Integrating Identities

An Innovative Bioarchaeological and Biogeochemical Approach to Analyzing the Multiplicity of Identities in the Mortuary Record

by Christina Torres-Rouff and Kelly J. Knudson

Despite our instinctive understanding of the importance of "identity," archaeologists and bioarchaeologists continue to struggle to rigorously investigate this complex phenomenon. Here, we present a contextualized multiscalar bioarchaeological approach to studying identities in the past—individual and group, mutable and immutable—through the mortuary record. We argue that, while many scholars have moved beyond the single-focus study, archaeological individuals themselves are still neglected. A contextualized bioarchaeological approach brings together a variety of methods to investigate aspects of individual and group identities, provides a means of accessing biological facets of identity, and allows for more nuanced understanding of the complexities of social identities. We illustrate the utility of our model with a case study using archaeological, bioarchaeological, and biogeochemical data from northern Chile, stressing both the fixed and the dynamic aspects of different identities. We focus on the tumultuous transition between the Middle Horizon (AD 500–1100) and Late Intermediate Period (AD 1100–1400) in northern Chile's San Pedro de Atacama oases and the neighboring upper Loa River Valley. Our research demonstrates a shift toward homogenizing representations of social identities as well as biological aspects of identities as societies began reformulating their social groups following the end of the complex and cosmopolitan Middle Horizon.

> *The separate parts of group identity come melded to each other in highly varied and often quite distinctive or eccentric ways. They are not machine-pressed products but works of art.* (Isaacs 1975:206)

In life and death, individuals embody and display multiple and intersecting identities. The ways in which people form these identities and the "long-term and large-scale effects of these processes" are among the most important questions for archaeologists today (Kintigh et al. 2014:880) as we attempt to understand the lived experience in prehistory. The dynamics of these social processes in the past can help elucidate contemporary cases of identity formation and even ethnogenesis, but more directly, they can inform our understanding of community formation and responses to social change. Here, we present an integrated multiscalar bioarchaeological approach to studying identities in the past—individual and group, mutable and immutable—through the mortuary record. Studies of burial traditions have long been used to explore interred individuals and the society that mourned them (e.g., Binford 1971; Bloch and Parry 1982; Brown 1971; Metcalf and Huntington 1991; Saxe 1970; Tainter 1978). However, many of these analyses are centered on specific aspects of identity, such as eliteness. These approaches, while fruitful, neglect other aspects of an individual's lived experience. Here, we focus on elements of identity that can be explored through mortuary data, including material culture, mortuary practices, and information derived from human skeletal remains. While group identities are often reflected in mortuary practices that present idealized perspectives (e.g., Hodder 1982; Parker Pearson 2000), the individuals being commemorated reveal multiple, complex, overlapping indicators of individual and group social identities. We argue that, while many archaeologists have moved beyond simply considering one aspect of identity, such as sex or status (Meskell 2001:187, 197), the archaeological individuals themselves are still neglected. We stress the value of an approach that integrates osteobiography or life-history approaches with population-level analyses (Zakrzewski 2015). A contextualized bioarchaeological approach brings together a variety of methods to investigate aspects of individual and group social identities, provides a means of accessing biological relationships and their impacts on social identities, and allows for more nuanced understanding of the complexities of human identities.

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 0011-3204/2017/5803-00XX$10.00. DOI: 10.1086/692026

Here, we provide a brief introduction to investigations of social identity in the past. We then present our model for considering identities in the mortuary record, contextualized with published approaches to investigating different social identities. We illustrate the utility of our model by stressing both the fixed and the dynamic aspects of social identities and present a case study based on archaeological, bioarchaeological, and biogeochemical data from the tumultuous transition between the Middle Horizon (AD 500–1100) and the Late Intermediate Period (AD 1100–1400) in the San Pedro de Atacama oases and the neighboring upper Loa River Valley of northern Chile (fig. 1). Finally, in our discussion and conclusion, we present the potential contributions of our integrative multiscalar approach to scholarly investigations of ancient identities.

Investigating Identities in the Archaeological Record

Drawing on an immense corpus of social science and humanities research (see overviews in Brubaker and Cooper 2000; Burke and Stets 2009; du Gay, Evans, and Redman 2000; Hutchinson and Smith 1996; Romanucci-Ross and De Vos 1995), the study of "identity" has been the focus of much archaeological research (see overview in Buikstra and Scott 2009). Here, we define identity as "not about who people were or where they or their ancestors came from but about who they thought they were, how they advertised this identity to others, how others perceived it, and the resulting repercussions of this matrix of interpersonal and intersocietal relationships" (Knudson and Stojanowski 2009*a*:5). Importantly, individuals can simultaneously and situationally embody a suite of different social identities. Drawing on the concept of intersectionality from feminist theory, we recognize that different social identities impact and affect each other (e.g., Cho, Crenshaw, and McCall 2013; Crenshaw 1991; Werbner 2013). In our approach, we consider social identities, which we define as a collective identification of a community, both by others and by the community members, through exploration of cultural practices inscribed on the body, the practice of burial, and the material goods accompanying the dead. We also consider those immutable aspects of identity, such as genetic relatedness and geographic origins, and how these can variously impact social identities and lived experiences. Therefore, we assume that each individual embodies and performs a number of different social identities at any one time that can be impacted by the individual and the group as well as biology and that we can explore these social identities through the body itself and in the mortuary context created by the mourning society.

Ethnicity and Social Identities in the Past

Until relatively recently, anthropological investigations of identity in the past focused almost exclusively on one aspect of identity at the level of the social group: ethnicity. Following

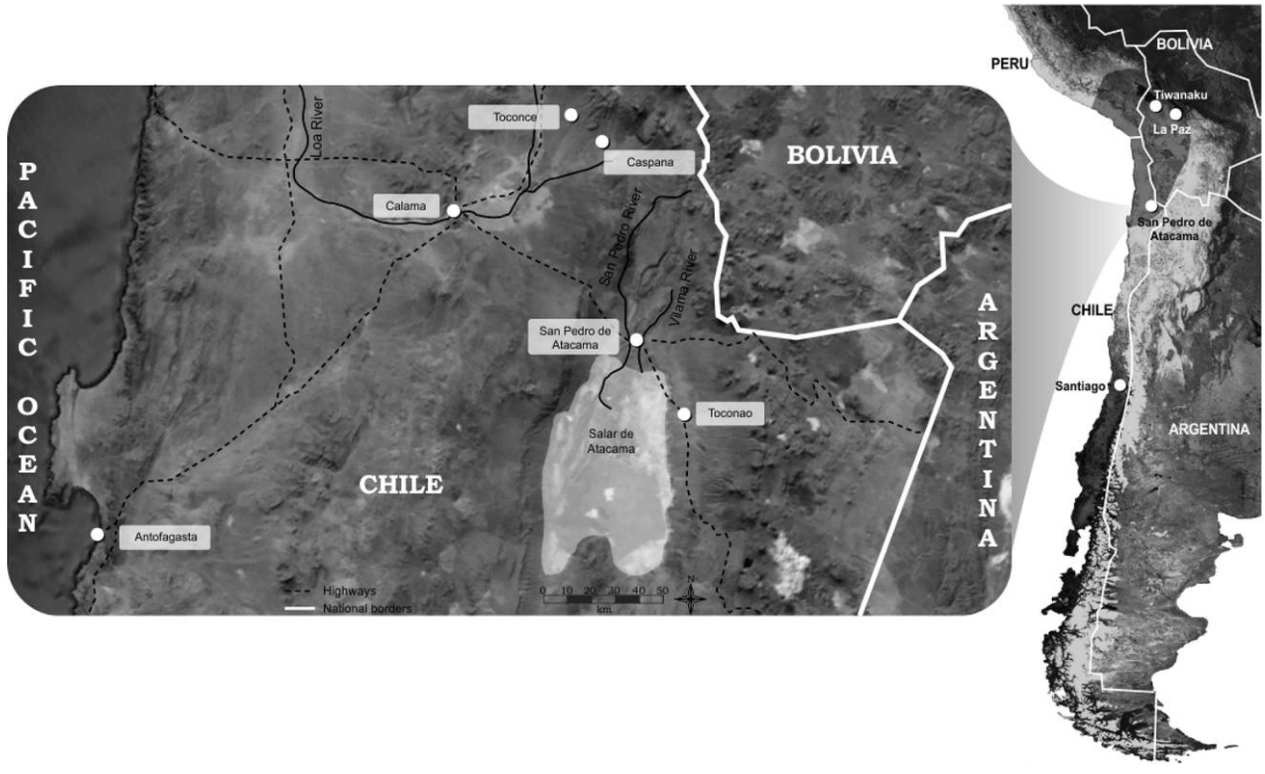

Figure 1. Map of the south-central Andes.

Barth (1969), most contemporary scholars argue that ethnic identity is in fact a process, a dynamic cultural construction formed through constant interaction with other groups, rather than a primordial or essential feature of humanity. For example, Jones (1997), like many others (e.g., Janusek 2005), uses practice theory and habitus in her examination of multidimensional ethnicity and Romanization in Europe. She argues that, rather than attributing "ethnicity" to bound spatio-temporal groups and "the identification of styles that were involved in the conscious expression of ethnicity," one must explore it "with the makeup of entire assemblages of material culture in different spatial and temporal contexts, which may provide information about the social relations and cultural practices underlying the generation of transient, but repeated, expressions of identity" (Jones 1997:134). We take this idea of a holistic view to be crucial to understanding the complexities of social identities. Working from a similar perspective, Smith (2003) highlighted ethnic identity within the household, as seen in ceramic assemblages, as well as in public spaces, as seen in monumental architecture, to argue that Egyptian and Nubian ethnic identities in ancient Nubia were situational and complex. While robust archaeological studies of ethnicity are generally informed by multiple lines of evidence and, by definition, contextualized bioarchaeology as well, some successful studies of ethnic identity have focused on one aspect, such as domestic architecture (Aldenderfer 1993; Vaughn 2005) or mortuary textiles (Baitzel and Goldstein 2014; Oakland Rodman 1992). It is noteworthy that there has been a recent surge in research on ethnogenesis and ethnic identity formation, particularly among bioarchaeologists (e.g., Hu 2013; Klaus and Chang 2009; Kurin 2012; Stojanowski 2005). While we are not specifically focused on ethnogenesis here, we would like to highlight Voss' critique (2015:663) that bioarchaeologists are inclined "to locate the 'truth' of social identity in the body" and note that we attempt to move away from this with the integrated multiscalar nature of our model. It is our hope to bring the body into a stronger dialogue with society and material culture.

More recently, archaeologists have recognized group formations that extend beyond the ethnic group. Mac Sweeney (2009:102) notes that "contemporary experience tells us that groups can rally around an almost infinite range of factors, from professional occupation to political persuasion, from sporting allegiance to religious conviction, from sexuality to class." A variety of approaches have been used to examine group identity, defining a group at the level of household, community, or region, among others. For example, at the Anatolian site of Beycesultan, artifactual and architectural analyses demonstrate temporal changes in group identities and community cohesion, although these group identities were not based on shared descent or ethnic identities (Mac Sweeney 2009). Material culture studies have also demonstrated the importance of examining identity at different scales. To consider a different case, Janusek (2005:50) employed ceramic styles at the Bolivian sites of Tiwanaku and Lukurmata to convincingly argue that "the concept of identity is more complex than commonly considered, and that a phenomenon such as Tiwanaku comprised multiple nested and overlapping forms of social identity, ethnic and otherwise."

Complementing investigations of group identity are the growing number of studies that focus on different social identities that can be examined at the level of the individual. Many social identities coexist within a larger group identity, such as gender and age identities. Some of these social identities, such as age identities, are also expected to change over an individual's lifetime (Buikstra and Scott 2009; Gowland 2006).

Since Conkey and Spector's important work (1984), gender identity has seen substantial archaeological research. As is standard, we use "sex" to refer to biological sex based on osteological indicators and "gender" to refer to a socially constructed identity closely tied to biological sex (Walker and Cook 1998). Bioarchaeologists have begun to move beyond the documentation of biological sex to consider gender and its material correlates (e.g., Geller 2008, 2017; Sofaer 2006*a*, 2006*b*). This has produced a number of interesting works that do more than assign sex based on particular grave goods and instead provide a nuanced perspective on the role of sex, gender, and sexuality in prehistoric societies.

