and diaspora communities in the ancient Andes. Archaeologists working in the Andes have examined the Inca policy of relocating groups of people and creating diaspora communities in the process (Bauer and Stanish 2001; D'Altroy 2002; Julien 2000) and have provided a thorough overview of how diasporas relate to ayllus and the vertical archipelago systems (Goldstein 2005). My focus is on an earlier time period: the Middle Horizon (AD 500–1000). I summarize bioarchaeological studies that document diaspora communities associated with the Tiwanaku and Wari states (Figure 34.1).

## MIGRATION IN THE ANCIENT ANDES

Spanish chroniclers documented Inca resettlement policies that effectively created diaspora communities in the pre-Hispanic Andes. Communities that were forcibly relocated were called *mitmaquna*; they were ethnically distinct groups in the places to which they were moved. The Inca ruler, Pachacuti, was the first to resettle potentially rebellious communities that lived in defensible locales (Sarmiento de Gamboa 1999 [1572]). In time, the Inca state more systematically relocated some ethnic groups to distant zones (under Huayna Capac, see D'Altroy 2002: 248), often placing these *mitmaquna* near those who spoke a different language, effectively preventing them from forming well organized rebellions against the state (Rowe 1946: 269). In other cases, the relocated population might be loyal to the Inca, so transplanting them as monitors of sorts prevented other subject (conquered) peoples from allying against the Inca (Rowe 1946: 269).

Additionally, subject and resettled communities constituted part of a vertical archipelago system in the Inca Empire, enabling the state (and ayllus) to control the production and distribution of foodstuffs and other goods (Murra 1972). These Inca state policies aimed at limiting rebellions and managing the deployment of resources through forced or encouraged movement of peoples have been discussed by other scholars (Bauer and Stanish 2001; D'Altroy 2002; Julien 2000), yet antecedents to these kinds of state policies remain less explored (but see Goldstein 2005), particularly from a bioarchaeological perspective.

The Middle Horizon states of Tiwanaku and Wari (see Chapter 37 in this volume), which originated in the southern and central highlands (Isbell 1985; Kolata 1993a; Schreiber 1992), each expanded to incorporate distant geographical zones. Tiwanaku and Wari may have originated the first state-sponsored or state-influenced migration and relocation policies in the Andes, colonizing distant zones and creating urban centers to which foreigners migrated. Identifying diaspora communities in the Middle Horizon illuminates the role that the earliest states played in the engineering of human migration. This is not to imply that ancient states dictated all aspects of population movement and settlement. Nevertheless, state policies and structures certainly would have profoundly affected where people lived, journeyed, died, and were eventually buried. Documenting these various phases through

