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Embodying borders: human body modification and diversity in Tiwanaku society

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Abstract

Building upon recent studies of settlement patterns and material cultural, this paper focuses on human body modification preserved in human bone as a complementary means of studying diversity in ancient societies. A review of ethno-historical sources in conjunction with a human osteological study of cranial shape modification offers original data regarding diversity in Tiwanaku society, which was situated in the southern Andes from ca. AD 500–1100. The study sample includes 412 individuals from the site of Tiwanaku, surrounding sites in the Tiwanaku and Katari valleys, and Tiwanaku-affiliated sites in the Moquegua valley of southern Peru. A distinct regional pattern is clear in the ways in which head form was modified. In the Moquegua valley, solely fronto-occipital modification was employed, while in the Katari valley a distinctly different, annular modification was practiced. In contrast, individuals interred in the capital city of Tiwanaku displayed both head form styles. These results suggest that diverse groups of people from neighboring areas were drawn to the Tiwanaku capital in the highlands, and cranial shape modification was involved in symbolic boundary maintenance at the juncture of two distinct environmental niches, the precise location of the capital site of Tiwanaku.

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As one of the longest-lived and extensive South American polities, Tiwanaku flourished in the south-central Andes from approximately 500–1150 AD. At its point of greatest expansion, Tiwanaku was one of the most extensive pre-Inca forces in South America. Tiwanaku-style material culture was present throughout a large region, including the southern highland shores of Lake Titicaca and the lowland regions to the west and east in modern-day Peru, Bolivia, Chile, and Argentina.

Early ethnohistorical documents provide rich descriptions of the site of Tiwanaku (e.g., Acosta, 1954 [1590]; Betanzos, 1996 [1551–1557], pp. 7, 196; Cieza

de León, 1959 [1553]; Cobo, 1979 [1653], pp. 95, 105, 141; de la Vega, 1961 [1609]; Molina, 1989 [1575]), and extensive archaeological research in the highland demographic “core” has significantly increased our understanding of this ancient society (e.g., Albarracín-Jordán, 1992; Alconini Mújica, 1995; Bermann, 1994; Blom et al., 2003; Couture, 2002; Escalante, 1992; Graf-fam, 1990; Isbell and Burkholder, 2002; Janusek, 2004; Kolata, 1993; Ponce Sanginés, 1972; Rivera Casanovas, 1994; Seddon, 1994; Stanish, 1994; Vranich, 1999; Wise, 1993). Likewise, additional archaeological studies have been carried out throughout the vast lowland regions to the east and west where Tiwanaku-style material culture has been found (e.g., Blom et al., 1998; Cohen et al., 1995; Goldstein, 1989a; Higuera-Hare, 1996; Janusek

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and Blom, 2005; Moseley et al., 1991; Mujica et al., 1983; Stovel, 2002). As a result of this research, new interpretations have been proposed to explain Tiwanaku sociopolitical complexity.

In spite of early interpretations as an unpopulated ceremonial center (e.g., Bennett, 1934; Lumbreras, 1974; Schaedel, 1988; Squier, 1973 [1877]), the site of Tiwanaku can now be characterized as a large, urban settlement of approximately 20,000–40,000 inhabitants (Kolata, 1993; Parsons, 1968). Most archaeologists (e.g., Janusek, 2004; Kolata, 1993, 2003; Stanish, 2003) consider the site to be the political core of a centralized “state” based on the presence of expansive irrigation networks; extensive monumental architecture; settlement patterns suggesting hierarchy, social stratification and restricted access; and iconographic elements suggesting violent coercion. Nevertheless, some researchers such as Albarracín-Jordán (1992, 1996a,b) argue that local, segmentary communities articulated through reciprocity and common ideology characterized the Tiwanaku realm. One element held in common by the various researchers is that they do not envision “Tiwanaku” as a monolithic, undifferentiated mass of bureaucratic institutions. Almost every model incorporates diversity, and Tiwanaku is viewed as encompassing various social groups, be they akin to *ayllus* (Andean descent groups) (Albarracín-Jordán, 1992), moieties, or ethnic groups (Bermann, 1994; Janusek, 2004; Kolata, 1993; Ponce Sanginés, 1972).

Researchers working in regions distant from the Tiwanaku core have proposed various scenarios for the ways in which the Tiwanaku polity established its influence in these regions. Most concur that different methods were used to incorporate foreign areas into Tiwanaku’s “sphere of interaction,” depending on such factors as the distance from the Tiwanaku core and local social, demographic, and ideological structures (Kolata, 1993; Mujica, 1985). In the more distant regions, it has been suggested that clientage relationships were likely established, in which local elite strengthened their status through the exclusive social ties with the Tiwanaku core. In the less distant lowland valleys such as Moquegua, archaeological data suggest that direct colonization was employed in areas that often included various ethnic groups (Browman, 1980; Goldstein, 1989a; Kolata, 1993; Oakland Bodman, 1992; Owen and Goldstein, 2001; see also Higuera-Hare, 1996).

This recent focus upon social diversity has been productive, and additional lines of archaeological evidence are necessary to address the issue in detail and identify the nature of diversity in Tiwanaku society. Certainly, archaeologists cannot observe the most critical aspects of group membership such as ascription (Banks, 1996; Barth, 1969; Chapman, 1993; Jones, 1997), and researchers often acknowledge that the use of material culture can be problematic in studying these issues (see, e.g., Jones,

1997 for a synthesis of this debate). However, group membership has been viewed indirectly through material remains, providing archaeologists an opportunity to distinguish social groups through “style” in material culture (Aldenderfer and Stanish, 1993; Conkey and Hastorf, 1990; Plog, 1983; Shennan, 1989; Weissner, 1983).

Diverse archaeological approaches to detect ethnic and other social groups in Tiwanaku settlements have been employed, including studies of agricultural practices, residential patterns, household structure, and monumental architecture (Albarracín-Jordán, 1996a,b; Bermann, 1994; Goldstein, 1989a; Higuera-Hare, 1996; Janusek, 2002; Stanish, 1992; Wise, 1993). Also addressed are the nature of domestic and public rituals (Blom et al., 2003; Blom and Janusek, 2004; Goldstein, 1989a; Janusek, 2004), textiles (Oakland Bodman, 1992), diet (Janusek, 2002; Wright et al., 2003), style and iconography on serving vessels and other ceramics (Goldstein, 1989a; Janusek, 2002), and archaeolinguistics (Browman, 1994). Bioarchaeological data from Tiwanaku can enhance this archaeological inquiry by providing information that cannot be gleaned through the study of material culture alone. The present study emphasizes the use of human skeletal remains and provides a new dimension to the existing studies on the role of diversity within Tiwanaku society.

Contrary to folk wisdom in contemporary US society, anthropologists know that defining “ethnic,” or “racial,” groups on the basis of physical differences is invalid, since most variation occurs across a continuum or cross-cuts folk categories of race. As outlined in a public statement by the [American Anthropological Association](#) (1998), race and ethnicity are not biological variables; they are social constructs. However, within a specific cultural context, particular biological traits can be ascribed meaning and essentially used by societies to “racialize” bodies (Ahmed, 2002).

In addition to ascribing meaning to certain phenotypic traits, humans often actively distinguish themselves from others through body modification, marking personal identity while simultaneously demarcating group cohesion within society. Seen in this light, the human body is an interface between the individual and society (Comaroff, 1985; Durkheim, 1952 [1897]; Foucault, 1979; Lock, 1993; Turner, 1980). By creating distinct differences that are not present at birth and by giving meaning to these differences, “cultural bodies” are constructed, and symbolic boundaries (see Lamont and Molnar, 2002) created. The body as displayed socially can sometimes be directly observed by archaeologists through human osteological studies.

The present study offers an original review of ethno-historical sources and human osteological studies on body modification in the Andes, concentrating especially on modification that would have left its mark on human bone. In conjunction with archaeological variables, data

from the remains of 412 individuals from three major regions of the Tiwanaku, Moquegua and Katari valleys are analyzed to address aspects of diversity and sociopolitical complexity in the ancient Andean society of Tiwanaku.

Andean group identity and the body

Then and there Paria Caca gave his command: “Children, don’t grieve. Take with you this, my golden headdress. You must dance holding it up . . . then they’ll say, awestruck, ‘What people are these? They’re the beloved of Paria Caca!’” [Salomon and Urioste (translators), 1991 [ca. 1600], p. 118].

The importance of headdresses as a visual display of group identity is alluded to in the above quotation from the Huarochirí manuscript, a seventeenth-century record of Andean myth/history relating to the ancestor deity Paria Caca. As in many societies, a custom of expressing group affiliation through specific clothing styles exists in the Andes (Berenguer, 1993; Cereceda et al., 1993; Cornejo, 1993; Eicher, 1995; Femenías, 1998; Murra, 1962; Zorn, 1998). Ethnohistorical documents abound with descriptions of how people from each “province,” “nation,” or “ethnic group” could be recognized by their distinct clothing, headdresses, and hairstyles (e.g., Cieza de León, 1984 [1553], p. 173; Cook, 1997, p. 387; de la Vega, 1966 [1609], p. 485; de las Casas, 1967 [ca. 1550], pp. 594–595; Julien, 1983, pp. 42–45; Vaca de Castro, 1920 [1542], p. 18). This can also be seen in the origin myths of the Inca: “. . . and there, in Tiahuanaco, the Creator began to raise up the people and nations that are in that region, making one of each nation of clay, and painting the dresses that each one was to wear. Those that were to wear their hair, with hair; and those that were to be shorn, with hair cut . . .” (Molina, 1873 [1553], p. 4).