The examination of other social identities is a more recent phenomenon. Building on initial studies that explored childhood in the past (e.g., Baxter 2008; Kamp 2001), a growing number of scholars are focusing on the complex development of age identities in archaeological populations (e.g., Gowland 2006; Sofaer 2011). Rather than highlight "childhood," here we define age identities as social identities that are expected to change over an individual's lifetime and are based on biological and social ages. Similar to the distinction between sex and gender, we use the term "juvenile" when referring strictly to the physiological age of individuals who have not reached skeletal maturation, while different age identities are demarcated as social constructs, such as "child."

Beyond these well-explored areas, a variety of researchers have also studied social identities through the lens of familial relations, occupation, disability, socioeconomic standing, political roles, or religious identities. While this does not speak to all possible permutations, it does suggest the range of social identities that any individual can carry to the grave. As such, an approach that integrates a number of methodological perspectives and explores the variety of identities employed by individuals as well as small and large groups can yield greater detail and understanding about identity construction in the past. Ultimately, our approach, which we detail below, allows for deep consideration of the individual life while still exploring the group as a collective.

An Integrated Multiscalar Bioarchaeological Approach to Identities in the Mortuary Record

At both the group and individual levels, identities are a complex combination of biological and social factors. We argue that a contextualized bioarchaeological approach is particu-

larly fruitful for investigating individual and group identities in the past, because it integrates social theory and an array of methodological approaches, positioning bioarchaeological research to answer anthropological questions that go beyond the descriptive and the biological (Agarwal and Glencross 2011; Buikstra and Beck 2006; Knudson and Stojanowski 2008). Here, we argue that a bioarchaeological approach provides a number of tools to explore biological and social identities in the past by integrating data sets that can give different perspectives on individuals and their society. Examining multiple cemeteries and incorporating a substantial number of individuals allows for the clearest view into patterns at both the group and individual level. This large-scale project–based approach allows for detailed analyses and the integration of multiple data sets for stronger and well-supported interpretations of individual lived experiences as well as explorations of group dynamics. We argue that consolidating demographic information, metric and nonmetric trait data, information on body modifications, biogeochemical analyses of paleomobility, and grave structure and contents elucidates biological and social aspects of identity.

There is a long history of reconstructing individual life histories in bioarchaeology, originating with Saul's (1972) concept of osteobiography, and this continues to be a fertile area of research (e.g., Stodder and Palkovich 2012*a*). This type of research helps to develop an understanding of the archaeological individual and not solely the population, group, or site. We contribute to this growing movement with a multiscalar element that employs a large-scale analysis to explore identities at multiple levels.

Through bioarchaeological fundamentals, we can access age and sex profiles and infer potential age and gender identities (e.g., Sofaer 2006*a*, 2006*b*). Analysis of skeletal and dental metric and nonmetric traits affords a view into the relatedness and diversity of different mortuary populations and has been particularly useful in studies of ethnogenesis—the formation of new ethnic groups (Stojanowski 2005; Sutter 2009). Studies of body modifications are important in understanding both intentional signifiers of community identities (e.g., Blom 2005; Tiesler 2014; Torres-Rouff 2008) and unintentional skeletal and dental changes that can then be related to different social identities (Torres-Rouff 2011*b*). Similarly, biogeochemical studies of paleomobility can be used to infer geographic origins as they relate to social identities (e.g., Knudson and Blom 2009). Finally, mortuary ritual can be a particularly powerful means by which different identities can be strengthened or transformed and provides the context necessary to situate any individual or group within their culture and society (e.g., Chesson 2001). We stress the importance of considering data sets both separately and together, particularly the integration of biological and cultural data, to yield a more detailed view of prehistoric individuals and the multiple identities they carried to the grave. In the following sections, we present a case study based on our research in prehistoric northern Chile and demonstrate the ways in which this integrative approach provides a thicker view of the subtleties of group identities. We consider the mutual influences of the individual and group and of mutable and immutable identities; these factors are not binaries or in opposition but rather ends of a spectrum of expression of identities. Moreover, we highlight the complex interplay of identities at the level of the individual to access past lived experiences.

Case Study: The San Pedro De Atacama Region of Northern Chile

Middle Horizon to Late Intermediate Period Transition

The Middle Horizon to Late Intermediate Period transition likely impacted the ways in which social identities were constructed in the San Pedro de Atacama oases of northern Chile and as such serves as an ideal case study for our integrative multiscalar model (fig. 1). The San Pedro de Atacama oases are located in the harsh Atacama Desert at the northern tip of the Salar de Atacama. Despite the unforgiving landscape, humans have occupied this area for over 2,500 years, building a variety of settlements and forging strong networks with groups throughout the region. Decades of archaeological research have resulted in a broad understanding of the human occupation and the excavation and curation of remains from numerous cemeteries (fig. 2). The Middle Horizon Tiwanaku polity, centered on the capital site of Tiwanaku in the Lake Titicaca Basin, influenced the southern Andes between AD 500 and 1100. Tiwanaku-style material culture is found in Argentina, Bolivia, Chile, and Peru (see overviews in Goldstein 2005; Janusek 2008), and the San Pedro de Atacama oases exhibit a clear relationship with the Tiwanaku polity (Salazar et al. 2014; Torres-Rouff 2008). Núñez (1991) argues that the Middle Horizon shows the earliest evidence for the production of surplus, facilitating the rise of persistent inequality, as well as incipient craft specialization, including new metallurgical practices (Lechtman 2014), population growth (Llagostera and Costa 1999), and individuals who focused their energies on the caravan trade (Pomeroy 2013).

The Late Intermediate Period has long been viewed as a time in which smaller regional polities withdrew into defensible settlements, engaged in warfare and raiding, and participated in limited trade and exchange networks (Parsons and Hastings 1988). However, a growing body of research demonstrates that the Late Intermediate Period was much more complex, with considerable political and environmental changes throughout the Andes, including changes to settlement patterns, trade and exchange relationships, and political organization (Arkush 2008; Arkush and Tung 2013; Conlee et al. 2004; Covey 2008; Kurin et al. 2016). During the Late Intermediate Period in San Pedro de Atacama, formerly disparate populations consolidated into neighboring river valleys and canyons, perhaps seeking defensive positioning and safety. Settlement pattern changes indicate substantial population aggregations and the construction of fortified sites, most notably the Pukará de Quitor in San Pedro and the *pukarás* of Turi and Lasana in the

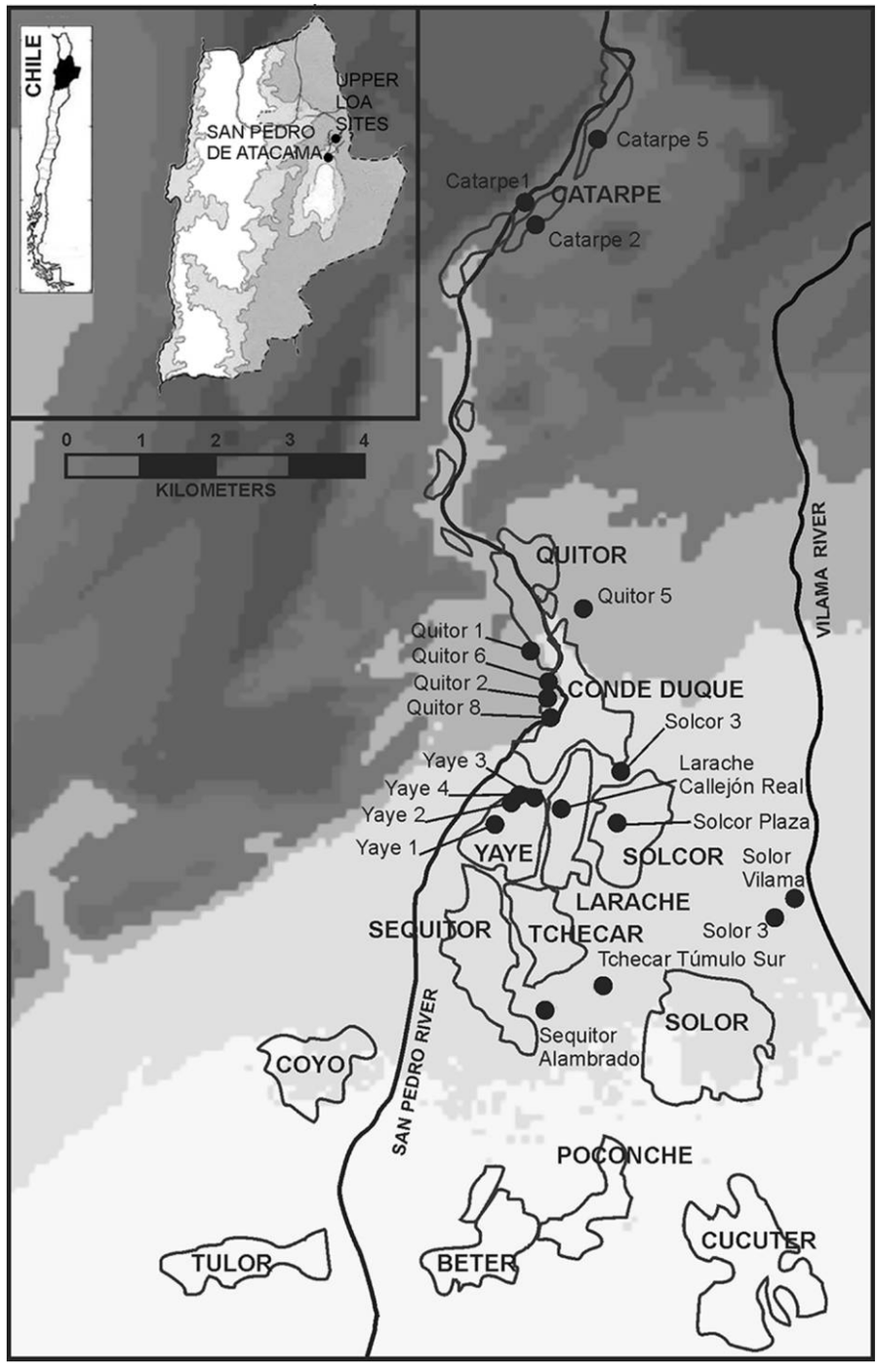

Figure 2. Map of the Atacameño oases indicating cemeteries included in our case study.

Loa River Valley (Mostny 1949). Environmental decline coincided with these cultural developments, likely causing resource stress in these already environmentally marginal societies (Llagostera 2004; Ortloff and Kolata 1993).

The collapse of Tiwanaku created cultural space for the construction of new identities, hierarchies, and social groupings that would ultimately come to power in the Late Intermediate Period. Llagostera (2004:157, 172) argues that the population dealt with these changes by altering local hierarchies to place power in the hands of warriors, suggesting that leaders no longer differentiated themselves through exotic goods and other manifestations of their status. This parallels the shift toward a corporate ethos seen in the archaeological record. Given the probable strain on resources and the upsurge in

fortifications in the Late Intermediate Period, it is possible that the community sought unity through the portrayal of cohesive group identity, or perhaps exhibited group division or, ultimately, disintegration.

The few earlier studies of group identity in the Atacama support the idea that Atacameños responded to this period of transition by strengthening a cohesive group identity. For example, in ceramics, Uribe (2002) notes a homogenization of Late Intermediate Period Atacameño ethnicity that he argues is an internal reaction to stress, poverty, and population displacement. Torres-Rouff's (2003) early research on cranial modification reveals a shift toward homogeneity in head-shaping patterns. These lines of evidence support the idea that the Late Intermediate Period witnessed a consolidation of local society, bioarchaeologically visible in head shape and mortuary context and paralleling immutable aspects of identity. The shifts in social identities concurrent with external social changes suggest these transitions are well suited for studies of past identities. Through our project, we provide a comprehensive view of both mutable and immutable aspects of social attributes of identities in these populations as they reacted to changes in their social and environmental worlds.