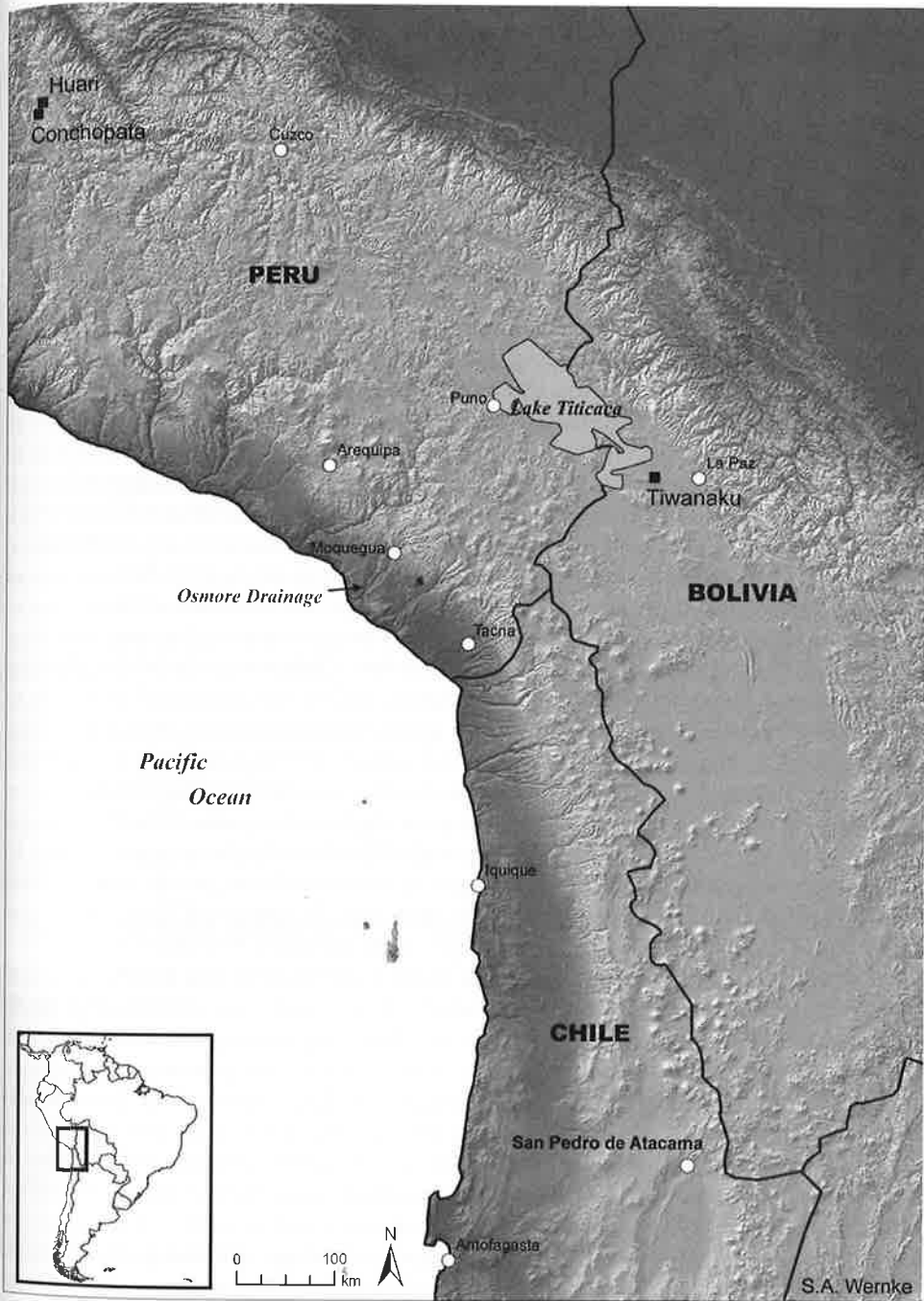


Figure 34.1. Map of the south Central Andes showing key sites mentioned in the text and the terrain of the area discussed. (Drawn by Steve A. Wernke)

combined archaeological, osteological, and archaeological chemical analyses can illuminate how state and community structures may have affected an individual's life course.

## BIOARCHAEOLOGICAL STUDIES OF TIWANAKU STATE COLONIZATION

A series of archaeological and bioanthropological studies reveal possible Tiwanaku colonization in the Atacama desert of northern Chile where Tiwanaku goods have been documented at several of those sites, leading archaeologists to posit competing hypotheses regarding the nature of Tiwanaku influence and expansion. Some scholars have suggested that individuals from Tiwanaku were settling in foreign zones (Berenguer and Dauelsberg Hahmann 1989; Kolata 1992, 1993a, b; Ponce Sangines 1972; Rodman 1992), while others have proposed that the Tiwanaku established colonies consisting of various ethnic groups (Mujica et al. 1983), akin to the "vertical archipelagos" proposed by Murra (1972). A third group of scholars has hypothesized that Tiwanaku goods and ideology were spread through exchange (Torres and Conklin 1995), trade and llama caravans (Dillehay and Núñez 1988), or commercial missionaries (Browman 1978) (and see also the social field interpretation by Stovel in Chapter 49 of this volume). The cases described below show how a series of studies over several decades have come together to address some of these debates.