Clothing was apparently used for group recognition before the Inca (Cieza de León, 1984 [1553], p. 150; de las Casas, 1967 [ca. 1550], p. 594). However, the Inca encouraged these symbols of differentiation, building on past concepts and practices. As with many of the chroniclers who attributed everything “civil” and ordered as decreed by the Inca, Pachacuti Yamqui (1968 [c. 1613], p. 77) writes, “[the Ynca Manco Ccapac] ordered that the dresses of each village should be different, that the people might be known, for down to this time there were no means of knowing to what village or tribe an Indian belonged.” What may be more significant is that this push toward consistent local stylistic information was occurring contemporaneously with an attempted homogenization of language and religion (Cieza de León, 1984 [1553], p. 174; see also MacCormack, 1991). The Incas apparently used the differentia-

tion in dress styles to their advantage. At times the royal Inca changed his clothing and hairstyle to dispel tensions, even adding a hairpiece when necessary, to conform to the local people’s style in the towns that he visited (Betanzos, 1996 [1551–1557], p. 168; Murra, 1980 [1956], p. 77, citing Cieza de León Bk. II, chs Iii, Ivii, pp. 175, 187). Vaca de Castro (1920 [1542], p. 18) wrote that each town and place had its own clothing and headdress sanctioned by law, and that any individual changing his or her style would be severely punished. These examples demonstrate the power that clothing and headgear have for establishing group identity and cohesion.

The practice of cultural modification of head form is another way in which group identity could be displayed. Alteration of cranial shape often corresponded to a particular headdress (de las Casas, 1967 [ca. 1550], p. 594; Julien, 1985, p. 219; Ulloa Mogollón et al., 1965 [1557–1586], p. 327) and was one of the customs that particularly surprised Europeans upon reaching the Americas. Spanish missionaries and explorers in the Andes during the early Colonial period documented their observations of cranial shape modification and the ways that they differed from group to group. For example, it is reported that:

The Collaguas wore on their heads something they called *chucos*, a type of tall brimless hat, and so that they could wear this hat they molded the heads of their newborns to lengthen and narrow them as high and as elongated as they could so that in remembrance the head would have the form of the volcano from which they came. . . . [the Cavana who come from a snow-peaked cerro] have very different heads from the Collaguas, because they wrap them tightly and make them squat and wide [Ulloa Mogollón et al., 1965 [1557–1586], p. 327].

The [Palta] tribe’s distinguishing mark is the flattening of the head: when a child is born a small board is placed before its forehead and another behind its nape and the two are fastened together and daily drawn a little tighter. The baby is kept lying on its back and the boards are not removed until it is three years old: the result is a very ugly deformation of the head [de la Vega, 1966 [1609]].

While some early Spanish chroniclers described cranial shape modification as a cultural atrocity, most tended to discuss it as an overt sign of group affiliation, important in distinguishing regional, ethnic, and/or kin group differences (e.g., Cieza de León, 1984 [1553], p. 124; Cobo, 1979 [1653], 1990 [1653], pp. 196–197; de la Vega, 1966 [1609]; de las Casas, 1892 [1561]; Julien, 1985, p. 219; Torquemada, 1995 [lived ca. 1557–1664], T2, p. 583). We hear time and time again: “In general the headdress, *llautu*, the hairdo and frequently the type

of cranial deformation differed from one ethnic group to another” (Murra, 1980 [1956], p. 67). In addition to donning the *pillaca-llauta*, a specific headband of the Inca, and wearing their hair in a distinctly short style, the Inca warriors’ heads were “. . . tapered on top. They were known by this feature. . . whenever they left Cuzco or walked through the land” (Betanzos, 1996 [1551–1557], p. 68). Cranial modification could change the height of the person or the shape of the head, as well as the shape of the face (Anton, 1989; Arriaza, 1988; Cheverud and Midkiff, 1992), and styles were accentuated with specific hair styles as well as hats (Dingwall, 1931). Consequently, the ways that Andeans changed their bodies in conjunction with different ways of dressing served as a powerful means of symbolic visual expression and potential distinction from one group to another.

The observation linking specific body modification to certain groups has cross-cultural precedent (Brain, 1979; Ebin, 1979; Isaacs, 1975; Lyman and Douglass, 1973; Rosenthal, 1995; Royce, 1982). Cranial shape modification would have been quite dramatic and noticeable to strangers, and such highly visible cues generally are used to exchange information and mark group or ethnic boundaries (Hegmon, 1992; Isaacs, 1975). Humans often use obvious physical features such as skin or hair color, which cannot easily be changed, as identifiers of group membership.¹ These types of cues may be premeditated “messaging” approximating Weissner’s (1983) “emblemic style” or Sackett’s (1990) “active style.” However, the suggestion that the ancient people modified their head shape precisely to show that they were from different groups is perhaps too simplistic. The fact that cranial shapes are patterned could be secondary or latent (more in line with Sackett’s “passive style”) if they were a result of practices envisioned as necessary for proper childrearing such as cradle boarding. This is unlikely for the majority of the modified head forms found in the Andes, which required complex modifying apparatus to effect the final forms, especially given the ways in which people referred to cranial modification styles in the historic documents.

Patterning in cranial modification within one portion of the Lake Titicaca Basin when the Spanish arrived illustrates how these styles might be viewed during Tiwanaku times (see above quotes by Ulloa Mogollón et al., 1965 [1557–1586], p. 327). The region that Cieza de León (1984 [1553], p. 123) calls “Collas”² encompassed three

different polities (*señoríos*) and people, the Lupaca, Pacajes, and Colla (see also Stanish, 2003). Collas was not a larger political unit at the time, but de León appears to be referring to “a region unified by an ethnic identity,” which may have been an earlier political body (Julien, 1985, p. 219). The Pacajes, Lupaca, and Collas displayed their difference through headdresses that varied slightly (for example, the Pacajes wore yellow) (Julien, 1983, p. 43; Mercado de Peñalosa, 1965 [1583], p. 338), but in general the unity of Colla territory inhabitants was emphasized by heads elongated in a similar manner and the wearing of tight, cone-shaped hats, which accentuated their already altered head form (Cieza de León, 1984 [1553], p. 124; Cobo, 1979 [1653], p. 197; Julien, 1983, pp. 42–45, Julien, 1985, p. 219). Suggesting that head modification practices were often quite localized in the prehistoric Andes, we find no discussion of this cranial modification/hat type outside the Collas territory, except for one group located in nearby Collaguas province (Cook, 1997; Julien, 1983).

Ethnohistorical accounts state that the Collaguas migrated to the valleys of Arequipa from the highlands and sought to alter their heads to emulate the shape of their primary *huaca*, a volcano, from which they originated, in a form like that used by the Collas. This contrasted with the pattern found in the nearby Cabana Province, where a group with local origins lived further down the Colca River. The “Cabanas” apparently formed their heads very differently, like their primary *huaca* /mountain, which was short and wide (Dingwall, 1931, p. 217; Jiménez de la Espada 1885:II, pp. 40–41 cited in Julien, 1985, p. 219; Ulloa Mogollón et al., 1965 [1557–1586]). The Collaguas found the Cabanas’ heads disproportionate and ugly (Ulloa Mogollón et al., 1965 [1557–1586], p. 327). In addition to modifying their heads into different shapes, the Cabanas and Collaguas each had their own distinct manner of dress, spoke different languages, and farmed land of differential productivity (Cook, 1997, p. 387; Ulloa Mogollón et al., 1965 [1557–1586], pp. 328–329). This example indicates that cranial modification had a spiritual and aesthetic significance,³ and it again emphasizes the visual and symbolic aspects of head form in the Andes.

Attaining particular cranial shapes required forethought. Intentional modification of head form was achieved by keeping cranial modifiers made of boards, straps, cords, and/or pads on children’s heads for extended periods of time until the age of three to five years (Cieza de León, 1984 [1553]; de la Vega, 1966 [1609]; Diez de San Miquel, 1964 [1567], p. 244; Torquemada, 1995 [lived ca. 1557–1664]). Cranial modification was, supposedly, also rarely made by shaping with the hands (Diez de

¹ In order to differentiate within a larger group, subgroups often use more subtle visible differences to make these distinctions.

² Esta parte que llaman Collas es la mayor comarca, a mi ver, de que (sic) todo el Perú, y la más poblada. Desde Ayavire comienzan los Collas, y llegan hasta Caracollo (Cieza de León, 1984 [1553], p. 123).

³ See also Cieza de León, as quoted in Allison et al. (1981, p. 239) and Hasluck (1947).

San Miquel, 1964 [1567], p. 244; Dingwall, 1931). Since heads must be molded during early childhood when the cranium is malleable, modified head shape is a life-long cultural imposition on societal members. Therefore, cranial modification is a permanent symbol of either ascribed identity or acquired or aspired identity of one's elders, as opposed to one's acquired identity.