Cultural Heterogeneity in San Pedro De Atacama and the Loa River Valley

Sites along the upper Loa River Valley provide an important perspective on heterogeneity and geographic variability during the Middle Horizon to Late Intermediate Period transition in the Chilean Atacama. Like the neighboring San Pedro de Atacama oases, sites along the tributaries of the Loa River at this time also show evidence of fortification (Mostny 1949; Schiappacasse, Castro, and Niemeyer 1989). While early archaeologists frequently lumped their finds together into the "San Pedro Cultural Complex," some have argued that two separate cultures existed during the Late Intermediate Period, likely as a result of migrations from the *altiplano* after the disruptions caused by Tiwanaku's fall and concurrent environmental stress (Castro, Aldunate, and Berenguer 1984). Early ethnographers argued for a Bolivian *altiplano* origin for the contemporary Loa River Valley population, because last names and place names were predominantly Aymara and the modern inhabitants spoke Aymara, the language of the Lake Titicaca area (Schiappacasse, Castro, and Niemeyer 1989). Archaeological evidence, including the construction of *chullpas*, also suggests an *altiplano* origin for the Loa River Valley population (Castro, Aldunate, and Berenguer 1984). We argue that the heterogeneity seen in the San Pedro de Atacama oases and the Loa River Valley during the Late Intermediate Period makes the comparison of these regions ideal for our case study. In considering the dynamic and transformative elements of social identity, something documented by numerous scholars, we note that it is particularly worth exploring the possibility that groups may have used these social identities to mask biological similarity or to emphasize distinctiveness.

Methods: Immutable Aspects of Identity through Bioarchaeology and Biogeochemistry

Biological Relatedness through Bioarchaeological Determination of Biological Distances

We propose a model that accesses biological relatedness through two skeletal data sets—discrete trait (nonmetric) and metric analyses—to maximize information about genetic relationships (Corruccini 1976). Here, we assessed biological relationships or patterns of genetic relatedness at the level of the population through analysis of cranial metric and nonmetric traits. While we argue that an individual's genetic relationship to others is immutable and can strongly impact identity, relatedness in any population has a strong social component as well.

Craniometrics and other analyses of cranial morphology are generally employed to demonstrate group relatedness (e.g., Howells 1989; Hubbe et al. 2015; Roseman 2004; Ross, Ubelaker, and Guillen 2008). Here, analyses of metric data were limited by the high frequency of intentional cranial modification (over half the sample), which reduces the number of variables that can be used to explore biological affinities between groups. Therefore, the metric analyses presented here are preliminary and should be seen as a complement to the nonmetric analyses described below. Morphological affinities were explored with Mahalanobis distances between series centroids and represented graphically via Kruskall-Wallis multidimensional scaling.

Nonmetric traits are minor morphological features that include such things as the presence of foramina and suture completeness. Understanding biological relatedness (as well as geographic origins) allows us to more fully explore social identity as dynamic and possibly distinct from biological relatedness. These traits have comparatively high heritability and, after adulthood is reached, change little with increasing age (Saunders 1989). For bilateral nonmetric traits, the "individual count method" was used (Konigsberg 1990*b*). Only maximal expression was used, because significant asymmetry is uncommon (Berry 1979). Intra-observer studies were conducted to ensure comparability of data. All data were examined for effects related to age, sex, and head shaping. The nonmetric traits chosen are minimally altered by modification (Rhode and Arriaza 2006). Data were examined using mean measure of divergence, which provides a measure of morphological similarity as well as the adapted Mahalanobis distance proposed by Konigsberg (1990*a*). Multidimensional scaling (using the Guttman-Lingoes method) provided a graphic representation of both distances that represents the best visualization of the relative distances between series in the two dimensions of a graph (Konigsberg 1990*a*).

While we collected 33 cranial and mandibular measurements from 823 adult individuals, we ultimately worked with nine measurements that demonstrated no statistical difference between modified and unmodified crania from the facial

skeleton of 739 adult individuals. Our cranial nonmetric trait analysis involved recording twenty-three discrete traits in 715 adult individuals (Torres-Rouff, Knudson, and Hubbe 2013).[1] These suites of data were then compared across regions and time periods to get a broad sense of the relatedness of these populations over time and across space.

Geographic Origins and Paleomobility through Biogeochemical Analyses

In addition to examining biological relatedness at the population level, we use isotopic analyses to examine geographic origins and residential mobility at the level of the individual. As with biological relatedness, geographic origins are immutable for any individual, yet they also have a strong social component. More specifically, isotopic analyses can inform our understanding of embodied identity, in which socially important movements are reflected in the skeleton (White et al. 2009). Briefly, radiogenic strontium and stable oxygen isotope analyses can identify first-generation migrants from different geologic and environmental zones and are increasingly useful techniques (e.g., Bentley 2006). Radiogenic strontium isotope ratios vary worldwide according to the age and composition of bedrock, and $^{87}Sr/^{86}Sr$ values do not appreciably fractionate as strontium cycles through an ecosystem (Faure 1986). As strontium substitutes for calcium in hydroxyapatite, $^{87}Sr/^{86}Sr$ values in enamel or bone reflect the $^{87}Sr/^{86}Sr$ values found in the plants, animals, and water that she or he consumed, which reflect the soil and bedrock of that geologic region or regions. Since tooth enamel, unlike bone, does not remodel after it has formed, enamel $^{87}Sr/^{86}Sr$ values can identify geographic origins (Ericson 1985).

Oxygen isotopes vary worldwide according to environmental and climatic factors such as temperature, elevation, humidity, distance from the ocean, and latitude (e.g., Craig 1961). The oxygen isotope value in meteoric water is reflected in hydroxyapatite carbonate in tooth enamel and bone at constant body temperature (Longinelli 1984; Luz, Kolodny, and Horowitz 1984). If most oxygen came from local water sources, oxygen isotope analysis indicates the environment in which an individual was living during enamel and bone formation.

To investigate geographic origins and their relationships to social identities in northern Chile, radiogenic strontium isotope data were collected from 435 enamel and bone samples from 305 individuals (table 1). Oxygen isotope analysis was performed on a subset of 350 samples from 251 individuals; oxygen isotope ratios ($\delta^{18}O_{carbonate}$) are reported relative to the Vienna PeeDee belemnite (V-PDB) carbonate standard and are expressed in per mil (‰; Coplen 1994; table 1). In each cemetery, 10%–20% of the population was randomly selected for inclusion in the isotopic analyses. At Arizona State University, all samples were prepared in the Archaeological Chemistry Laboratory following published procedures (Price et al. 1992; Sillen and LeGros 1991) and analyzed in the W. M. Keck Foundation Laboratory for Environmental Biogeochemistry (see data and laboratory methods in Knudson and Price 2007; Knudson and Torres-Rouff 2009, 2014; Knudson, Torres-Rouff, and Stojanowski 2015). Using radiogenic strontium data from 305 individuals and stable oxygen isotope data from 251 individuals, we inferred geographic origins and then compared these data to other aspects of social identity, both mutable and immutable.

Methods: Mutable Social Identities through Bioarchaeology and Biogeochemistry

Biological Sex and Gender Identities

Demographic data are one of the fundamental sets of information accessible to bioarchaeologists. We can frequently determine sex in human remains, which can be closely correlated to the construction of a gender identity in the grave. Whenever possible, we determined sex from adult remains using sexually dimorphic characters of the skull and pelvic bones (Brooks and Suchey 1990; Buikstra and Ubelaker 1994; Ubelaker 1989). These data were collected from the skeletal remains of all adult individuals. We then explored the relationships between sex and the other attributes considered here, specifically geographic origins, cranial modification, and grave goods.

Age Identities and the Life Course

While an individual cannot change the actual number of days since their birth, age identity is mutable in that it is expected to change throughout the life course (Gilchrist 2000). We utilize Gowland's (2006:143) distinction between "physiological age," represented by the physical aging process, and "social age," which is socially constructed and defines appropriate behaviors and activities for a particular age group. When possible, skeletal age was assessed from the remains of 1,264 individuals using dental formation, dental wear, epiphyseal closure, ectocranial suture closure, and changes in the pubic symphyses and auricular surfaces (Brooks and Suchey 1990; Buikstra and Ubelaker 1994; Lovejoy et al. 1985). Analysis of pathology and body-use data is an important component of our life course analysis, because it speaks to, for example, disease and nutritional stress experienced by juveniles. Data for a suite of paleopathological indicators were collected based on the methods detailed in Buikstra and Ubelaker (1994) and Buzon and colleagues (2005). However, discussion of age identities and changes in social identities over the life course in our case study is hampered by past excavation and curation strategies; many cemeteries are represented only by cranial elements,

1. A more robust analysis would include both cranial and dental nonmetric traits, which show higher heritability values; however, the combination of severe attrition and a high prevalence of antemortem tooth loss, compounded with a substantial loss of teeth postmortem as a result of earlier conservation practices, did not allow us to do so in our case study.

Table 1. Summary of individuals studied in different temporal and spatial contexts in the San Pedro de Atacama oases and the Loa River Valley

Site	Cultural chronological phase (range)	MNI of cemetery	No. individuals included in biodistance analysis	No. individuals included in cranial modification analysis	No. individuals included in strontium isotope analysis (samples)[a]	No. individuals included in oxygen isotope analysis (samples)[a]
Middle Horizon cemeteries:						
Casa Parroquial	Coyo (AD 750–1000)	22	0	9 (6 U, 2 A, 1 T)	14 (36)	13 (33)
Coyo Oriental	Coyo (AD 750–1000)	262	0	0	15 (17)	18 (19)
Coyo-3	Coyo (AD 750–1000)	80	45	43 (26 U, 0 A, 17 T)	10 (18)	4 (5)
Larache	Sequitor and Quitor (AD 100–750)	52	43	44 (20 U, 4 A, 20 T)	25 (46)	20 (39)
Quitor-5	Sequitor and Quitor (AD 100–750)	181	117	176 (77 U, 29 A, 70 T)	29 (29)	17 (17)
Solcor-3	Coyo (AD 750–1000)	132	104	116 (58 U, 23 A, 35 T)	24 (43)	19 (28)
Solcor Plaza	Quitor and Coyo (AD 400–1000)	84	56	77 (46 A, 21 A, 10 T)	16 (16)	13 (13)
Solor-3	Sequitor and Quitor (AD 100–750)	106	49	63 (26 U, 13 A, 24 T)	20 (20)	18 (18)
Solor Vilama	Quitor (AD 400–750)	229	0	0	14 (21)	15 (22)
Tchecar Túmulo Sur	Coyo (AD 750–1000)	202	162	198 (133 U, 28 A, 37 T)	28 (60)	27 (58)
Overall		1,350 (407 F, 378 M, 481 I, 84 J)	576	726 (392 U, 120 A, 214 T)	195 (306)	164 (252)
Late Intermediate Period cemeteries:						
Caspana	Yaye and Solor (AD 1000–1470)	72	56	66 (4 U, 54 A, 8 T)	21 (31)	14 (17)
Catarpe-2	Coyo and Yaye (AD 750–1250)	216	0	194 (75 U, 56 A, 63 T)	36 (39)	35 (36)
Catarpe-5	Coyo and Yaye (AD 750–1250)	43	0	36 (24 U, 7 A, 5 T)	5 (8)	5 (8)
Quitor-1	Coyo and Yaye (AD 750–1250)	42	0	0	14 (17)	14 (18)
Quitor-6 Tardío	Coyo and Yaye (AD 750–1250)	55	35	42 (22 U, 1 A, 19 T)	7 (7)	1 (1)
Quitor-9	Coyo and Yaye (AD 750–1250)	21	0	14 (9 U, 2 A, 3 T)	3 (3)	3 (3)
Toconce	Yaye and Solor (AD 1000–1470)	28	25	28 (4 U, 20 A, 4 T)	3 (3)	1 (1)
Yaye-1	Coyo and Yaye (AD 750–1250)	45	30	42 (18 U, 1 A, 23 T)	6 (6)	6 (6)
Yaye-2	Coyo and Yaye (AD 750–1250)	71	36	62 (41 U, 3 A, 18 T)	7 (7)	4 (4)
Yaye-3	Coyo and Yaye (AD 750–1250)	23	20	24 (19 U, 1 A, 4 T)	4 (4)	3 (3)
Yaye-4	Coyo and Yaye (AD 750–1250)	25	18	23 (13 U, 4 A, 6 T)	4 (4)	1 (1)
Overall		641 (213 F, 222 M, 116 I, 90 J)	220	531 (229 U, 149 A, 153 T)	110 (129)	87 (98)

Note. Cultural chronological phases in the San Pedro de Atacama oases are as follows: Late Formative Period (Sequitor phase, AD 100–400), Middle Period (Quitor phase, AD 400–750; Coyo phase, AD 750–1000), and Regional Developments Period (Yaye phase, AD 1000–1250; and Solor phase, AD 1250–1470). A = annular; F = female; I = indeterminate; J = juvenile; M = male; MNI = minimum no. individuals; T = tabular; U = unmodified.