Some researchers have suggested that Tiwanaku satellite communities may have been present in the San Pedro de Atacama desert of northern Chile during the Middle Horizon (Berenguer and Dauelsberg Hahmann 1989; Kolata 1993a), and analysis of textiles from the Middle Horizon cemetery of Coyo Oriental in the Atacama seemed to support this: local textile styles were abruptly altered, most likely by foreign individuals from the Bolivian altiplano who may have been physically present in the Atacama (Rodman 1992). Additionally, a biodistance study analyzing cranio-facial metrics of skeletal samples from the Atacama region noted a significant increase in morphological diversity from pre-Tiwanaku to Tiwanaku times, leading the authors to suggest an infusion of new genetic material from high plateau peoples, arguing that they would have been the carriers of Tiwanaku culture (Varela and Cocilovo 2000: 129,131). However, while increased heterogeneity of cranio-facial metrics was observed, those data do not locate from where the new genetic variability came. Additionally, the cranio-facial metrics used by the researchers can vary based on masticatory function, not underlying genes (see Larsen 1997); thus, the measured differences may be more related to behavior (diet, or use of the mouth as a tool), not genetic origin.

Building on these earlier studies, Torres-Rouff (2002) investigated this problem through an examination of Atacama cranial modification styles from pre-Tiwanaku to Tiwanaku periods, and hypothesized the following: if Tiwanaku foreigners were present in San Pedro de Atacama, then Tiwanaku era local cranial modification styles should differ from the pre-Tiwanaku sample. Her study documented a high frequency of tabular erect and tabular oblique cranial modification forms in the pre-Tiwanaku Atacama groups [Note 1]; thus a shift away from that pattern might suggest a Tiwanaku colonizing presence. Although there was a statistically significant difference in the frequency of moderately shaped annular forms between the pre-Tiwanaku and Tiwanaku sites, there were no "strong annular forms of the altiplano" present at either Atacama site, nor was there a statistically significant change in the frequency of individuals with cranial modification (Torres-Rouff 2002) [Note 2]. This led Torres-Rouff (2002) to conclude that there were no Tiwanaku colonists in the Atacama region during the Middle Horizon.

To examine this problem further, an analysis of strontium isotope ratios from dentition from Atacama burials was recently undertaken by Knudson (2004). Strontium isotope ratios from dental enamel reveal the geological zone of an individual's childhood diet because the chemical compositions of foods are absorbed by enamel as dentition is forming (Grupe et al. 1997; Price et al. 2002; Price et al. 2000). By extension, if local foods are consumed, then the strontium isotope ratio in teeth can serve as a proxy for establishing the geological zone(s) where an individual may have lived during childhood. Thus, if individuals interred in the Atacama exhibited dental strontium isotope ratios different from the local strontium isotope value, then those data would indicate that they consumed large quantities of food grown in another geological zone; this would suggest that they likely spent their childhood in a different locale. In contrast; if strontium isotope values matched that of the local region, then it is likely that they were native to the area (or at least consumed foods from the local geological zone).

The interpretation put forward by Torres-Rouff (2002) was supported by data from Knudson's (2004) isotope study; none of the dental enamel samples from Middle Horizon Atacama burials show strontium isotope ratios expected for Tiwanaku natives (i.e., from the southeastern Lake Titicaca basin). Specifically, 35 individuals interred at three Middle Horizon Atacama sites (Coyo-3, Coyo Oriental, and Solcor 3) were sampled, and while four of the 35 exhibited non-local dental strontium isotope values, none was within the range expected for a person who spent their developmental years in the Tiwanaku heartland (Knudson 2004) [Note 3]. Granted, a sample of 35 represents only 0.6% of the 632 Atacama burials, so Tiwanaku migrants may yet be identified. However, the majority of the dental samples are from those interred with Tiwanaku artifacts who may be the ones most likely to express Tiwanaku strontium isotope signatures (see Knudson 2004). Among the four Atacama burials with non-local strontium isotope values, two expressed signatures that matched expected values for the upper Osmore drainage (or another geological zone like the upper Osmore), suggesting that individuals from those Tiwanaku-affiliated sites may have migrated south to Atacama (Knudson 2004).