The permanent nature of cranial modification contrasts with other cultural expressions of group identity such as textile styles, which can be transformed during one's lifetime. Clothing changes have been and continue to be a common practice in the Andes and changed with one's age or identity during different stages in life, moving to another group, or even traveling from region to region (Betanzos, 1996 [1551–1557]; Cieza de León, 1984 [1553], pp. 154–155). However, cranial modification is not flexible, and its study, in conjunction with material culture, is a powerful tool for understanding the cultural and social processes involved in group formation, structure, and transformation.

Some researchers suggest that cranial modification has been used to delineate status or social class (Weiss, 1962). For example, de las Casas (1892 [1561]) states that the Inca distinguished themselves from “lower classes” by artificially elongating their skulls (see also Torquemada, 1995 [lived ca. 1557–1664], Lib XIV, Cap 25, Pt. II, pp. 582 ff). However, this may be a mistaken correlation. Groups such as the Inca, while belonging to a “higher class,” were also viewed by themselves and others as a distinct lineage. Ethnicity and status are often linked in the Andes (van den Berghe, 1975, 1979; van den Berghe and Primov, 1977; Weismantel, 2001; Zuidema, 1973), and these two cannot be readily separated. Therefore, correlates to status differentiation may also be involved to some degree, and this should be kept in mind and explored in each case.

While a few societies in the Amazon still practiced cranial modification 30 years ago (Tommaseo and Drusini, 1984),⁴ studies of cranial modification have been largely limited to skeletal remains in archaeological contexts. A remarkable range of cranial modification styles from the Andes is visible in the vast skeletal collections that are housed worldwide. They have been extensively investigated since the nineteenth century (e.g., Dembo and Imbelloni, 1938; Drusini et al., 1983; Falkenburger, 1938; Morton, 1839). Some researchers examined modified skulls at the request of archaeologists who wanted to incorporate information about human remains into their studies (e.g., Chervin, 1908; Hjortsjö and Lindh, 1947; Topinard, 1879; Virchow, 1890), but many of

these descriptive studies were insensitive to the archaeological context. However, researchers began to detect patterning in the distribution of modification types through the course of such studies. Cranial modification began to be viewed as more than a biological oddity, and it began to be linked to cultural affiliation (Allison et al., 1981; Imbelloni, 1937; Kroeber and O'Neale, 1926–1937; Tello, 1928; Weiss, 1962). These first attempts led to a linking of cranial modification types to broad cultural, geographical and/or temporal groupings in the Andes.

Finally, many studies on cranial modification are distinct in their contribution to a greater understanding of Andean social structure (e.g., Gerszten, 1993; Hrdlička, 1914; Latcham, 1938; Soto-Heim, 1987; Torres-Rouff, 2002). For example, a study by Hoshower and colleagues (1995) offers a new dimension in the interpretation of cranial modification data at the Tiwanaku-affiliated Omo site in the Moquegua valley within the broader Osmore drainage of southern Peru. Rather than simply outlining broad spatial and temporal patterns, these researchers isolated inter-cemetery distinctions in technological means of cranial modification such as number, shape, and placement of the pads. They suggested that, if contemporaneous, the individual cemeteries at Omo might have represented residential descent groups (or *ayllu* clusters) whose corporate status was symbolized by unified cranial forms.

Also working in the Osmore drainage, but closer to the coast in the Ilo valley, Lozada (1998; Lozada and Buikstra, 2002) studied cranial shape modification in several Chiribaya sites. Lozada argues that Chiribaya society approximated Rostworowski de Diez Canseco's (1977) model of “horizontality.” Instead of linking cranial shape modification to *ayllu* membership, she argues that the defining units in Chiribaya society were *señoríos*, large ethnic groups that were composed of smaller autonomous, socially isolated groups of economic specialists. Her data demonstrate distinct head shapes among those who focused on agricultural production (*labradores*) and those who exploited marine resources (*pescadores*). Such investigations provide a basis for the present study.

By using various lines of evidence to inform about group identity, archaeologists can begin to access social complexity in the past, and body modification, more specifically cranial shape modification, provides one means of doing this. Studies of cranial shape modification add to our understanding of style in material culture because head modification is a permanent, imposed attribute, and it is precisely the type of physical feature that people tend to use to categorize others. Head form modification is also uniquely suited to the analysis of diversity in the ancient Andes, because the rich ethnohistorical record often links modified head form to lineage or regional or local group membership.

⁴ Nevertheless, Francisco de Toledo, Viceroy of Peru from 1569 to 1581, outlawed the practice of cranial modification at some point between 1570 and 1575 (Bandelier, 1911, p. 233). Dingwall (1931) states that this order was given on November 6, 1573, but I could not verify this date.

These various discussions also focus on social control, aesthetics, and visual symbolism. Therefore, an analysis of cranial shape modification in human remains associated with Tiwanaku-style artifacts will provide additional clues for the interpretation of Tiwanaku social organization and diversity.

Cranial modification in Tiwanaku society

To examine cranial modification in Tiwanaku society, samples were used from excavations at sites in two principal areas: the Moquegua valley and the Tiwanaku “heartland” in the Lake Titicaca Basin (Fig. 1). The Moquegua valley, a system of rivers running through

the coastal tropical desert of southern Peru, provides an excellent sample for studying diversity within Tiwanaku society beyond the highlands (Fig. 2). Located approximately 300 km southwest of the capital of Tiwanaku, the Moquegua mid-valley is the region of most extensive and intensive Tiwanaku “influence” outside of the altiplano highlands. Tiwanaku-style material first appeared in Moquegua during the second half of the first millennium, after approximately 500 AD, and intensive archaeological investigations have revealed that Tiwanaku-style material culture permeated most contexts, including burials, domestic contexts, and ceremonial and ritual spaces (Goldstein, 1989a,b, 1993b, 2000a). Goldstein, for example, has proposed that Moquegua was the site of a Tiwanaku “colony,”

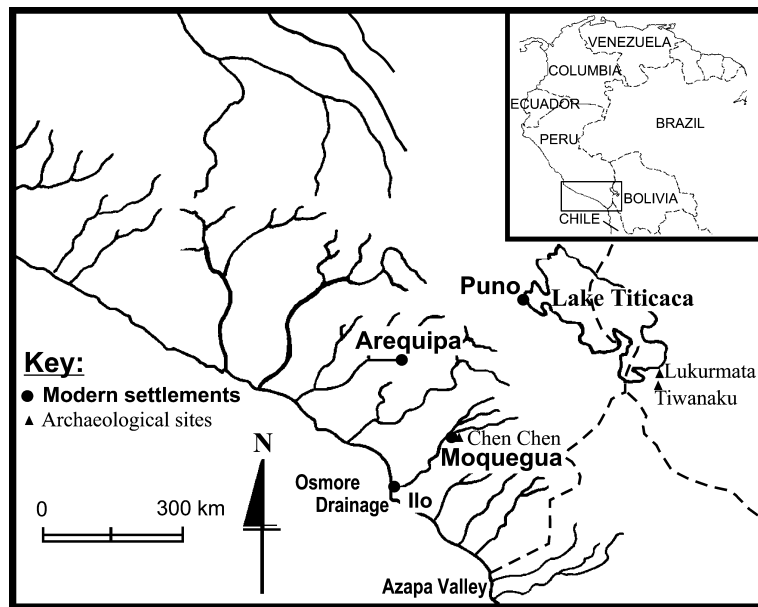


Fig. 1. The study area.

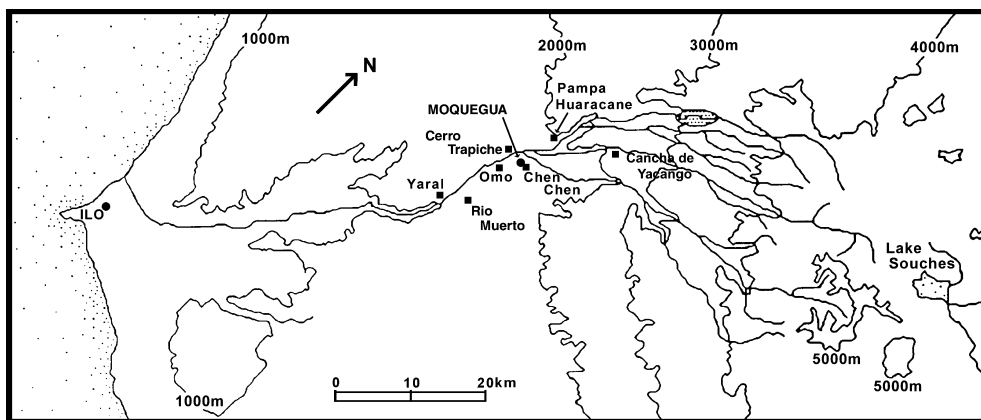


Fig. 2. Osmore drainage with detail of the Moquegua valley sites mentioned.