[a] For isotopic analysis, samples from multiple skeletal and dental elements that formed at different times were collected from the same individual, when possible, to reconstruct paleomobility within one individual's lifetime. To clarify this, the number of samples collected from each cemetery is shown in parentheses.

and individuals who died in adulthood are over-represented. Despite these limitations, we can reconstruct age identities in cemeteries like Solcor-3, which were excavated more recently. Even in cemeteries with only cranial elements available, some aspects of age and its relationship to different social identities can be reconstructed through, for example, isotopic analysis of dental enamel that formed in the first years of life.

Community Identities through Cranial Vault Modification

Practitioners of cranial vault modification intentionally reshape the head using binding fabrics and/or stiff pads during the first years of life, when the bones of the skull are malleable (Blom 2005; O'Brien and Stanley 2013; Tiesler 2014; Torres-Rouff 2008). Cranial modification is an ascribed symbol of group identity and a permanent signifier of social identity imposed upon children; it reflects a decision made by community members and likely represents Wiessner's (1983) emblemic style. In the Andes, modified head shapes appear to be culturally dictated and related to community identities (Blom 2005; Cocilovo and Zavattieri 1994; Torres-Rouff 2002). This cross-generational symbolic decision serves as a relatively stable cultural feature, ideal for analyses of community identity and social change.

Not surprisingly, the global practice of cranial vault modification has significant regional variation. The most common forms of cranial vault modification in the Andes are annular, in which bandages are used to force the head into a conical form, and fronto-occipital or tabular, in which stiff pads or boards are used to flatten the front and back of the head while allowing parietal expansion (figs. 3, 4; Dembo and Imbelloni 1938). Minor variations to natural head shape, such as those created by casual use of head wraps, would not have conveyed visible markings of community identity among the living. We documented presence, type, and degree of modification in 1,146 individuals and then considered the results in relation to sex, geographic origins, and mortuary context.

Social Identities in Mortuary Contexts

Through mortuary behavior, individuals maintain and/or manipulate the social identities of the dead (e.g., Binford 1971; Bloch and Parry 1982; Brown 1971; Metcalf and Huntington 1991; Saxe 1970; Tainter 1978). Therefore, mortuary contexts are integral to understanding the relationships between different social identities (e.g., Chesson 2001; Goldstein 2006; Knudson and Stojanowski 2009*b*; Rakita et al. 2005). In San Pedro de Atacama, analyses of mortuary artifacts have proven useful, particularly for the Middle Horizon. For example, Oakland Rodman (1992) argues that certain features in tunics are signs of Tiwanaku ethnic identity. In addition, hallucinogenic snuffing paraphernalia may be associated with high status and ritual practice; stylistic attributes of the snuff tablets excavated from several Middle Horizon sites have been extensively analyzed (e.g., Niemeyer et al. 2015; Torres et al. 1991). Similarly, metal objects are generally associated with prestige, and ore sources are well established (Lechtman 2014; Llagostera 2004; Salazar et al. 2014). Finally, ceramic style and production techniques have been useful when examining the nature of Tiwanaku influence in the Atacama (Stovel 2001; Uribe 2002).

Our analysis of mortuary behavior focused on detailed field notes and photographs, used to provide cemetery descriptions and contextual information for each burial, as well as on the mortuary objects themselves. In addition to analyzing the distribution of artifacts and artifact types to assess potential distinctions both within and between cemeteries, we focused on particular mortuary elements that may reflect social identities. These include analyses of tomb construction, the number of bodies interred in each grave, the composition of the complete mortuary assemblage, and particular elements that convey emblemic information (Wiessner 1983). Mortuary textiles, snuffing paraphernalia, and metal objects are particularly important in our analysis, although distinct clusters of grave goods may function in the same way in other regions. We used χ^2 and cluster analyses to compare the data sets from groupings based on time period, sex, burial, cemetery location, and object interrelationships.

Results: Immutable and Mutable Aspects of Social Identity through Bioarchaeology and Biogeochemistry

We argue that certain aspects of identity derive from immutable aspects of our biological selves. An individual cannot change to whom or where they were born, yet genetic relationships and geographic origins strongly impact lived experiences. These data can provide information about social identities that is not accessible through other means. Here, we investigate immutable identities through studies of genetic relationships and geographic origins to elucidate the complexities of this element of identity. Other social identities are more dynamic or mutable and are expected to transform throughout the life course. Here, we investigate community identities through intentional cranial vault modification, an ascribed symbol of group social identity that cannot be changed after it is imposed on an individual early in life, although its social meaning and significance may change over time. We investigate more mutable social identities, such as gender, age, ethnic, or status identities, through an analysis of mortuary contexts, including mortuary objects such as mortuary textiles, snuffing paraphernalia, and metal objects.

Analyses of cranial nonmetric and metric traits demonstrate that biological difference between groups diminished in the Late Intermediate Period when compared with the earlier Middle Horizon sample. Our nonmetric data show numerous significant differences between cemeteries in the Middle Horizon but not in the Late Intermediate Period (Torres-Rouff, Knudson, and Hubbe 2013). While it appears that the Middle Horizon was a time of great biological diversity in the San Pedro de Atacama oases, and hence a time of more variability in biological identities, the Late Intermediate Period saw a

Figure 3. Lateral and posterior views of the cranium of Individual 11,648, buried in the cemetery of Caspana in the upper Loa River Valley, illustrating a typical annular pattern of cranial modification. A color version of this figure is available online.

surge of genetic homogeneity (Torres-Rouff, Knudson, and Hubbe 2013). When individuals from the two Loa River Valley cemeteries of Toconce and Caspana ($n = 96$) are included, they are significantly different from both Middle Horizon and Late Intermediate Period oasis cemeteries, although not from each other, suggesting that the Loa population was biologically distinct from the population in the Atacama oases. The metric results corroborate this (fig. 5). While the Loa River Valley sites (Toconce and Caspana) are not as different as seen in the nonmetric trait analysis, they appear separated from the San Pedro de Atacama oases sites in the second dimension of the multidimensional scaling plot. Similarly, there is a clear temporal difference among the oasis, with Late Intermediate Period cemeteries concentrated on the lower values of the first di-

Figure 4. Lateral and posterior views of the cranium of Individual 11,233, buried in the Tchecar Túmulo Sur cemetery in the San Pedro de Atacama oases, illustrating a typical fronto-occipital or tabular pattern of cranial modification.

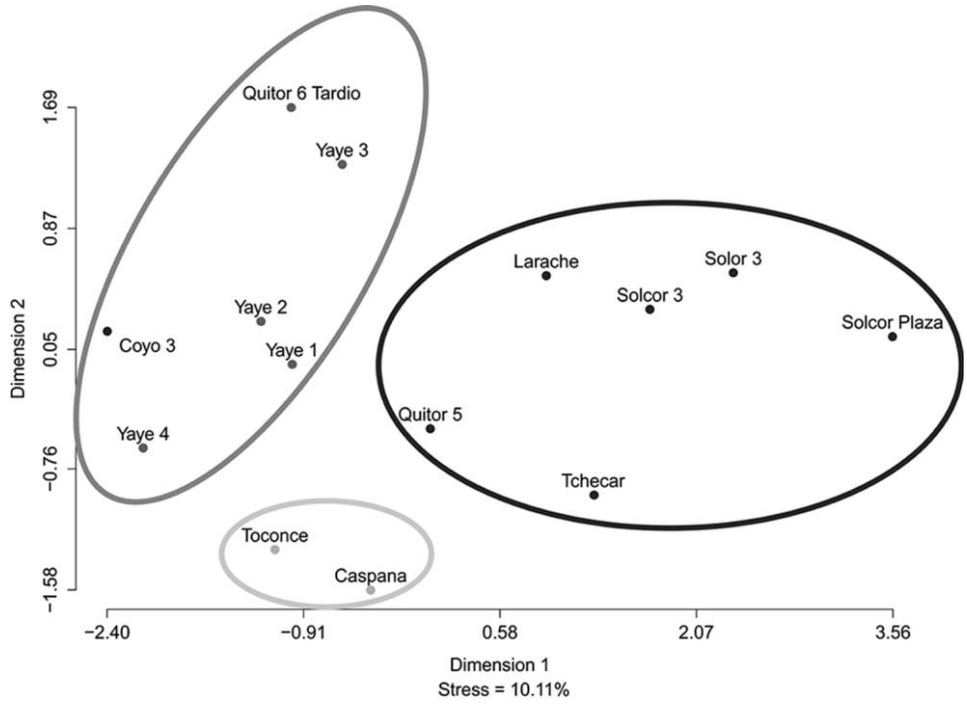

Figure 5. Morphological affinities among series according to nonmetric multidimensional scaling of the Mahalanobis distances matrix. Ellipses represent the period of each series: Middle Horizon sites are in black, Late Intermediate Period sites are in dark gray, and upper Loa River Valley sites are in light gray.

mension and Middle Horizon cemeteries occupying the higher values of this analysis.

Analysis of isotopic data demonstrates that most individuals buried in San Pedro de Atacama cemeteries likely lived in the oases during their first years of life (Knudson 2008; Knudson and Torres-Rouff 2014). However, when compared with the subsequent Late Intermediate Period, the Middle Horizon saw greater isotopic diversity in San Pedro de Atacama, likely the result of increased movement throughout the South Central Andes rather than migration from the area surrounding the Tiwanaku capital (Knudson 2008; Knudson and Torres-Rouff 2014). More specifically, we use a "local" range for San Pedro de Atacama of $^{87}Sr/^{86}Sr = 0.7074–0.7079$ based on archaeological and modern faunal samples (Knudson and Price 2007). For individuals in Middle Horizon cemeteries, mean tooth enamel and bone $^{87}Sr/^{86}Sr = 0.70842 \pm 0.00175$ (2σ; $n = 306$), whereas individuals buried in Late Intermediate Period cemeteries exhibited mean tooth enamel and bone $^{87}Sr/^{86}Sr = 0.70785 \pm 0.00098$ (2σ; $n = 129$). Similarly, stable oxygen isotope data from San Pedro de Atacama cemeteries also demonstrate more isotopic variability in the Middle Horizon compared with the Late Intermediate Period (Knudson, Torres-Rouff, and Stojanowski 2015). During the Middle Horizon, mean $\delta^{18}O_{carbonate\ (VPDB)} = -5.5 \pm 2.2$ (2σ; $n = 252$), whereas during the Late Intermediate Period, mean $\delta^{18}O_{carbonate\ (VPDB)} = -4.6 \pm 1.5$ (2σ; $n = 98$). Finally, in the neighboring Loa River Valley sites, there is no clear evidence for any in-migration (Knudson and Torres-Rouff 2009, 2014). For example, the Late Intermediate Period San Pedro de Atacama samples exhibit mean $\delta^{18}O_{carbonate\ (VPDB)} = -4.7 \pm 1.4$ (2σ; $n = 80$), while the Late Intermediate Period Loa River Valley samples exhibit mean $\delta^{18}O_{carbonate\ (VPDB)} = -4.4 \pm 1.6$ (2σ; $n = 18$). While the Loa River Valley population appears biologically distinct from the San Pedro de Atacama oases, this was likely not the result of migration from the *altiplano*.