### Immigrants (and Sojourners) to State Centers

As urban sites develop, people from surrounding and distant regions may migrate there, building its status as an important city while also creating a cosmopolitan center in which different ethnic groups interact. The city of Teotihuacán in central highland Mexico is a case in point, where studies of ceramics have identified non-local ethnic barrios (Rattray 1990; Spence 1992), and analyses of strontium isotope ratios from human tooth and bone pairs have documented foreign-born persons who migrated to and settled at this center (Price et al. 2000). In the Andes, the development of the urban center of Tiwanaku in the Lake Titicaca basin also appears to have been a magnet for immigrants; artifactual and osteological data indicate that peoples from diverse zones migrated to this highland center. Based on the diversity of ceramic styles present in distinct areas of the site—a pattern that holds over time—Janusek (2004: 159–164) proposed that people of different regions may have emigrated to the center, while maintaining close ties to their homeland for many generations. This interpretation has been supported by bioarchaeological analyses, in which two major types of cranial modification have been documented: the annular form and the fronto-occipital form (Blom 1999; Blom 2005). Because this type of body modification is likely to express ethnic identity or regional affiliation and must occur in infancy when the skull is malleable, modified head shape can serve as a proxy measure of one's natal

community (Blom 1999; Blom 2005; Janusek 2004). Thus, the two forms of cranial modification at Tiwanaku suggest that different ethnic groups immigrated to this center (Blom 1999; Blom 2005), an interpretation that coincides with artifactual data from the same site (Janusek 2004).

Questions regarding in-migration to the urban site of Conchopata in the Wari heartland have also been addressed through analyses of grave good associations, cranial modification, and strontium isotope ratios (Tung 2003; Tung and Cook 2006; Tung and Knudson n.d.). The bodies of 46 individuals and associated grave goods from seven multi-occupant tombs at Conchopata were examined, revealing that pre-Wari individuals seemed to be identifiable by association with local Huarpa goods and Wari-era persons by association with local Huamanga ceramics (Tung and Cook 2006). Moreover, none exhibited cranial modification such as the tabular oblique or tabular erect styles (also known as fronto-occipital modification) (Tung 2003), which are more common in coastal populations (Blom 1999; Kellner 2002; Torres-Rouff 2002; Tung 2003) [Note 4]. Thus, the artifactual and osteological data suggest that non-locals were absent in the core mortuary area of the site. To further test this, strontium isotope ratios from six individuals (one male, four females, and one newborn infant, which by extension provided a strontium isotope value for its mother) were examined to ascertain if they consumed local or non-local foods: a proxy measure of local or foreign status (Tung 2003; Tung and Knudson n.d.). These analyses showed that all had similar strontium isotope ratios in their teeth and bones, and that these values matched the local strontium value, which was based on small fauna that consumed locally grown vegetation (Tung 2003; Tung and Knudson n.d.). These data indicate that those six individuals interred with local goods in Conchopata tombs had spent their childhood and adulthood in the region of the Wari heartland (their strontium isotope ratios  $[87\text{Sr}/86\text{Sr}]$  ranged from 0.7055 to 0.7061). The combined artifactual, osteological, and strontium isotope data suggest that few, if any, of those buried at Conchopata were immigrants from distant zones. Thus, unlike Tiwanaku, current data suggest an absence of immigrants at the urban center of Conchopata, yet it remains unknown if the capital site of Huari was more similar in this regard to its neighbor, Conchopata, or to the distant center of Tiwanaku.

## GENDER-BASED DIASPORAS: FEMALE VS. MALE EXOGAMY

Combined bioarchaeological and archaeological studies also have the potential to inquire about gender-based diasporas, particularly as they relate to issues of female versus male exogamy. That is, if sex-based differences in migration are detected through biodistance and stable isotope analyses and cranial modification studies, then it may be possible to reconstruct community organization as it relates to post-marital residence rules. For example, in the study of cranial modification among Atacameños, Torres-Rouff (2002) noted an increase in moderate annular forms among females from pre-Tiwanaku to Tiwanaku times, perhaps resulting from virilocal exogamy, in which foreign-born females were incorporated into the local group (Torres-Rouff 2002). This seemed to coincide with facial morphology data, showing differences between the sexes at the same Atacama sites. However, given that both time periods showed “foreign-looking” females (Costa and Llagos-Tera 1994), it is possible that the male-female morphological differences could have been more related to sexual dimorphism or a long historical tradition of virilocal exogamy with non-Atacama groups (who did not