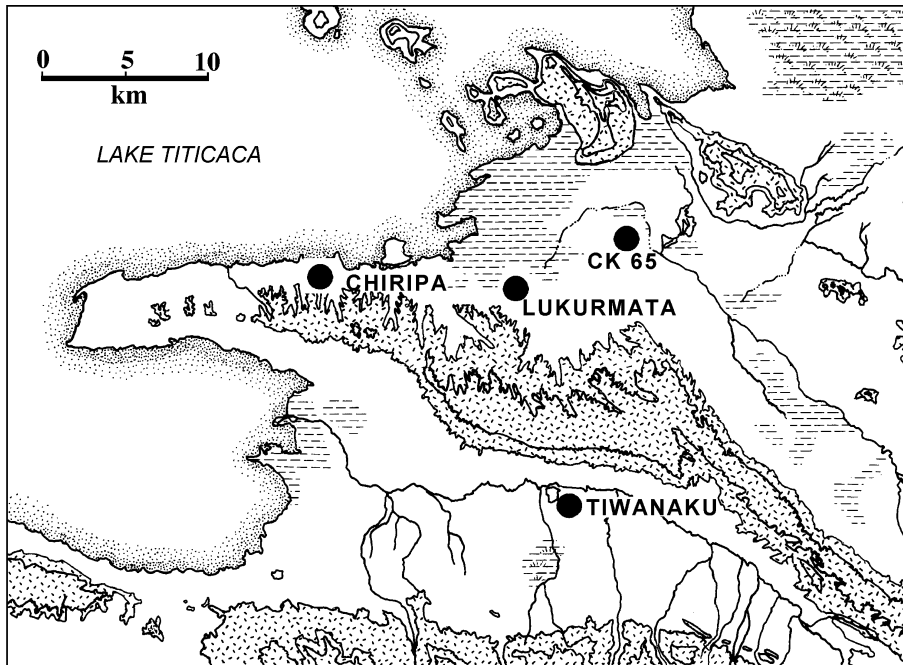


Fig. 3. Tiwanaku heartland. After Kolata (1986, Fig. 2).

“provincial center,” or “diaspora community,” and epigenetic and strontium isotope analyses on samples from Moquegua indicate migration between Moquegua and the altiplano during the Tiwanaku period (Blom et al., 1998; Knudson et al., 2004). More recent studies (e.g., Owen and Goldstein, 2001) suggest that multiple ethnic groups inhabited this area. During the Tiwanaku period when Tiwanaku settlements in the valley were most prominent, there was a general elaboration of settlements, cemeteries, agricultural fields, and canal systems in the middle Moquegua valley (Goldstein, 1989a, 1993b; Williams, 1997). This is dramatically illustrated at the site of Chen Chen (M1), with up to 90 hectares of fields, 23.4 hectares of domestic sectors, and more than 10 hectares of cemeteries (Goldstein, 2000a; Williams, 1997; see also Vargas, 1994; Owen, 1997).

The Moquegua sample used in the present study consists of a large series from the site of Chen Chen. In addition, a small sample gathered through surface collection was available for comparison from other Tiwanaku contexts within the Moquegua valley (12 individuals from the sites of M7 [Trapiche], M43 [Rio Muerto], and M1666 [Cancha de Yacango]). In order to inform about earlier pre-Tiwanaku contexts, a much smaller number of the only available Huaracane phase skeletons from Omo (M10) and one from M162 were also included (Goldstein, 1989a, 1990). The Moquegua valley Huaracane phase (“385 cal BC–cal 340 AD” per Goldstein, 2000b) was contemporaneous with the Late Formative in the altiplano, but more expansive than

the highland counterpart. Furthermore, the Huaracane phase was characterized by distinct, overwhelmingly local (i.e., non-altiplano) settlement patterns, material culture, and burial patterns, thus suggesting two separate but inter-related developments.

The altiplano sample is drawn from sites excavated by Proyecto Wila Jawira (Kolata, 1996, 2003), which concentrated on two valleys within the Tiwanaku core area: the Tiwanaku and Katari valleys (Fig. 3). The Tiwanaku valley sample is derived from the urban site of Tiwanaku and from extensive surveys and excavations conducted in the Lower (Albarracín-Jordán, 1992) and Middle (Mathews, 1992) Tiwanaku valley. The rural sites in the sample include TMV101 (Tilata), TMV228 (Mollo Kontu⁵), and TMV332 in the middle valley and Obsidiana, Pukara, Guaqui, and Iwawe in the lower valley. Collections from the site of Tiwanaku proper were obtained from excavations in the areas of Mollo Kontu (Couture, 1992), Akapana (Alconini, 1993; Manzanilla, 1992; Manzanilla and Baudoin, 1990; Manzanilla and Woodard, 1990), Ch’iji Jawira (Rivera Casanovas, 1994), Putuni (Couture, 2002; Sampeck, 1991), and Akapana East (Janusek, 2004).

Northeast of the Tiwanaku valley, the Katari valley has long been linked to Tiwanaku culturally. The Katari valley sample includes the urban site of Lukurmata

⁵ This is not the same “Mollo Kontu” from the site of Tiwanaku.

(Bermann, 1994, 1997; Estevez Castillo, 1991a,b; Janusek, 2004; Stanish, 1987; Wise, 1993), as well as several rural sites (Graffam, 1990; Janusek, 2001; Janusek and Kolata, 2003; Kolata, 1986, 1991; Seddon, 1994). Rural sites sampled from the raised-field agricultural region of the Pampa Koani include Kirawi (CK65), Urikatu Kontu (CK70), CK104, and CK152 (Janusek, 2001; Janusek and Kolata, 2003; Kolata, 1993). The main sample from the Katari valley derives from various sectors at Lukurmata, a Tiwanaku regional center on the edge of Lake Titicaca, 14 km from Tiwanaku (Bermann, 1994; Janusek, 2004).

The remains were assigned broad time categories using information from various publications, reports, field notes and dissertations associated with the excavations, and the chronological categories are: Early/Middle Formative (Chiripa), Late Formative (phases Tiwanaku I and III), Moquegua Formative (Huaracane), Tiwanaku period (phases Tiwanaku IV and V), and Pacajes (Post-Tiwanaku) (Table 1). All samples from the Tiwanaku valley are from the Tiwanaku period. The Katari and Moquegua valley samples include both Late Formative and Tiwanaku period contexts, allowing for a comparison of pre-Tiwanaku and Tiwanaku contexts in these areas. Although the study sample includes more than 1200 individuals, only 412 were suitably complete for cranial modification studies.

The analysis of cranial shape modification was carried out using methods developed by María Lozada Cerna and Blom while studying cranial modification in a large sample of human crania ($N = 255$) from Chiribaya and Tumulaca phase sites (Chiribaya Alta, San Gerónimo, Algodonal, and Yaral) in the Moquegua valley of coastal Peru (Lozada et al., 1996, 1997). Blom elaborated this typology for the Moquegua valley and altiplano sites in the context of this study. The method involved grouping crania according to skull shape, and the procedure was repeated twice to minimize error. In order to prevent biases based on knowledge of the contextual information by site, associated ceramic styles, or cemeteries, this information was not revealed during classification. The skulls were then sorted into main

types and specifics were recorded using the coding schema outlined in Table 2, which is a modified version of that found in Buikstra and Ubelaker (1994).

These studies were undertaken to examine broad regional differences in cranial modification as visualized by individuals within their societies. Overall skull shape was therefore considered primary and subtle differences in modification apparatus were considered secondary. In order to standardize results, the present study utilized Hoshower and colleagues' (1995) technologically-based typology, which was based on a smaller sample in the Moquegua cemeteries (Omo M10 and M11⁶) on a subset of the sample (Blom et al., 1995; Yeatts, 1994). The typology for the present study and that of Hoshower et al. overlap quite significantly ($\chi^2 = 216.747$; $df = 12$; $p < 0.0005$; $N = 131$). Therefore, the typology and resultant data from this study are comparable for studies that use Hoshower et al.'s classification system.

The cranial modification typology resulted in the following categories (see Fig. 4).

Unmodified

Crania were classified as “unmodified” when no apparent alteration in shape by deforming device was observed. Because this study focuses on intentional modification, crania that had evidence of “unintentional” modification resulting from the infant lying on a hard surface were also considered unmodified. The skulls that were “unintentionally modified” present a slight, acutely angled flattening at lambda with no concurrent modification of the frontal. Overall, crania in the “unmodified” category do not evince any obvious marking that could be attributed to modifying apparatus.

Fronto-occipital or tabular oblique

The crania corresponding to the fronto-occipital or tabular oblique types of modification exhibit anterior–posterior compression of the frontal, and occipital bones, which results in a relative shortening of the parietal chord and lengthening of the occipital chord. In extreme cases, the parietals expand laterally, resulting in highly prominent parietal bossing. The style was effected using tablets or rigid pads bound by thin straps. Depending on the placement of the tablets or pads, their relative flexibility, and the angle at which the pressure was applied, a variety of slightly different cranial forms were produced. One skull in the study

Table 1
Titicaca basin chronology

Period	Phase	Time
Tiwanaku period	Late Tiwanaku V	1000–1150 AD
	Early Tiwanaku V	800–1000 AD
	Late Tiwanaku IV	600–800 AD
	Early Tiwanaku IV	500–600 AD
Formative period	Tiwanaku I/III (Late formative)	200–500 AD
	Late Chiripa	800–100 BC
	Middle Chiripa	1000–800 BC
	Early Chiripa	1500–1000 BC

Note. Dates from Janusek (2003).

⁶ This sample consisted of 24 skulls from Tiwanaku V phase contexts from Omo M10, four Tumulaca phase individuals from M10; four Huaracane phase skulls from M10, and one Tumulaca phase cranium from Omo M11 (Hoshower et al., 1995, pp. 54–55).