Interestingly, there is no statistically significant temporal difference in the presence of cranial modification, which is found in approximately half of the mortuary population during both the Middle Horizon and the Late Intermediate Period of the oases. Of the 676 individuals examined in Middle Horizon contexts, 315 exhibited intentional cranial vault modification (315 of 676; 46.6%), while 215 out of a total of 470 individuals analyzed from Late Intermediate Period contexts exhibited cranial vault modification (215 of 470; 45.7%). During the Late Intermediate Period, cranial modification patterns in the oases shift significantly toward the tabular form, which has been associated with the local area since the earliest occupations, after a period where there was a surge in annular head shaping (Torres-Rouff 2002, 2008). More specifically, there were significantly ($\chi^2 = 16.214$, df $= 1$, $P \leq .0005$) more individuals with annular forms of modification during the Middle Horizon (115 of 315 [36.5%] vs. 34 of 215 [15.8%]). Overall, these data suggest that community identity as defined and displayed through head shape became more homogenous over

time. This parallels the results we see in aspects of community identities as inferred from radiogenic isotope and cranial morphology analyses. The Loa River Valley sites, however, contrast sharply with contemporaneous modification styles in the oases, with 85 of 93 (91.4%) of individuals modified and 73 of 85 (85.9%) displaying annular modification. In both cases, we see a homogenizing of head-shaping patterns in the post-Middle Horizon, although with different local styles. Following Barth (1969), contrasting head shapes between these neighboring groups might have served to distinguish between the two communities and reflect their distinct lineages. Future work on cranial modification that approaches the practice through geometric morphometrics may allow for more nuanced analyses of intragroup distinctions.

The mortuary contexts in the San Pedro de Atacama oases reflect changing relationships with foreign polities as well as broad shifts in different social identities. There is a general difference in displays of status and of interregional contacts between the two periods. Our approach reveals not only this shift but also the layers of complexity in the representation of these identities in the grave. While individuals we might consider elite in the Middle Horizon are buried with foreign objects and plentiful and varied material culture (e.g., Stovel 2013; Torres-Rouff 2008), the Late Intermediate Period sees a loss of clear "eliteness" and differential access to resources in the mortuary context. However, our data suggest that these general patterns vary both within and between cemeteries. Within the Middle Horizon sample, some cemeteries show a radically unequal distribution of rich grave goods (Larache and Casa Parroquial), while others demonstrate evidence of incipient inequality (Solcor-3), and still others reflect a more egalitarian presentation in the grave (Tchecar Túmulo Sur and Quitor-5). For example, foreign goods and other signs of interaction with groups outside the oases are distributed throughout the Solcor-3 cemetery and associated with contexts that are rich in metals as well as in goods more generally, yet they are rare or even absent in poorer cemeteries, such as Solcor Plaza. There are a series of cemeteries that occupy a spectrum between these two extremes; Tchecar Túmulo Sur reflects less apparent social differentiation with no opulent graves and few prestige goods, although there is still variety in the distribution of mortuary goods within the cemetery. Interestingly, there is evidence for 19 Tiwanaku objects among the 132 individuals at Solcor-3 and 10 Tiwanaku objects for the 202 individuals at Tchecar Túmulo Sur, showing a clear difference in frequency between the sites. However, it is noteworthy that the nature of these foreign objects also varies, with a preponderance of objects tied to ritual and group identity (snuff paraphernalia and textiles) at Solcor-3 and primarily domestic objects (ceramics, containers, and spoons) at Tchecar Túmulo Sur. Taken together, these Middle Horizon mortuary contexts suggest the emergence of new social classes and social identities that were crafted to reflect the increased interaction and social standing of the community as well as of specific individuals during the process of burial and its attendant ritual.

During the Late Intermediate Period, the homogenization evident in biological data and in cranial modification practices extends to the grave, perhaps because the Late Intermediate Period population is more focused on presenting group identity in place of individualized memorials. In the oases, the style of burial does not shift, suggesting that some elements of mortuary ritual remained the same, although grave contents change dramatically. For example, the Late Intermediate Period cemetery of Quitor-6 Tardío shows a strong decrease in both the quality and quantity of grave goods accompanying an individual in death (particularly when compared with the neighboring Middle Horizon cemeteries of Quitor-5 and Quitor-6) and a loss of material culture from distant regions. Individuals in Late Intermediate Period graves were predominantly buried with objects of economic significance. At Quitor-6 Tardío, we see this manifest in the plethora of graves with baskets that contain foodstuffs and as well as ceramics and other household materials. Occasional pieces of metal in the cemetery are almost exclusively objects of personal adornment and not tied to ritual paraphernalia. This widespread pattern does have some variation, however, as the dramatic material poverty of the Late Intermediate Period Yaye cemeteries is more notable than that of centrally situated cemeteries. The transitional Middle Horizon/Late Intermediate Period cemetery of Coyo-3 already shows these later-period tendencies, with most graves containing ceramics, baskets, and gourds as well as metal, again overwhelmingly in the form of personal adornment, in place of the more varied and complex goods of the Middle Horizon. These patterns of homogenization hold particularly true in the Loa River Valley cemeteries, where individuals are buried in large communal graves that blur individual distinctions. Together, these Late Intermediate Period data suggest that biological homogenization was fully reflected in cultural markers of identity in the grave. Moreover, it appears that Late Intermediate Period inhabitants sought to emphasize their community at the cost of representing individual differences in their mortuary practices.

Discussion

Here, we first present the general trends and our interpretations of the various social identities manifest during the Middle Horizon to Late Intermediate Period transition in the San Pedro de Atacama oases and the neighboring Loa River Valley. After discussing our integrative approach and what we have elucidated about social identities in the past, we then illustrate the value of a multiscalar approach that simultaneously examines individual lived experiences in the context of larger patterns. We end this section with closer look at two cemeteries, Solcor-3 and Solcor Plaza, and then at specific individuals from the Middle Horizon and Late Intermediate Period in San Pedro de Atacama.

Based on multiple lines of bioarchaeological and biogeochemical evidence, we argue that the Middle Horizon to Late Intermediate Period transition in the Chilean Atacama was broadly characterized by a shift from heterogeneity to homo-

geneity. More specifically, genetic relatedness through biodistance analysis, geographic origins through isotopic data, and community identity inferred from cranial modification styles all become more homogenous over time. Mortuary artifacts also became more homogenous during the Late Intermediate Period, reflecting a reduction of individual commemoration in the grave. We note that the heterogeneity of mortuary behavior during the Middle Horizon, as revealed through our data, is also supported by recent iconographic and sourcing studies of snuffing paraphernalia and metal artifacts (Salazar et al. 2014). In addition, this later-period homogeneity is similar to that found in the neighboring Calchaquí Valley of Argentina during the Late Intermediate Period, where "funerary practice privileged the representation of a person dissolving into the communal, of the collective over its constituent parts, privileging the 'us' more than the 'I'" (Acuto, Kergaravat, and Amuedo 2014:323).

Our approach allows us to explore identity formation and presentation at the broad scale of the cemetery or community and in the individual lived experience. To better understand the archaeological, bioarchaeological, and biogeochemical heterogeneity seen during the Middle Horizon at the larger social scale, we focus on two different Middle Horizon cemeteries, Solcor-3 and Solcor Plaza. Both are located within the contemporary Solcor *ayllu* (a kin-based geographic unit) and are spatially linked and temporally contemporaneous. In addition to examining variability and social identities at the group level, we argue that one important aspect of our integrated multiscalar bioarchaeological approach is the ability to examine the multiplicity of identities at the level of the individual. To illustrate this, we examine and contextualize the bodies and graves of particular individuals to explore individual lived experiences as well as temporal differences in social identities, and particularly group identities, in the Middle Horizon and Late Intermediate Period.

Although contemporary, it is clear that the individuals buried at the centrally located cemeteries of Solcor-3 ($n = 116$) and Solcor Plaza ($n = 77$) displayed differing social identities between their communities and in their bodies and graves (Nado et al. 2012; Torres-Rouff 2011*a*). Considered as a whole in the biodistance studies, the two Solcor cemeteries were not significantly different from each other (Torres-Rouff, Knudson, and Hubbe 2013). This is particularly interesting, as it suggests that these burial populations were biologically related but crafted social identities that reflected individual and group difference. Solcor-3 demonstrates a certain cosmopolitanism lacking in the Solcor Plaza burials, as seen in material from southern Bolivia and northwestern Argentina as well as prestigious Tiwanaku goods. These Tiwanaku materials include ceramics, snuffing paraphernalia, and textiles in the form of bags and tunics with Tiwanaku iconography. In addition, 28 enamel or bone samples from 19 individuals exhibit radiogenic strontium values that are outside of the "local" radiogenic strontium isotope range for the oases and are consistent with geographic origins outside of the oases. The presence of a number of potential foreigners and foreign goods suggests the important role that some individuals buried at Solcor-3 may have played in the burgeoning interregional exchange networks of the Middle Horizon. In contrast, Solcor Plaza burials included only a few ceramics from nearby regions of southern Bolivia; radiogenic strontium isotope data show four individuals whose values place them outside the local region. The distinction between these neighboring and contemporaneous cemeteries in their association with outside groups suggests that the choice made in burial location itself reflects aspects of an individual's identity.

When we look beyond foreign objects to a consideration of mortuary goods writ large, the disparity between sites in the abundance of goods is clear, as it is in so-called prestige goods (Torres-Rouff 2011*a*). For example, aside from the four foreign ceramics mentioned above, no other goods stand out as possible signs of prestige at Solcor Plaza, although two individuals were buried in graves with more abundant goods than typical for the cemetery. Metal goods in the forms of plaques, ornaments, or jewelry are frequently associated with status in the Middle Horizon; they are radically uneven in their distribution between these two cemeteries, with 34 metal objects in Solcor-3 graves and only one at Solcor Plaza. Even considering the two somewhat more extensively outfitted graves from Solcor Plaza, the difference in range of burial style between the cemeteries is substantive, and these outliers fall well below the level of abundance seen at Solcor-3. Our broad assessment of the mortuary assemblages suggests that the sites housed the dead of different segments of the community or, more likely, segments that also chose to represent themselves differently in death.

At these two cemeteries, as well as throughout the Middle Horizon sample, our research shows that sex seems to have played a role in the distribution of goods. For example, weapons in graves are common, and while there is a statistically significant difference between the sexes ($\chi^2 = 27.066$, df $= 1$, $P \leq .0005$), weapons are still represented in numerous graves with females. What does show a surprisingly strong relationship to sex is the snuff complex. During the Middle Horizon, we observe the introduction and rapid dominance of the snuff complex—defined by small, portable, frequently decorated trays accompanied by tubes for inhaling, small spoons, and leather bags of snuff contained within elaborate textile bags (fig. 6; Torres 1987). While snuff tablets have been found in graves that contain females among the individuals whose skeletal material could be used to determine sex in our analyses, they are found on the bodies of males in all but two cases at Solcor-3 and Solcor Plaza ($n = 32$). Llagostera and colleagues (1988:84), in their detailed study of the snuff complex, indicate that those few females that they see buried with snuff paraphernalia (occasionally a tube or tray, rarely a complete snuff kit) were all considerably older, arguing that their access was limited by maturity. This suggests the possibility that maleness might be tied to access to if not control over the ritual sphere. Snuff objects are imbued with great social significance and frequently

Figure 6. One of the sets of snuffing paraphernalia interred with Individual 13,111 in tomb 112 of the Solcor-3 cemetery in the San Pedro de Atacama oases. A color version of this figure is available online.

carved with iconography tied to shamanism and power (Llagostera, Torres, and Costa 1988; Torres 1987). We might see a parallel in the three gold *keros* (chicha drinking vessels)—the only objects of their kind in the oases—that are buried with an adult male of high social standing at the contemporaneous site of Larache (Torres-Rouff et al. 2015). Here, the snuff kits are carefully packaged and placed—part of the visible display of social identities in the grave—and seem to be the nearly exclusive purview of biological males and, we would argue, individuals gendered as men.

Interestingly, cranial modification styles at Solcor-3 and Solcor Plaza are broadly distributed with both types and their two variants represented. However, cranial modification styles are present in quite different proportions in each cemetery, also reflecting the creation of cultural differences suggested by the mortuary analyses. As is standard in the oases throughout time, there are no significant differences between the sexes in the practice of cranial modification, implying the presentation of a possible lineage or ethnic identity (Torres-Rouff 2002). More of the population is modified at Solcor-3 (51% vs. 39%), and tabular forms account for 62% of the modified population at Solcor-3 (36 of 58) and only 31% of those at Solcor Plaza (9 of 29). This suggests that, in life, the individuals who were to be buried at each cemetery included groups that looked unlike each other.