necessarily come from Tiwanaku). Additionally, the differences in facial morphology could have been related to masticatory behavior, not genes (see comment above), so it is unclear if non-local females migrated into the Atacama group. Moreover, among the four Atacama burials that exhibited non-local strontium isotope ratios, all were male (Knudson et al. 2004); no females exhibited non-local values, suggesting that no foreign-born females were present among those sampled from the Atacama cemeteries. Based on my analysis of Knudson's (2004) detailed strontium isotope database of Atacama samples (see Appendix A in Knudson 2004), there was no statistically significant difference in the frequency of foreign males ( $4/23 = 17\%$ ) relative to foreign females ( $0/11 = 0\%$ ) (Fisher's exact test,  $p = 0.191$ ;  $df = 1$ ;  $N = 34$ ) ( $N = 34$  and not 35 because one individual was unsexed). Thus, current data are more consistent with local endogamy than with female or male exogamy. While much remains to be done, methods are in place to examine these kinds of nuanced questions.

Bioarchaeological data from Conchopata also provide preliminary insights into similar issues, keeping in mind that current datasets are too small to formulate conclusions. As recounted above, all four females from Conchopata (five females if the infant's strontium signature, which reflects the mother's signature, is included) exhibited local strontium isotope ratios in their teeth and bones (Tung 2003; Tung and Knudson n.d.). This suggests that women were born locally, spending their entire lives there until buried at the site. To date, no strontium isotope or cranial modification data reveal females from distant zones residing within the Conchopata community (Tung 2003), suggesting endogamy for the site or local area [Note 5].

## CONCLUSION

These studies have shown that the union of archaeological and bioarchaeological data are particularly well suited to addressing questions regarding diaspora communities and patterns of migration. Moreover, these kinds of studies serve to address broader anthropological themes regarding ancient statecraft and the influence of states on local communities. For example, the absence of Tiwanaku colonizers in the San Pedro de Atacama desert has shown that a colonizing presence was not necessary to create and maintain strong ties between the two regions. Studies of migration and diaspora communities can also document the role of immigrants in the process of urbanization, as foreign people move to new centers; this appears to have occurred at the site of Tiwanaku, but not at the Wari heartland site of Conchopata. And while Conchopata is only the secondary capital in the Wari core, these apparently different paths to urbanization among two contemporaneous states provide insights into how each may have developed and created or fomented an environment that brought diverse peoples together. Future studies at the Wari capital site of Huari may reveal additional distinctions or identify more parallels between Tiwanaku and Wari. Questions on migration also have become more nuanced with inquiries that address such things as marriage rules, which should eventually produce a richly textured view of ancient lifeways and community and ayllu organization in the Andes. Taken together, the combined methodologies and complementary scales of inquiry are coalescing to provide insightful perspectives of life "on the move."

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## NOTES

1. There are slight differences in the tabular erect and tabular oblique styles, but they are nonetheless distinct from the annular form of modification. In the tabular erect style, the occipital bone is flattened at a 90-degree angle, so the back of the head is straight up and down, whereas the tabular oblique style displays an occipital bone that is angled up.
2. Tiwanaku cranial modification forms are not solely characterized by annular modification; however, a higher frequency of that style in Atacama during the Tiwanaku era would suggest a shift away from local form, perhaps resulting from highland colonizers.
3. Knudson (2004) identifies 12 non-local strontium isotope values in the Atacama samples, but concludes that only four are "clearly non-local." The eight individuals that exhibit strontium values slightly outside of the local range, but end up being interpreted as local are from Solcar 3 (see Knudson 2004: 133–135).
4. Although central and southern Andean coastal groups exhibit tabular modification nearly exclusively (Blom 1999; Kellner 2002; Torres-Rouff 2002; Tung 2003), the highland urban center of Tiwanaku has individuals with both tabular and annular forms (Blom 1999). However, the pattern of mixed cranial deformation styles at Tiwanaku does not mean that cranial modification styles are randomly distributed throughout the Andes; rather, the combined studies demonstrate that tabular forms dominate near the coast, while a variety of styles are present at Tiwanaku, suggesting the presence of a cosmopolitan center with people from a variety of locales (Blom 1999). Thus, the tabular form is a fairly reliable indicator of coastal origin.
5. At Conchopata here is significantly more data on the mortuary treatment and health status of females relative to males because there are statistically significantly more females (62%) than males (38%) have been found, relative to an even sex distribution ( $p=0.0176$ ;  $N=81$ ) (Tung 2003).

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