Table 2
Cranial modification coding

<p>Posterior modification</p> <p><i>Number of posterior pads</i></p> <p>1 = None</p> <p>2 = 1 “pad” (midline)</p> <p>3 = 2 “pads” (lateral to midline; note if asymmetrical)</p> <p>4 = Band</p> <p><i>Posterior pad location</i></p> <p>1 = Absent</p> <p>2 = Lambda</p> <p>3 = Planum occipitale</p> <p>4 = Squamous portion of occipital</p> <p><i>Plane of pressure in relation to transverse plane</i></p> <p>1 = Absent</p> <p>2 = Perpendicular (90°)</p> <p>3 = Acute (<90°)</p> <p>4 = Obtuse (>90°)</p> <p><i>Posterior pad shape</i></p> <p>1 = Absent</p> <p>2 = Circular or oval</p> <p>3 = Donut-shaped</p> <p>4 = Triangular</p> <p>5 = Rectangular</p> <p>6 = Irregular form</p> <p>7 = Band</p> <p>8 = Unknown</p> <p>Note impression of bindings</p> <p><i>Sagittal depression</i></p> <p>1 = Absent</p> <p>2 = Slight near lambda (slight)</p> <p>3 = Almost to coronal suture (moderate)</p> <p>4 = Continuous (marked)</p> <p>Note lambdaic elevation or depression or sagittal elevation</p>	<p>Anterior modification</p> <p><i>Number of anterior pads</i></p> <p>1 = None</p> <p>2 = 2 “pads” (lateral to midline; note if asymmetrical)</p> <p>3 = 1 “pad” (midline)</p> <p>4 = No definite pad impression, likely band</p> <p>5 = Band</p> <p>Note bregmatic elevations</p> <p><i>Anterior pad location</i></p> <p>1 = Absent</p> <p>2 = High near coronal</p> <p>3 = Above bosses</p> <p>4 = Inferior, near or below bosses</p> <p><i>Anterior pad shape</i></p> <p>1 = Absent</p> <p>2 = Circular or oval</p> <p>3 = Donut-shaped</p> <p>4 = Triangular</p> <p>5 = Rectangular</p> <p>6 = Irregular form</p> <p>7 = Band</p> <p>Note impression of bindings</p> <p><i>Degree of anterior depressions</i></p> <p>1 = Absent (band also)</p> <p>2 = Faint</p> <p>3 = Marked</p> <p><i>Post-coronal constriction</i></p> <p>1 = Absent</p> <p>2 = Slight</p> <p>3 = Marked</p> <p><i>Post-coronal constriction continuous</i></p> <p>1 = Absent</p> <p>2 = Not continuous</p> <p>3 = Continuous</p>
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did not fit within the typology outlined because the plane of modification in the occipital region was distinctly perpendicular (tabular erect).

Circumferential or annular

The annular oblique type⁷ is considerably different from the fronto-occipital types of cranial modification and would have produced a visible difference in head shape.

⁷ This modification type for the present study differs considerably from the annular type that has been reported for Chiribaya period skulls (Lozada, 1998; Lozada et al., 1996, 1997). In the Chiribaya skulls, the bands were likely of an approximately 10-cm width, while those discussed here were thinner. Therefore, the skulls in the present study do not have the “loaf shape” of those from Chiribaya contexts.

An elongated, tubular vault, produced by circumferential compression from bands of textiles that encircled the frontal, temporal, parietal (below the temporal line) and occipital bones characterized these crania. The deformers used for this technique were probably constructed of textiles and pads, or even thin flexible pieces of wood. Circumferential pressure still represents the principal deforming force in skulls belonging to this category.

In some cases, specific modification type could not be determined, so only general observations were documented for use in comparisons regarding the presence or absence of modification.

During their lifetimes, individuals with these three different skull shapes would have appeared quite distinct from one another. Early Aymara dictionaries indicate that terms regarding head form coincide

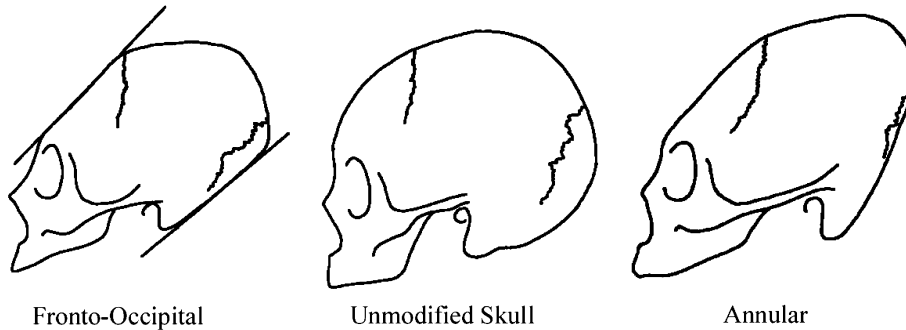


Fig. 4. Cranial modification styles.

Table 3
Aymara terms regarding heads and head forms

Spanish	Aymara	English
Cabeza	Ppekena, Cchuncchu, Chhikhana	Head
Cabeza ahusada	Sayttu, Sucuya, Cchocata, Sau, Chunta, Kistuna, Ppekena (e.g., Chunta ppekenani)	Tapered head
Cabeza redonda	Molloko, Moko, Mati ppekena (Mocona)	Round head
Aymara	Spanish	English
Phekena saytu	De cabeza ahusada, cabeza sauu	of tapered head
Phekena suticaa (or pallalla)	De cabeza aplastada	of squashed head
Sayttu ppekenani	De cabeza ahusada	of tapered head
Sucuya ppekenani	De cabeza ahusada	of tapered head
Cchacata ppekenani	Same?	
Cchocatha	Ppekeñani, o atar la cabeza con una trancadera, o por enfermedad, o porque ahusándose la cabeza de los niños y niñas encajen mejor el sombrero, o capirote	tie or bind the head with a binding, or from sickness, or because they taper the heads of the children they fit into the caps better
Cchocana	La trancadera así	The apparatus used
Cchocatha ppekenani	De cabeza ahusada	of tapered head

Note. Data from Bertonio (1984 [1612]).

with the forms presented in this study (unmodified [“round”], fronto-occipital [“squashed”], and annular [“tapered”]) (Bertonio, 1984 [1612]; see Table 3).

Eighty-three percent ($N = 342/412$) of the skulls in the study were modified (Table 4). Although D’Orbigny (1944, p. 186) claimed that males had altered head shapes while female skulls were unmodified, cranial modification was equally common for both sexes (79% of the individuals for whom sex could be determined; Table 5). All modified crania for which head shape could be determined fit within the two major forms outlined above: annular and fronto-occipital. As illustrated in Table 5, these particular styles were shared by males and females with no significant differences by sex. Likewise, when the lack of modification is viewed as a third

“style,” no significant difference was observed between males and females.⁸

χ^2 Analyses indicate no significant difference in the presence of cranial modification in general between highland (altiplano) and lowland (Moquegua) populations (Table 6). However, when the type of modification is taken into consideration, the differences are significant. Only fronto-occipital (tabular) styles were present in the samples from the Moquegua study area. However, in the highlands, annular types were present but in conjunction with fronto-occipital styles.

⁸ In an ideal data set, we might even find patterning in which “exceptions” to any general patterns are of one sex, allowing us to make interpretations about marital patterns. After much exploration, no such patterning was found in this sample.

Table 4
Cranial modification data (sample)

Location	Time	Fronto/Occipital Modification	Annular Modification	Total Modified ^a	Total Unmodified	Total
Moquegua Valley						
Omo M10	Huaracane	4	—	4	—	4
M162	Huaracane	—	—	—	1	1
Chen Chen	Tiwanaku V	201	—	242	45	287
M1666	Tiwanaku	4	—	4	2	6
M43	Tiwanaku	3	—	3	1	4
M7	Tiwanaku	1	—	2	—	2
	Total	213	0	255	49	304
Altiplano						
<i>Tiwanaku Valley</i>						
Tiwanaku Site	Tiwanaku IV	—	—	2	1	3
	Late Tiw. IV	3	—	3	1	4
	Late IV-Early V	—	1	2	1	3
	Tiwanaku IV-V	8	6	16	3	19
	Tiwanaku V	4	2	6	—	6
	Unknown	—	1	1	—	1
Lower Valley Sites	Tiwanaku V	—	—	2	—	2
	Tiwanaku IV-V	1	—	1	—	1
	Pacajes	—	—	—	1	1
	Unknown	—	1	1	—	1
Middle Valley Sites	Tiwanaku V	—	4	6	—	6
	Pacajes	—	1	2	1	3
	Unknown	—	—	1	—	1
	<i>Valley subtotal</i>	<i>16</i>	<i>16</i>	<i>43</i>	<i>8</i>	<i>51</i>
<i>Katari Valley</i>						
Lukurmata Site	Tiwanaku I	—	5	6	—	6
	Tiwanaku III	—	1	1	—	1
	Tiwanaku IV	—	3	5	4	9
	Tiwanaku V	1	1	3	—	3
	Pacajes	—	1	4	—	4
	Unknown	3	9	13	6	19
Pampa Koani Sites	Late Chiripa	—	1	1	—	1
	Tiwanaku III	—	3	4	—	4
	Tiwanaku III-Early IV	—	1	1	—	1
	Tiwanaku IV	—	1	1	—	1
	Tiwanaku V	—	3	3	2	5
	Pacajes	—	1	2	1	3
	<i>Valley subtotal</i>	<i>4</i>	<i>30</i>	<i>44</i>	<i>13</i>	<i>57</i>
	Total	20	46	87	21	108
Sample Total		233	46	342	70	412

^a Combines all modification types with those that were modified but could not be securely assigned to a specific type due to fragmentation.