Changing our scale from the cemetery to consider the individual experience, the cosmopolitan nature of Solcor-3 is also apparent in specific graves. Here, we would like to highlight a series of tombs and individuals who are distinct from their contemporaries but whose bodies and graves, contextualized within their time and place, give us a strong glimpse into individual lives and identities. The individuals in tombs 107, 112, and 113 at Solcor-3 were buried in single-pit burials near each other in the cemetery with abundant goods and sharing a small group of items with unique iconography, suggesting a shared experience (fig. 7). In the bodies and graves of these two adult males (107 and 112) and one adult female (113), we argue that a number of social identities are visible and coincide with and build on the patterns in the Middle Horizon locally and at Solcor-3 specifically.

Individual 107 was a young adult male (25–35 years old at the time of his death) whose body was dressed in five layers of textiles, including two tunics with Tiwanaku iconography, tying him to the foreign polity through this particularly Andean means of identity construction and display (e.g., Baitzel and Goldstein 2014). While the grave does not show clear evidence of all of childhood, we know that, as an infant, his head had been shaped in a tabular erect style, the most common form at this time (fig. 8). His hair was worn long and made into a ponytail wrapped in black cords, and he wore a series of plaited headbands (Conklin 1997–1998). Unlike most individuals in the oases, he died with most of his teeth in place and in good health (Hubbe et al. 2012), arguing for a lifetime of access to resources. Similarly, his skeleton had no signs of disease or deprivation in childhood, coinciding with the abundance that typifies the period; together with the dental data, this suggests the possibility of increased access to resources even as a child. He had evidence of a healed projectile injury on two ribs implying that, even at his young adult age, there was long-term healing from serious injury. These skeletal traumas suggest engagement in conflict—in this case, not the low-scale interpersonal conflict commonly seen in the oases (Torres-Rouff 2011*a*; Torres-Rouff and Costa 2006) but perhaps conflict as a result of interaction with other groups.

In his well-appointed grave, Individual 107 was surrounded by 10 baskets, three local ceramics, one Argentine vessel, 19 pieces of copper adornment, a small gold bell-like object, four textile bags, and a complete snuffing kit, plus a number of tools and weapons that included an axe and bows and arrows. Several of his baskets were decorated with small figures that paralleled those placed in the graves of Individuals 112 and 113. Although many adult males from this cemetery were interred with snuff paraphernalia (Torres et al. 1991), this individual's paraphernalia included an elaborately carved tray with Tiwanaku iconography (fig. 9) as well a corresponding snuff tube with local iconography wrapped in a gold sheet;

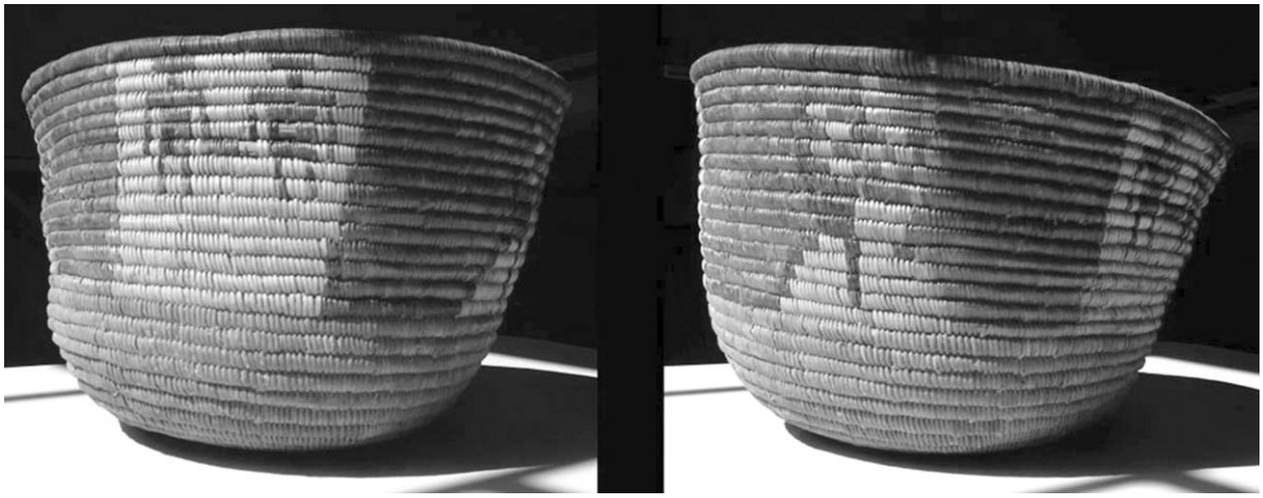

Figure 7. Basketry depicting shared iconography buried with Individual 13,118 in tomb 107 of the Solcor-3 cemetery in the San Pedro de Atacama oases. A color version of this figure is available online.

these were then wrapped in a textile with Tiwanaku iconography. This melding of local and foreign occurs elsewhere in his tomb, as in the ceramic vessels, suggesting that Individual 107 was fully integrated into the large Middle Horizon exchange networks and that he may have derived a particular social identity from this role. Support for this also comes from radiogenic strontium isotope data from three dental elements that formed at different times and are all outside of the San Pedro de Atacama "local" range (ULI1 $^{87}Sr/^{86}Sr = 0.70809$, LRM2 $^{87}Sr/^{86}Sr = 0.70812$, LRM3 $^{87}Sr/^{86}Sr = 0.70839$) and are consistent with movement between the oases and the neighboring *altiplano*. The weapons, in concert with his skeletal injury, may speak to a social identity related to this individual's experience in conflict that intersected with other identities, including age and gender identities, as well as his engagement with trade networks and his foreign origins.

Individual 112 was a middle-aged male (35–50 years old) whose head shape was unaltered in infancy. His body, like most others, was shrouded in numerous textiles and, in his case, prominently topped with a cylindrical hat made of red feathers, possibly from local Andean flamingos (fig. 10). He had lost most of his teeth over the course of life and showed evidence of degenerative joint disease, all in keeping with his more advanced age and what seems to have been the long-term effect of the Atacameño diet (Hubbe et al. 2012). He had evidence of a healed projectile injury on his left distal humerus, also illustrating his involvement in some form of conflict, although when this occurred is less clear given the advanced healing and his older age. His grave was less opulently outfitted than that of Individual 107 with regard to volume and clear luxury items; however, it was no less replete with items indicative of an individual life. In addition to the aforementioned shared baskets, there were other baskets, two local ceramics, a small ceramic drinking vessel with a camelid carved into the handle, a silver pectoral, two sets of bows and arrows, an axe whose blade had been replaced with a camelid scapula, and, interestingly, two complete snuffing kits in polychrome textile bags (fig. 8). No other individual buried at Solcor-3 carried two snuff kits to their grave. Unlike Individual 107, both his trays were simple—one undecorated and the other with a few stone inlays in the flat panel (Torres et al. 1991). The presence of a set of snuff paraphernalia, drinking vessels, and a weapon whose blade had been rendered useless all provide hints of engagement with a ritual role. Moreover, the repetitive pairing of

Figure 8. Lateral view of the cranium of Individual 13,118 in tomb 107 of the Solcor-3 cemetery in the San Pedro de Atacama oases illustrating tabular erect modification. A color version of this figure is available online.

Figure 9. Tiwanaku iconography carved on a snuff tray that accompanied Individual 13,118 in tomb 107 of the Solcor-3 cemetery in the San Pedro de Atacama oases.

elements in his mortuary assemblage is noteworthy and syncs not only with larger Andean traditions (DuViols 1973) but also with the assemblage of Individual 113 detailed below. While he had a textile bag with iconography that may be tied to groups from southern Bolivia, in contrast to Individual 107, he had no express ties to Tiwanaku and seems less expressly engaged in trade networks.[2]

The last of these individuals is Individual 113, a young adult female (25–35 years old) with a pronounced tabular erect head shape whose grave was also elaborately furnished. Her skeleton suggested that she had been in good health, retained most of her teeth, and showed no evidence of nutritional stress in her youth or of traumatic injury. She was buried with two ceramics, 10 baskets, fibers, and spinning materials. A large textile bag laid across the back of her shoulders included a series of finely woven small polychrome bags containing pigments, fibers, freshwater shells, a gypta stick carved with a small figure wearing a copper mask (fig. 11) tucked into a small ceramic vessel, and a pyro-engraved bone with Tiwanaku iconography (fig. 12). While her possessions were a sharp contrast to the more typical accoutrements for males at this cemetery, Individual 113 still carried items that indicated a higher social standing as well as connections to distant groups and particular social identities. Like Individual 107, she exhibited "nonlocal" radiogenic strontium isotope values in three different dental elements (LLI1 $^{87}Sr/^{86}Sr = 0.70805$, ULM2 $^{87}Sr/^{86}Sr = 0.70805$, URM3 $^{87}Sr/^{86}Sr = 0.70808$) consistent with movement between the oases and the neighboring *altiplano*. As indicators of potential foreign origin, these values also function much like the shared baskets, tying two individuals together in their death and suggesting that they shared another form of social identity in life. Finally, it is possible that some aspects of the contrasting contents of these graves were tied to gender roles inside this community in addition to individual social identities.

Considering the three individuals together, we can see the varied ways in which individuals interred at Solcor-3 engaged with the growth of social hierarchies in the oases at this time and the growth of San Pedro as a node in larger exchange networks. Their bodies and graves reflect the cosmopolitan nature of the Middle Horizon as well as the distinctions between groups and individuals. They carry symbols of affiliation with particular groups, of their own involvement in the events of their time, and of their roles within the community.

If we consider these three linked and potentially elite graves from the Middle Horizon, they stand in sharp contrast to the data collected from Late Intermediate Period individuals, even those from cemeteries whose Middle Horizon portions suggest similar prominence to Solcor-3. For example, Individual 352 from tomb 31, a burial dated to the Late Intermediate Period

Figure 10. Excavation photograph of Individual 13,118 in tomb 112 of the Solcor-3 cemetery in the San Pedro de Atacama oases. A color version of this figure is available online.

2. We do not have radiogenic strontium isotope data to determine geographic origins for Individual 112 as a result of his poor dental health.

Figure 11. Carved gypta stick interred with Individual 13,120 in tomb 113 of the Solcor-3 cemetery in the San Pedro de Atacama oases.

portion of the Quitor-6 cemetery (Quitor-6 Tardío), was an adult male (25–35 years old). Like the other individuals sampled from this site ($n = 7$; table 1), he exhibited "local" $^{87}Sr/^{86}Sr$ values (LLM3 $^{87}Sr/^{86}Sr = 0.70774$), consistent with geographic origins in the oases. He showed no evidence of suffering from nutritional deprivation in his youth despite the assumed poverty of the Late Intermediate Period. His head had been modified in the tabular erect style that came to dominate this period and suggests the emphasis of a local group identity. Despite his young age, his body had evidence of degenerative joint disease, particularly affecting the elbow, which may suggest a pattern of body use that extended into his youth. His dentition, again as was typical in the oases, especially in this period when we see a rise in caries and, some argue, a decrease in meat consumption (Costa, Neves, and Hubbe 2004; Hubbe et al. 2012), demonstrated extensive evidence of caries and attrition. His skull displayed a healed depressed cranial fracture.

Interestingly, Individual 352's tomb was one of only a small number ($n = 13$ of 42) that had a circular array of stones on the surface to signal it in addition to the typical wooden marker as well as a layer of algarrobo (*Prosopis* species) above the body (Costa 1988:103). In keeping with general patterns for this later period, grave wealth was drastically reduced (Schiappacasse et al. 1989; Costa 1988, Costa and Llagostera 1994). Individual 352's burial included beads, mortuary textiles, and a hat, and items perhaps related to his activities in life, including arrows, wooden toggles used in camelid herding, and two small local ceramics. The dearth of goods is similar to that seen in poorer and more peripheral cemeteries as well, such as the Yaye cemeteries, as is the nearly complete lack of foreign goods, which likely results from the collapse of the large interregional networks of the Middle Horizon. However, the extra attention paid to his burial in the construction of the tomb implies the importance of the moment of burial and mourning, perhaps amplified by his young age at death.

Finally, the nature of our approach allows our scale to shift from individual to cemetery and, in this case, also to a broader look at the region, where we can briefly compare trends in the San Pedro de Atacama oases with those in the neighboring upper Loa River Valley. The results of our biodistance analyses suggest the Loa population was biologically distinct from the population in the San Pedro de Atacama oases. However, there is no evidence for first-generation migrants from the Tiwanaku heartland at Caspana or Toconce (Knudson and Torres-Rouff 2009). It is noteworthy that cranial modification patterns are dramatically distinct from those of the oases (Knudson and Torres-Rouff 2009), suggesting the maintenance of cultural distinctions in social identities despite homogeneity in the immutable aspect of their identity signified by geographic origins. Finally, at Caspana, individuals were buried in communal *chullpas* rather than in the individual pit burials used in the Middle Horizon and Late Intermediate Period in the San Pedro de Atacama oases but with mortuary ceramic assemblages that consisted largely of local San Pedro de Atacama styles (Knudson and Torres-Rouff 2009). Therefore, despite linguistic and architectural ties to the *altiplano*, individuals buried in these

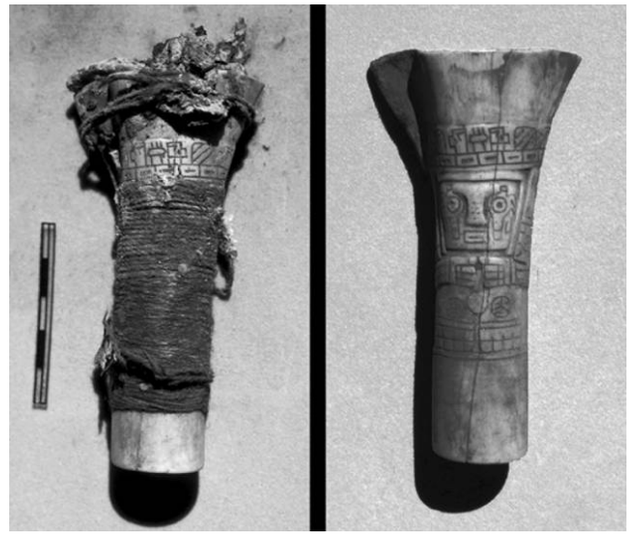

Figure 12. Pyro-engraved camelid bone with Tiwanaku iconography interred with Individual 13,120 in tomb 113 of the Solcor-3 cemetery in the San Pedro de Atacama oases.

cemeteries do not appear to be *altiplano* migrants. Instead, we argue that individuals in the Loa River Valley and the San Pedro de Atacama oases constructed and consciously maintained distinct community identities.

Conclusion

Rather than examine "identity" in the archaeological record with one or two lines of evidence, we use an integrated and contextualized multiscalar bioarchaeological approach to examine the complexities of both immutable and mutable aspects of social identities using multiple lines of evidence. Our research complements other integrative approaches in the Andean Middle Horizon (Baitzel and Goldstein 2014; Salazar et al. 2014) and elsewhere, and we look forward to future research on this complex topic. In particular, we hope that our approach provokes greater integration of bioarchaeological and individual life-history data into these broader analyses. Following the recent call to synthesize life-history approaches with population-level analyses (Zakrzewski 2015), we combine multiple analyses at the levels of the individual and the population. This approach allows us to document aspects of individual lives and also look broadly to read the patterns created at the level of the group or population and open new avenues for research. By combining bioarchaeological and biogeochemical data, we find that we can move beyond understanding the Middle Horizon and Late Intermediate Period as simply periods of prosperity and tumult. A closer look at cemeteries and individual lives allows us to see the interplay between the many social identities carried by any one person from sex to status to social engagement. Considering the integration of biodistance and geographic origin data, we can see changes in the population and explore the ways that integration into exchange networks and the oases' role as a node for travelers was reflected in the individual experiences of Atacameños. In this, we follow White and colleagues (2009:158), who convincingly argue that "the embodiment of place through local water consumption cannot be considered a conscious or a social act of identity expression, but movement between or among landscapes is almost always a conscious and social act that does become embodied in our skeletal chemistry." Finally, consideration of the cultural aspects of identity allows us to document the ways in which these could be manipulated to enhance differences between groups.

Our case study was a long-term and multifaceted discussion of social identities that has underlined a number of directions for new investigations and areas for greater emphasis in future research. For example, more temporal control through radiocarbon or other forms of dating might allow for an exploration of multicomponent cemeteries or distinct cemeteries in use simultaneously. This is particularly important, since social identities change over the life of an individual as well as over societal time. Incorporating this sort of dynamic understanding of the fluidity of identities, particularly those tied to age and the formation of social identities in juveniles, would also provide a useful temporal perspective. In addition, light-stable isotopes of carbon and nitrogen could allow paleodietary reconstruction to complement our understanding of the individual experience. Given the importance of food choices in the construction and maintenance of social identities (Cuéllar 2013), paleodietary data could, for example, allow us to identify individuals with greater access to ritual resources like maize beer. Finally, incorporating recent theoretical contributions to the study of postmortem agency would allow an examination of how social identities in the Middle Horizon to Late Intermediate Period transition could have been shaped by the dead (Tung 2014). Through research that not only collects and considers but also integrates multiple lines of bioarchaeological and biogeochemical evidence in the analysis of individuals and groups, we can reconstruct the flexibility and fluidity—or the immutability—of identities in the past.

Acknowledgments

We are grateful for funding from the National Science Foundation (BCS-0721229 and BCS-0721388), Arizona State University, Colorado College, and Dumbarton Oaks. We thank Blair Daverman, Laura King, Emily Stovel, and William Whitehead for their contributions and support. We thank the personnel of the Archaeological Chemistry Laboratory and the W. M. Keck Foundation for Environmental Biogeochemistry at Arizona State University for laboratory access and help with sample processing and analysis, particularly Graduate Research Associates Allisen Dahlstedt, Sara Marsteller, Kristin Nado, and Emily Schach. We also thank Mark Hubbe, M. Arturo Torres, and the staff of the Instituto de Investigaciones Arqueológicas y Museo in San Pedro de Atacama for their generous support of our research. Finally, we thank the editor, Mark Aldenderfer, as well as three anonymous reviewers for their constructive evaluation and comments.

Comments

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The approach developed by Torres-Rouff and Knudson is built upon an innovative theoretical framework for the study of multilayered social identities and a robust interdisciplinary bioarchaeological design. At a methodological level, the authors integrate tools for the study of fixed or immutable aspects of identity, such as biological relatedness and geographical origin, and flexible or mutable aspects, such as material culture and

religion. The robustness of the approach lies precisely in the combination of a broad theoretical framework with a sophisticated methodological approach. Namely, we can identify fertile research programs by their capacity to answer innovative questions with the archaeological record at hand.

The authors utilize a "multiscalar" perspective for the study of human identities, encompassing fixed and flexible aspects that occur at different levels between the individual and the population. Biological and social changes that occur along the life histories of individuals add another key dimension of variation to the fluid field of identity construction. I choose to comment on the multiscalar aspect of research, since I consider it to underscore two issues of wide archaeological interest. On the one hand, the inherently multiscalar character of historical processes acts as a key source of social variation. On the other hand, it demands a theoretical framework with the capacity to articulate processes that operate under very diverse constraints and enablers. It is my suggestion that this is most efficiently done by combining theoretical tools from different—but compatible—sources.

The variable interactions between human decisions and processes occurring at the level of individuals, their families, communities, and populations are in themselves a source of behavioral variation through time. There is feedback between the levels of individual lived experiences and identities and the larger patterns recorded at the level of populations. The multiscalar approach has the capacity to identify the extent to which this interplay produces the variation that we observe in the archaeological record. The main conclusion of the paper illustrates this issue by suggesting "that the Middle Horizon to Late Intermediate Period transition in the Chilean Atacama was broadly characterized by a shift from heterogeneity to homogeneity." This involves a fundamental shift from an emphasis on the individual to one on the community as the level with the stronger influence in the construction of identity.

As I mentioned above, the multiscalar nature of historical processes requires that we utilize equally complex theoretical frameworks. Human life history, which is a key component of a bioarchaeological approach to social identities, provides a wonderful case in point of this issue. Currently, different theoretical fields converge in the study of diverse levels of human life history. On the one hand, the trade-offs between economic and reproductive decisions, including birth spacing, weaning age, and social cooperation, are key issues of an approach rooted in evolutionary anthropology (Hawkes and Paine 2006; Kaplan et al. 2000). While placing an emphasis on individual decision-making in the short term, these researchers seek to understand the socioecological context where long-term evolutionary processes take place. On the other hand, recent bioarchaeological research, where Torres-Rouff and Knudson's work figures prominently, is focusing on the analysis of different human tissues as an entry to changes along life history, including place of origin and residence (Knudson et al. 2014; Weber et al. 2010). This research takes nourishment from—although it is not exclusively derived from—social agency and practice theory (e.g., Knudson and Stojanowski 2008). From my perspective, while these fields of research underscore distinctive domains that operate on different analytical scales, they are ultimately part of the same complex historical processes that we seek to understand. In this context, the explanatory capacity of archaeology will grow substantively as a result of the confluence of compatible theoretical frames, which are tied together by common interests such as the role of social identity in the course of human life histories. I think that, in addition to the significant contribution that Torres-Rouff and Knudson's research is making to Andean archaeology and bioarchaeology, it will also play a role in the wider landscape of archaeological theory.

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As members of a comparatively young discipline, bioarchaeologists continue to experiment with various methodological approaches, types of evidence, and theoretical models. These have been successfully combined more frequently of late, with Torres-Rouff and Knudson's theoretically informed, holistic interpretation of demographic, biogeochemical, and archaeological evidence being a particularly sophisticated example. Building on the previous work of one of the authors on identity (Knudson and Stojanowski 2008, 2009*a*, 2009*b*), they drill down into a concept that is too frequently glossed over in bioarchaeological research by considering how identities are embodied biologically and socially and by exploring the recursive relationship between expressions of identity at individual and group scales.

At its strongest, the article argues for the efficacy of a multiscalar approach and delivers on this promise. In one particularly compelling instance, Torres-Rouff and Knudson combine biodistance and geographic origin data to "see changes in the population and explore the ways that integration into exchange networks . . . was reflected in the individual experiences of Atacameños." Here and elsewhere, they successfully analyze multiple lines of evidence at large, middle, and small scales while also attending to the connective tissue between them.

However, flaws exist with the model's terminology and the underlying premise that these terms imply. Namely, it relies on the sociohistorically specific (modern Western) assumption that the individual—characterized by autonomy and indivisibility—is a primary locus of identity (Fowler 2004). Archaeologies of personhood have been interrogating this assumption for the past two decades, and its practitioners continue to explore how identities can be embodied in personhoods that are formed relationally and along multiple dimensions (Clark and Wilkie 2006; Fowler 2016). The authors'

understanding of identity also tends to impose those aspects most accessible to bioarchaeologists (e.g., sex, gender, age, socioeconomic status, and biological relatedness) on past bodies and lives. However, in the absence of corroborating evidence, we cannot assume that direct equivalents of these aspects existed or were salient in a society so distant in time and space from our own (Meskell 1999). A welcome exception is Torres-Rouff and Knudson's treatment of "community identity": incorporating elements of age, ethnicity, and residence based on observed patterns of cranial vault modification, this aspect of identity is drawn from the available evidence rather than being imposed on it. As they move forward, I encourage the authors to engage with, and even interrogate, the cultural specificity of the identity constructs and related terminology that their model employs.

Torres-Rouff and Knudson are to be applauded for recognizing that identities are complex, intersectional, and fluid. Indeed, their integrative approach accounts effectively for numerous axes of identity and their locations along "a spectrum of expression." However, the qualities of intersectionality and fluidity do not fare as well. While the case studies allow the detailed exploration of residential mobility, health and diet, biological relatedness, social and ritual status, and mortuary practices, the treatment of age, sex, and gender is comparatively superficial. For example, sex is focused upon in terms of its correlation with the distribution of mortuary artifacts in the Middle Horizon sample. Although the authors conclude that snuff kits "seem to be the nearly exclusive purview of biological males and . . . individuals gendered as men," they fail to pursue the intriguing point that "those few females . . . buried with snuff paraphernalia were all considerably older." This is a missed opportunity to examine how maleness, femaleness, and advanced age were intertwined with social and ritual status (as seen in access to prestige goods). Perhaps using Torres-Rouff's own (2011*b*) treatment of embodied masculinities in Chile's El Molle complex as a template, future applications of this model could enhance its interpretations of lived experiences by attending more to qualities such as sex, gender, and age—which transform across the life course and influence how other aspects of identity are expressed.