When these data are separated by valley, further significant patterning is revealed (Table 7). Although no significant difference is seen in the presence of modification in general, the patterns in types of modification

used are significantly different. As noted above, all individuals with modification in the Moquegua valley displayed fronto-occipital styles. In the Katari valley, the majority of individuals with modified crania exhibited

Table 5
Cranial modification types and presence by sex

	Annular modification	Fronto/occipital modification	Modified	Unmodified
Females	<i>N</i> = 17	<i>N</i> = 84	<i>N</i> = 118 79% ^a	<i>N</i> = 31 21% ^a
	17% ^b 13% ^c	83% ^b 64% ^c		24% ^c
Males	<i>N</i> = 15	<i>N</i> = 49	<i>N</i> = 75 79% ^a	<i>N</i> = 20 21% ^a
	23% ^b 18% ^c	77% ^b 58% ^c		24% ^c

^a Modified vs. unmodified: $\chi^2 = 0.002$, *df* = 1, exact *p* = 1.000; *N* = 244.

^b Annular vs. fronto/occipital modification: $\chi^2 = 1.094$, *df* = 1, exact *p* = 0.318; *N* = 165.

^c Annular vs. fronto/occipital vs. unmodified: $\chi^2 = 1.096$, *df* = 2, *p* ≈ 0.578; *N* = 216.

Table 6
Cranial modification types and presence by region

	Annular modification	Fronto/occipital modification	Modified	Unmodified
Altiplano	<i>N</i> = 46	<i>N</i> = 20	<i>N</i> = 87 81% ^a	<i>N</i> = 21 19% ^a
	70% ^b 53% ^c	30% ^b 23% ^c		24% ^c
Moquegua	<i>N</i> = 0	<i>N</i> = 213	<i>N</i> = 255 84% ^a	<i>N</i> = 49 16% ^a
	0% ^b 0% ^c	100% ^b 81% ^c		19% ^c

^a Modified vs. unmodified: $\chi^2 = 0.625$, *df* = 1, exact *p* = 0.457; *N* = 412.

^b Annular vs. fronto/occipital modification: $\chi^2 = 177.763$, *df* = 1, exact *p* < 0.0005; *N* = 279.

^c Annular vs. fronto/occipital vs. unmodified: $\chi^2 = 172.752$, *df* = 2, *p* < 0.0005; *N* = 349.

Table 7
Cranial modification types and presence by valley

	Annular modification	Fronto/occipital modification	Modified	Unmodified
Katari Valley	<i>N</i> = 30	<i>N</i> = 4	<i>N</i> = 44 77% ^a	<i>N</i> = 13 23% ^a
	88% ^b 64% ^c	12% ^b 9% ^c		28% ^c
Tiwanaku Valley	<i>N</i> = 16	<i>N</i> = 16	<i>N</i> = 43 84% ^a	<i>N</i> = 8 16% ^a
	50% ^b 40% ^c	50% ^b 40% ^c		20% ^c
Moquegua Valley	<i>N</i> = 0	<i>N</i> = 213	<i>N</i> = 255 84% ^a	<i>N</i> = 49 16% ^a
	0% ^b 0% ^c	100% ^b 81% ^c		19% ^c

^a Modified vs. unmodified: $\chi^2 = 1.593$, *df* = 2, *p* ≈ 0.451; *N* = 412.

^b Annular vs. fronto/occipital modification: $\chi^2 = 195.266$, *df* = 2, exact *p* < 0.0005; *N* = 279.

^c Annular vs. fronto/occipital vs. unmodified: $\chi^2 = 185.904$, *df* = 4, *p* < 0.0005; *N* = 349.

the annular type. The pattern in the Katari valley can be contrasted with that from the Tiwanaku valley. At the site of Tiwanaku and the rural sites in the valley, an equal distribution of annular and fronto-occipital styles

is found. Likewise, when “unmodified” is considered a third category, the difference between valleys is significant, with the Katari valley sample having a larger proportion of unmodified crania. It is not certain if the

significant difference is due to the proportion of unmodified skulls or to the difference in distribution of the two modification types, especially considering that the difference in the presence of modification in general between valleys is not statistically significant.

To observe temporal patterning in cranial modification, the samples were grouped by broad temporal categories where possible (see Table 4). The altiplano samples consist of Formative and Tiwanaku period samples from the Katari valley (Lukurmata and rural sites) and a Tiwanaku period sample from the Tiwanaku valley (Tiwanaku and rural sites). The Moquegua sample has both Formative and Tiwanaku period remains. The cranial styles found in these samples are summarized in Table 8.

When observing the Katari valley sample across time, results indicate that the tendency to modify crania did not change significantly from the Formative (100% modified) to Tiwanaku (67% modified) periods. Of the individuals with visible modification types and known temporal context in the Katari valley, the annular type of modification was present in 100% of the Formative and 89% of the Tiwanaku period contexts, a statistically insignificant difference. Except for one individual from Lukurmata during the Tiwanaku V phase, all dated individuals with modified skulls buried in the Katari valley have annular style crania. The lack of definitive dates for 3 of the 4 crania with fronto-occipital modification

is unfortunate. No significant difference is seen over time in the Moquegua valley in either the presence of type of modification.

When the patterning solely within the site of Tiwanaku is observed, no clear spatial pattern is visible in terms of cranial modification styles (Table 9). Within the site, the percentage of fronto-occipital vs. annular is roughly 60% vs. 40%, while crania without alteration are uncommon (18%). All styles are present in each of the distinct areas. Nevertheless, some differences are suggested; for example, in the Akapana and Marka Pata sample fronto-occipital styles are more common, and the sample from the most likely location for high status burials (the Putuni “palace”) has a slightly higher percentage of altered crania. However, the small sample size from any given location at Tiwanaku makes a definitive statement problematic until a larger sample is available.

In summary, a distinct pattern exists in cranial modification styles within Tiwanaku society. Within the Moquegua valley and the Chen Chen site, all individuals display fronto-occipital cranial modification. Quite distinct from this pattern, individuals from Lukurmata and the Katari valley almost exclusively modified heads to reflect the annular style. Residents of Lukurmata and Chen Chen (and their surrounding sites) were differentially altering their head shapes into distinct and separate styles. In both these valleys, there is little

Table 8
Altiplano cranial modification type and area by time period.

		Annular modification	Fronto/occipital modification	Modified	Unmodified
Katari Valley	Formative period	$N = 10$	$N = 0$	$N = 12$	$N = 0$
		100% ^c	0% ^c	100% ^a	0% ^a
	Tiwanaku period	$N = 8$	$N = 1$	$N = 12$	$N = 6$
		89% ^c 53% ^c	11% ^c 7% ^c	67% ^a	33% ^a 40% ^c
Moquegua Valley	Formative period	$N = 0$	$N = 4$	$N = 4$	$N = 1$
		0% ^d 0% ^f	100% ^d 80% ^f	80% ^b	20% ^b 20% ^f
	Tiwanaku period	$N = 0$	$N = 209$	$N = 251$	$N = 48$
		0% ^d 0% ^f	100% ^d 81% ^f	84% ^b	16% ^b 19% ^f

^a Katari modified vs unmodified: $\chi^2 = 5.000$, $df = 1$, exact $p = 0.057$; $N = 30$.

^b Moquegua modified vs. unmodified: $\chi^2 = 0.057$, $df = 1$, exact $p = 0.587$; $N = 304$.

^c Katari annular vs. fronto/occipital modification: $\chi^2 = 1.173$, $df = 1$, exact $p = 0.474$; $N = 19$.

^d Moquegua annular vs. fronto/occipital modification: modification constant; $N = 213$.

^e Katari annular vs. fronto/occipital vs. unmodified: $\chi^2 = 6.481$, $df = 2$, $p \approx 0.039$; $N = 25$.

^f Moquegua annular vs. fronto/occipital vs. unmodified: $\chi^2 = 0.006$, $df = 1$, exact $p = 1.00$; $N = 262$.

Table 9
Tiwanaku sector by cranial modification type

	Annular modification	Fronto/occipital modification	Modified	Unmodified
Akapana	<i>N</i> = 1 14% ^b 11% ^c	<i>N</i> = 6 86% ^b 67% ^c	<i>N</i> = 7 78% ^a	<i>N</i> = 2 22% ^a 22% ^c
Akapana East	<i>N</i> = 3 60% ^b 50% ^c	<i>N</i> = 2 40% ^b 33% ^c	<i>N</i> = 6 86% ^a	<i>N</i> = 1 14% ^a 17% ^c
Ch'iji Jawira	<i>N</i> = 1 100% ^b 100% ^c	<i>N</i> = 0 0% ^b 0% ^c	<i>N</i> = 1 100% ^a	<i>N</i> = 0 0% ^a 0% ^c
Mollo Kontu	<i>N</i> = 1 50% ^b 33% ^c	<i>N</i> = 1 50% ^b 33% ^c	<i>N</i> = 3 75% ^a	<i>N</i> = 1 25% ^a 33% ^c
Marka Pata	<i>N</i> = 0 0% ^b 0% ^c	<i>N</i> = 2 100% ^b 67% ^c	<i>N</i> = 2 67% ^a	<i>N</i> = 1 33% ^a 33% ^c
Putuni	<i>N</i> = 4 50% ^b 44.5% ^c	<i>N</i> = 4 50% ^b 44.5% ^c	<i>N</i> = 11 92% ^a	<i>N</i> = 1 8% ^a 11% ^c

^a Modified vs. unmodified: $\chi^2 = 1.829$, $df = 5$, $p \approx 0.872$; $N = 36$.

^b Annular vs. fronto/occipital modification: $\chi^2 = 6.012$, $df = 5$, exact $p = 0.305$; $N = 25$.

^c Annular vs. fronto/occipital vs. unmodified: $\chi^2 = 7.578$, $df = 10$, $p \approx 0.670$; $N = 31$.

change over time indicating that the use of these styles in each region was an enduring custom.

In contrast to the relatively homogenous nature of the Katari and Moquegua valley samples, individuals from the site of Tiwanaku and in the Tiwanaku valley possessed both annular and fronto-occipital styles. Within the Tiwanaku valley, modified skulls were roughly split between fronto-occipital and annular styles. Furthermore, within this sample, no clear spatial pattern in cranial modification styles was observed. Both styles were found within nearly every site and within every compound in the site of Tiwanaku.

The results parallel the few archaeological reports of cranial modification for the region. Annular modification has been described or photographed for isolated finds in Tiwanaku and other nearby sites (Chervin, 1908, plate 105, my classification; Posnansky, 1957; Wyman, reported in Squier, 1973 [1877]; Waisbard, 1975, p. 72;⁹ see also Hjortsjö and Lindh, 1947 for

Khonko Wankane). Less commonly, fronto-occipital modification has also been reported for the site of Tiwanaku (Broca, 1878; Posnansky, 1957; Weiss, 1962), sometimes in an uncertain fashion: “the village of Tiahuanaco... rests... on... skulls!... some among them show the artificial deformity peculiar to older Aymará crania, namely: flattening of the forehead” (Bandelier, 1911, pp. 233–244). Overall, these few observations are consistent with the pattern found in the present study for the site of Tiwanaku.

Discussion

In understanding the data presented here, it is crucial to explore what cranial shape and its modification might have meant in Tiwanaku society. Because various studies have linked cranial modification to status, economic specialization, highland vs. lowland habitation, and other group memberships, all of these possibilities will be addressed here.

Status differentiation was clearly present in Tiwanaku society (Couture, 2002; Goldstein, 1993a, pp. 34–35; Kolata, 1993). The spatial organization of the

⁹ Waisbard literally writes “pointed like a volcano” (my translation).

Tiwanaku capital has, for example, been described as a concentric cline of decreasing status as one moves out from the monumental core (Janusek, 2002; Kolata, 1993). In an argument that focused upon social status, Posnansky (1957) argued that annular modification was linked to a special, priestly class in Tiwanaku. Since he argued elsewhere that occipital modification caused sexual perversion (Posnansky, 1925; as cited in Dingwall, 1931, p. 220), we might not accept his suggestions uncritically. D'Orbigny (1944, p. 189) also claims that there was an association between modification and elite status in the Lake Titicaca area, but again this is more speculation than fact.

In fact, status differentiation is an unlikely explanation for cranial shape modification in the Tiwanaku sample for three reasons. First, the majority of the people displayed cranial modification, making it unlikely that its presence conferred special status. Second, we might expect cranial modification of a specific type or in general to be more common in the elite core area of the Tiwanaku site, but no such patterning in cranial modification exists within Tiwanaku proper. Additionally, an extensive study of tomb architecture and inclusions in the Moquegua valley demonstrated no association between cranial modification and other commonly used as measures of status (e.g., tomb architecture, burial location, or grave inclusions; see Blom, 1999 for detailed analysis). Cranial modification simply does not seem to have been linked to status differentiation in Tiwanaku society, and some other explanation must be sought.

Highland vs. lowland distributions for cranial shape modification have also been suggested throughout the temporal sequence. Regardless of region, most annular forms of modification in the Andes are found in the highlands, while tabular, or fronto-occipital, forms are found on the western coast in Peru and elsewhere (Björk and Björk, 1964; Broca, 1878; Dingwall, 1931; Squier, 1973 [1877], Appendix B; Stewart, 1950; Weiss, 1962). In addition to osteological studies documenting this association, the annular form has been commonly described for highland Aymara groups in the ethnohistorical literature (e.g., Diez de San Miquel, 1964 [1567]; Mercado de Peñalosa, 1965 [1583]; Ulloa Mogollón et al., 1965 [1557–1586]). Another reason that the highland/lowland dichotomy is often accepted may be because it has been an established “truth” for over a century. Therefore, annular forms found on the coast have often been explained as invading “highlanders” who moved to the coast (e.g., Allison et al., 1981; Dingwall, 1931; Latcham, 1937; Núñez Atencio and Dillehay, 1979; Weiss, 1962), in spite of convincing evidence that annular forms of modification were also common on the south coast from Pre-ceramic to Late Intermediate period contexts over several thousand years at minimum (Gerszten, 1993; Lozada, 1998; Lozada et al., 1996;

Munizaga, 1964; Soto, 1972–1973, 1974; Soto-Heim, 1987).

Some annular modification varieties were apparently present on the coast and in the Atacama region of northern Chile during Tiwanaku times (Allison et al., 1981; Latcham, 1937), but this remains unclear because of differences in past terminology. In the Atacama region, near San Pedro de Atacama, annular modification forms seem to have been found in conjunction with tabular varieties (Costa, 1988; Dingwall, 1931; Munizaga, 1964). Cranial modification patterning there has been interpreted as multi-ethnic, with “Atacameña indígena” using tabular forms and “Tiwanaku” people using annular forms (Latcham, 1937). Or, as Berenguer and Dauelsberg (1989, p. 155) suggest, the differences may indicate status distinctions within the site of San Pedro de Atacama. It is sometimes difficult to determine the cultural affiliation of particular groups in these studies, however, because many of these crania were collected when little was known about Tiwanaku presence on the coast, especially its relationship with other Middle Horizon groups.

The division between highland and lowland is also seen in explanations that focus upon migration models, but here the division is used to explain the presence of fronto-occipital modification styles on the coast. For example, Gerszten (1993) argues that fronto-occipital modification was more prevalent in the highlands because he found it to be associated with Tiwanaku and Inca-period contexts on the coast of northern Chile. Although it could be argued that fronto-occipital forms arrived on the coast during the Middle Horizon with migrating Tiwanaku (Latcham, 1937; Soto, 1972–1973), the form was present on the coast in earlier, túmulo-associated phases of Alto Ramírez, or El Laucho (c.a. 530 BC), in northern Chile (Gerszten, 1993; Soto, 1972–1973, 1974) and, in the present study, in the contemporaneous Huaracane phase in Moquegua, Peru (see also Hoshower et al., 1995). More work obviously remains to be done to establish the timing and origin of different forms of cranial modification within both the coastal and altiplano regions in Peru and beyond. Nevertheless, the studies reviewed here and the present data demonstrating both modification types in the highland Tiwanaku valley indicate that the highland/lowland dichotomy is too simplistic.

Regional patterning in Tiwanaku cranial modification is quite clear. The frontal-occipital modification type predominates far to the southwest of the Tiwanaku capital, in the coastal Moquegua valley. In contrast, to the northeast of Tiwanaku individuals used an annular type of modification in the Pampa Koani and at Lukurmata in the Katari valley. Additionally, sites with Tiwanaku material cultural remains in the eastern slopes of the Andes such as Cochabamba (O'Brien and Sanzete-nea Bocha, 2002) and Niño Korin (Hjortsjö, 1972) have

produced skulls with annular modification. In both the Katari and Moquegua valleys, regional continuity is documented through pre-Tiwanaku and Tiwanaku periods. Consequently, it is possible to view the Tiwanaku realm over time as conceptually divided in two, with Moquegua and fronto-occipital types to the west and the Katari valley and annular forms to the east. The Tiwanaku valley and the capital city of Tiwanaku were situated at the border of these two regions. At this border, individuals with both head shapes lived and were ultimately buried.

As observed for the contemporaneous Chiribaya sites in the Moquegua region (Lozada, 1998; Lozada et al., 2002), cranial modification types might have been linked to groups differentiated by economic specialization. Janusek (1999) has argued that certain areas within the Tiwanaku site were inhabited by craft specialists, and Goldstein (1993a, pp. 34–35) noted similar community segregation in Tiwanaku period contexts at the site complex of Omo in the Moquegua valley. In contrast, no clear intra-site patterning was seen for cranial modification. In the absence of other data, the hypothesis that cranial shape modification and economic specialization were linked for these Tiwanaku-affiliated sites is unsupported in the present study, unless one considers economic specialization specific to the large geographical regions in which the two cranial forms are found.

The regions outlined in the present study are distinct environmental niches. While the Moquegua region near the coast is well-suited to the production of maize and other warm-weather crops, the Katari Basin is known for its extensive raised-field systems and its proximity to the lake edge high in the Andes. In addition to the production of high-altitude adapted grains and tubers and lake fish and fowl, the Katari Basin provides grazing lands for camelids. The difference between these regions is crucial in understanding interactions between these two areas, especially as it may relate to ethnicity.

South American chroniclers often described ethnic groups or “tribes” as distinguishing themselves through distinct head forms. The bioarchaeological record also supports using cranial shape modification in this way, but it is important not to assume that this was the case throughout time and space in the Andes. Could the pattern of diversity evident in Tiwanaku be reflective of multi-ethnicity? A recognizable group need not always be considered an ethnic group, as can be seen in groups that self-identify or are identified by gender or social class, variables which do not seem to be linked to cranial shape in this study. Jones (1997, p. 84) specifically defines ethnic groups as “culturally ascribed identity groups, which are based on the expression of real or assumed shared culture and common descent usually through the objectification of cultural, linguistic, religious, historical and/or physical characteristics.”

Using definitions such as this one, archaeologists have addressed the issue of ethnicity in Tiwanaku society in the past. Goldstein (1989a, 1993b) has argued that the Tiwanaku-affiliated settlements in the Moquegua valley were composed of a single ethnic group, in which all the inhabitants identified stylistically with Tiwanaku (see also Owen and Goldstein, 2001). Because of the distance that separates this enclave from Tiwanaku, Goldstein argues that the Moquegua valley was the location of a diaspora community (Goldstein, 2000a). Recognizing that people can adopt objects of other groups (Childe, 1950, p. 1; Dietler and Herbich, 1989; Herbich and Dietler, 1991; Hodder, 1978; Trigger, 1986, p. 39–47), Goldstein does not assume that access is equivalent to identity or, likewise, ethnicity. He bases his conclusion on the presence of solely Tiwanaku-style artifacts at the level of the individual household in these Moquegua sites. However, in other cases, access to particular ceramic styles is also linked to identity.

In his research on Tiwanaku and Lukurmata in particular, Janusek (2002) notes subtle intra-site household and regional differences in access to specific resources and ceramic styles and forms, even within the general Tiwanaku style. Further, Janusek argues that regional and household groups were actively displaying their local “ethnic-like” or “social” identity within a broader identity as members of Tiwanaku society. Likewise, Bermann (1994) argues that various domestic practices such as cooking methods and construction techniques at Lukurmata did not change with the advent of Tiwanaku-style material culture; thus, he argues local identity was maintained. In summary, while Goldstein has focused on overall similarity in material culture to link distant enclaves to Tiwanaku society, Bermann and Janusek utilize subtle differences in Tiwanaku style, access to exotic resources, and/or variation or similarity in domestic activities to infer fine-scale “local” identities within Tiwanaku society in the highlands.

In these studies, ethnicity is generally defined using a “primordial” perspective, in which one’s ethnic group is essentially a casualty of birth (Geertz, 1963; Shils, 1975), rather than using an “instrumentalist” or “circumstantialist” approach, where ethnic groups are viewed as created or reorganized for socioeconomic and political purposes (e.g., Nagel and Snipp, 1993; see also Bentley, 1987; Eller and Coughlan, 1993; Jones, 1997). As made explicit in the work of Janusek, it is certainly recognized that ethnic groups, even if couched in primordial perspectives, often are seen to act to their socioeconomic and political advantage. However, using a primordial approach, cultural traits that are defined as expressions of “ethnic identity,” “ethnic-like identity,” or “social identity” are viewed as long-term endurance of tradition, even if antecedents cannot be directly documented. In light of these studies, how can cranial shape modification be viewed?

Fredrik Barth's (1969, see also Barth, 2000) classic work on ethnic groups and their boundaries provides a helpful framework in exploring why cranial modification styles might have been maintained and perhaps emphasized in Tiwanaku society. By focusing on boundaries, Barth discusses how ethnic identity is maintained when groups interact, deviating from past assumptions that such groups become homogenized over time. Barth's model works particularly well in the present case because direct similarities exist between the Andean concept of verticality/zonal complementarity (Brush, 1977; Masuda et al., 1985; Murra, 1972), and Barth's description of scenarios where two or more ethnic groups interact. Barth contends that ethnic groups are often connected in a "social system" when their "characteristic cultural features" are complementary (Barth, 1969, p. 18). This is directly applicable to the groups identified in this study, given their complementary environmental niches. In fact, a reciprocal relationship and interdependence between these different regions is likely, as discussed by various other researchers (e.g., Browman, 1980; Goldstein, 1989a, 2000a; Kolata, 1993; Moseley et al., 1991; Mujica, 1985; Mujica et al., 1983; Stanish, 1992; Van Buren, 1996).

Boundary maintenance between different ethnic groups requires that group differences be "generally standardized," or "highly stereotyped" (Barth, 1969, p. 19; see also Hensel, 1996, pp. 91–94). This is especially true in the case of symbolic boundaries (see Lamont and Molnar, 2002). Ascription and self-identification are of principal importance to ethnic identity, but certain aspects of culture content and/or material culture are relevant for ethnic differentiation. This might include "overt signals or signs—the diacritical features that people look for and exhibit to show identity, often such features as dress, language, house-form or general style of life" (Barth, 1969, p. 14). Based on multiple ethnohistorical sources that demonstrate it as such in the Andes, we can reasonably propose that cranial shape modification was one of those stereotyped, overt signs of ethnic ascription and differentiation.¹⁰

This certainly leads to the possibility that, if we are observing ethnic groups, they may have existed before,

¹⁰ This brings up the question of what the lack of cranial modification might mean. At this point there is no clear evidence to answer this question. However, future studies might explore the hypothesis that those whose heads were not modified might have been those whose elders thought might cross boundaries in adulthood. The benefits of not being identified as belonging to a particular group might have been seen if they were, for example, members of llama caravans, who were thought to have traveled throughout the Tiwanaku realm. Of course, the chance that these may have been individuals who were not properly cared for in infancy or who did not clearly belong to a particular group is also possible.

during and after the time that "Tiwanaku culture" is evident. Cranial shapes used remained similar over time in the Katari and Moquegua valleys, even when characteristics commonly associated with culture or identity changed, including ceramic styles among other forms of material culture. The cultural content (or "stuff") or the organizational form of a group can change, while the boundaries, and, hence, the ethnic groups are still maintained (Barth, 1969, p. 14). It might also be that the same practice had different meanings over time (see Hensel, 1996).

The emergence of the Tiwanaku style in these models is generally seen as originating at the center or "core" and moving out into the peripheral areas where it was modified into regional variants (e.g., Cochabamba and Moquegua). However, analysis of the pattern of cranial shape modification can best be characterized differently. Individuals seem to have been drawn in from outlying homogeneous areas into a heterogeneous center, or boundary zone. This example provides an excellent reminder that migration is very rarely one-way (Anthony, 1990), and we can probably best view population movement in and out of Tiwanaku as cyclical. Yet, through rules of interaction, symbolic boundaries are maintained "despite a flow of personnel across them" (Barth, 1969, p. 9). Patterning in cranial modification style adhered to those rules, as best determined, and since it is permanent, the use of cranial modification allows us to directly observe geographical mobility through an individual's life and the boundaries to that mobility in Tiwanaku society.

Some have viewed the Tiwanaku capital as the point from which ideas and cultural material flowed—and that is certainly true—but we can also envision it as a borderland between two regions on the basis of cranial modification. Barth's (1969, p. 19) statement that "articulation" between groups might occur "in a ceremonial-ritual sector" or "politics along the border" precisely describes the ways in which the Tiwanaku capital is envisioned (e.g., Janusek, 2004; Kolata, 1993). A borderland need not be seen as an "insignificant" or "marginal zone" or as "thin slivers of land between stable places" (Gupta and Ferguson, 1997, p. 48). Instead, borderlands often have identities and rich meanings of their own (Barth, 2000). The identity of Tiwanaku was paramount, as a socially constructed place of unique and important interactions and as the capital of a vast area of influence in the south central Andes for more than 500 years.

Conclusion

Archaeologists have addressed the issue of group membership and diversity in Tiwanaku using style in different forms of material culture. The analysis of

permanent body modification is an essential addition to the archaeological interpretation of Tiwanaku for understanding issues of the dynamics of relevant social groups. This study demonstrates that an impression of rigidity exists outside the center, even though patterning in cranial modification conveys the sense of flexibility or flow in the capital. Only in the Tiwanaku capital do we have individuals of diverse social, perhaps ethnic, groups living together.

The border between east and west in the Tiwanaku realm was not clearly demarcated. Instead it was a dynamic borderland where groups from diverse areas converged. The capital of Tiwanaku was a diverse center; however, outside the capital and the fluid boundary, we see a strong sense of local identity displayed symbolically with homogeneity in culturally-constructed head shape.

Patterning among cranial modification styles does not indicate permanent, uni-directional movement of individuals between eastern and western regions. Instead, individuals may have moved to and from areas in which they had some local ties, indicating that Tiwanaku expansion was more complex than a simple flow of people from the highlands to the lowlands during the later Tiwanaku period. This study illustrates the importance of a bioarchaeological approach in addressing social complexity and group dynamics in ancient societies, and it provides body modification as another potential means of exploring ethnicity in the past.

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