The true test for this model will be whether it can be employed successfully in novel contexts. The authors make clear that their "large-scale project-based approach," which draws on multiple large data sets, allows for "stronger and well-supported interpretations." Their longitudinal study incorporated nearly a millennium's worth of archaeological and osteological data, focusing on a period of political and economic transition (when social transformations are most likely to occur). To prove its broader utility, Torres-Rouff and Knudson need to demonstrate that this model is similarly effective when applied to societies that are relatively stable, the more modest data sets that often characterize bioarchaeological research, and a more condensed time span. At the end of the article, the authors describe a number of productive directions for future research, and I hope that they will consider this as another one.

This article is an important example of a middle-range study produced by researchers with a sustained investment in one project area. Torres-Rouff and Knudson have collected, analyzed, and interpreted enough data from the south-central Andes and northern Chile to identify meaningful patterns and synthesize findings about lifeways and lived experiences during the Middle Horizon and Late Intermediate Period. Because their research agenda is ongoing, they can iteratively test this new model in its original setting, for example, via "future work on cranial modification that approaches the practice through geometric morphometrics [which] may allow for more nuanced analyses of intra-group distinctions." Middle-range studies can only take place when a discipline has matured and proven its sustainability. As shown by Torres-Rouff and Knudson's integrative model, bioarchaeology can increasingly offer significant theoretical and methodological contributions to anthropology as a whole. Moreover, understanding how social processes such as identity formation and ethnogenesis were experienced in the past is highly relevant to the present day, as we witness sweeping social and political transformations of our own.

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Torres-Rouff and Knudson present a model for reconstructing identity in the past, leveraging numerous lines of evidence to an extent not done often enough in our field, and making an important contribution by addressing the concept of intersectionality and using a multiscalar approach. The term intersectionality was coined by civil rights advocate and critical race theorist Kimberlé Crenshaw and defined by Davis (2008:68) as the "interaction between gender, race, and other categories of difference in individual lives, social practices, institutional arrangements, and cultural ideologies and the outcomes of these interactions in terms of power." Though feminist and historical archaeologists interested in the nexus of gender, race, and class (e.g., Battle-Baptiste 2011) have engaged with the concept of intersectionality, little has been done, at least explicitly, with the concept in bioarchaeology (exceptions include Geller 2017 and Kjellström 2014). All bioarchaeologists undoubtedly recognize that peoples' lives are shaped by multiple, co-occurring identities, some of which, as Torres-Rouff and Knudson write, are mutable, whereas others are fixed. However, although we might be aware that peoples' experiences can vary along multiple dimensions of identity, the existence of intersecting identities, the forces that shape them, and the effects thereof often get lost in bioarchaeological analysis in deference to relatively small sample sizes. We often pool data rather than subdivide samples

into potentially informative, multilayered categories of identity in order to have sufficient samples sizes for detecting patterns. Thus, individual facets of identity (e.g., sex, age, and status) are typically evaluated in isolation rather than as part of and inseparable from intersections of identity. We are also limited because of the existence of unidentifiable aspects of identity that we cannot access using conventional archaeological and bioarchaeological means (indeed some aspects might always remain hidden from us regardless of future methodological advances). It might also be the case, as is true in other social sciences (e.g., see Bauer 2014), that bioarchaeologists and archaeologists avoid engaging with the concept of intersectionality, not because they do not find value therein, but rather because they do not know how to do so fruitfully. Hopefully, Torres-Rouff and Knudson's work will provide a model for directly addressing intersectionality in the archaeological record as they bring together data on sex, age, metric, and nonmetric dental traits (as evidence of genetic diversity and relatedness), body modifications, biogeochemical signatures of geographic origins and mobility, and mortuary context. These multiple lines of evidence make it possible to access information about people beyond their age, sex, and status (i.e., a prerequisite for applying intersectionality in archaeological studies according to Fahlander 2012).

To examine multiple facets of identity simultaneously, the authors make another contribution to the field by employing a "contextualized multiscalar bioarchaeological approach," providing an example of how we might integrate various kinds of bioarchaeological data and move between population- and individual-level scales of analysis. They first reconstruct patterns at the regional population level within the San Pedro de Atacama region in Northern Chile. This includes revealing temporal trends in cranial vault modification variation, genetic relatedness, geographic origins, and mortuary contexts in relatively large pooled Middle Horizon versus Late Intermediate Period samples (i.e., numbering in the several hundreds). Their next step is an evaluation of social identities at a local population level, comparing patterns in two Middle Horizon cemeteries (Solcor-3 and Solcor Plaza). Finally, after having reconstructed the context of genetic relatedness, geographic origins, and other factors, they "examine the multiplicity of identities at the level of the individual" through detailed descriptions of a few individuals from the Middle Horizon and Late Intermediate Periods. Their approach recognizes the value of both broad patterns and rich descriptions of individual characteristics and experiences. In addition to providing interesting insights into this particular region and time period, this paper may motivate scholars who tend to adhere strictly to either population-level or individual-level analysis to instead adopt a multiscalar approach.

In applying their model, the authors emphasize the mutable and immutable aspects of identity in populations affected by changes in their social and environmental contexts and how people in the San Pedro de Atacama region used social identities to emphasize intercommunity differences. Another line of inquiry, not extensively explored in this paper, is the question of what might be the variable effects of identity, and particularly the multiplicity of identities, on individuals and how that can potentially be evaluated using their model. They highlight the tools available to bioarchaeologists to explore identity in the past, and they provide a compelling example of integrating numerous lines of evidence that are typically evaluated separately. How might identity, once reconstructed using their approach, be used as a tool for examining other phenomena of long interest in the field? The authors provide suggestions for future directions, including incorporating light-stable isotope data to reconstruct diet and thereby examine variation in access to dietary resources associated with social identity. I think there is also considerable potential for using the authors' approach to examine the intersection of health and identity (to a greater extent than is done in their current paper). The authors' integration of numerous sources of evidence that illuminate different aspects of identity and their incorporation of the concept of intersectionality might prove useful for future studies of variation in health and disease outcomes in this and other contexts (e.g., European colonial contact, industrialization, and urbanization) in which there exist multiple categories of difference. Such an approach would add temporal depth to our understanding of the nonadditive effects of multiple social and biological dimensions of identity on health. This is particularly important given how little empirical evidence there is for such interactions in living populations (Iyer, Sen, and Ostlin 2008), despite their potential important implications for public health policy and intervention strategies (Bauer 2014).

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In terms of scale, the dominant focus of bioarchaeology has been at the population level, while the individual has become somewhat lost (Stodder and Palkovich 2012*b*). A great deal of research in bioarchaeology has focused and continues to focus on documenting broad temporal trends or establishing between-group differences, to the extent that we have neglected consideration of the individual experience. The pendulum is shifting, however, with a renewed focus on osteobiographical and life-course analyses that focus on the lived and death experiences of the individual.

Identity studies have flourished in bioarchaeology over the past decade. Influenced and structured by earlier researchers (e.g., Barth 1969; Binford 1971; Saxe 1970), bioarchaeological analyses at first focused on aspects of identity such as social status, sex, and ethnicity. Increasingly, bioarchaeologists are considering facets of social identity that reflect a more sophisticated and nuanced appreciation for the myriad complexity that is contained in the concept of "social identity."

This includes individual lived experiences, such as the social construction of disability (Boutin 2016), health (Marsteller et al. 2011), and gender (Geller 2008). Furthermore, bioarchaeologists are considering death experiences and how social identity may transcend death (Crandall and Martin 2014; Duncan and Schwartz 2014; Nystrom 2011; Tung 2014).

In their paper, Torres-Rouff and Knudson reconstruct individual-, community-, and regional-level identities. The authors frame their analysis in terms of immutable and mutable markers of social identity—that is, those that are unchangeable and reflect genetic relationship and geographic residence and those that reflect individual behavior and embodied social identity, respectively. The authors harness a wide range of data, including biodistance measures, radiogenic isotopic signatures, artificial cranial modification, paleopathology, and archaeological material. Social identities are investigated through the analysis of grave assemblages, including tomb construction, textiles, metals, pottery, and ritual paraphernalia. Grave wealth and diversity are used as markers of ethnicity and elite/impoverished status. Community identity is assessed on the basis of analysis of cranial modification. As discussed by the authors, in the Andes, intentional cranial vault modification is thought to be closely associated with community or ethnic identity (Torres-Rouff 2002). This is an interesting source of data on identity. On the one hand, it is "immutable," in that once done it cannot be changed, yet its social meaning may very well shift through the life of the individual. It is distinct from the other forms of immutable identity markers in that it is ascribed and reflects an individualized embodied, though not necessarily voluntary, behavior.

The authors discuss how these disparate markers of identity may have articulated with one another within the mortuary context. Thus, while it is possible to get a glimpse into the "genetic" identity of an individual, it also provides the opportunity to consider the correspondence between biological relatedness and embodied social identity as reflected in activity patterns. The authors weave together these different data sets effectively to discuss the articulation of regional, community, and individual levels.

There is one aspect of the paper to which I want to devote the remainder of this comment: the authors' engagement with the intersection of biological estimation of age and sex and the cultural construction and interpretation of those concepts. This is not so much a criticism as it is an attempt to highlight an opportunity to more fully incorporate social theory and expand the interpretive power of the results.

The authors estimated biological sex and age on the basis of standard methods (e.g., sexually dimorphic features of the skull and pelvis, pubic symphyses morphology, and so on). The discussion of age identity is structured upon the distinction between physiological (the age-related morphological changes observable in the skeleton) and social age (socially constructed interpretation and structuring of age-related behavior). Ultimately, Torres-Rouff and Knudson infer social age on the basis of the observed relationship between physiological age and paleopathological and radiogenic isotopic data. In regard to the reconstruction of gender identity, the authors consider biological sex estimation to be "closely correlated to the construction of a gender identity in the grave."

In my opinion, one of the most interesting things about the data presented by the authors revolves around the discussion of the association between snuff complexes, age, sex, and gender. At the Middle Horizon sites of Solcor-3 and Solcor Plaza, Torres-Rouff and Knudson found a strong association between snuff complexes and individuals sexed as male. They also indicate, however, that snuff tablets were found in association with individuals sexed as female. Previous researchers have suggested that female access to this type of ritual paraphernalia was based on advanced age (Llagostera et al. 1988). A fuller description of the females from Solcor-3 and Solcor Plaza that were recovered in association with snuff complexes, however, is not provided. (How many were there? Were they older? Did they exhibit nonlocal isotopic signatures?). While changes in social identity for females may indeed be predicated upon age, gender signification also varies throughout the life course (Gilchrist 2000). That is, in addition to changes in social status and/or identity being solely associated with age, advancing age and association with ritual knowledge could also be associated with a change in gender. Torres-Rouff and Knudson actually open this door by stating that snuff kits are associated with "individuals gendered as men." Though discussing the possibility that females associated with snuff complexes are gendered as "men" would be a starting point, this would reify the Western-based dichotomization of "women" and "men" and neglect the possibility of nonbinary genders. In nonbinary gender systems, variables such as "temperament, skill or preference for work, spiritual endowment, and reproductive status" may serve as gender markers (Hollimon 2006: 436). To my knowledge, this perspective has never been prominently featured in South American bioarchaeological research, although nonbinary genders may have been present in groups that colonized the New World (Hollimon 2001). In terms of choosing which individuals to focus on for osteobiographical reconstruction, it would seem that those who proved to be the exception to the rule would be more interesting cases and provide greater opportunity to engage more fully with social theory.

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Torres-Rouff and Knudson offer an impressive analysis of social identity in northern Chile during the Middle Horizon (ca. AD 500–1100) and Late Intermediate Period (ca. AD 1100–1400). To investigate past social forms over such a large geographic area and time span, they collected a variety of archaeological, human skeletal, and biogeochemical data on hun-

dreds of individuals and their mortuary contexts from 21 cemeteries. Examination of these data at the levels of the region, cemetery, and burial for each period allows the reconstruction of collective and individual identities as well as recognition of changes in these identities over time. By combining population-level analyses with individual life histories, the study documents the ways in which larger-scale patterns shaped the lived experience of individual people. Torres-Rouff and Knudson's integrative, multiscalar approach not only illuminates prehistoric Andean society but also provides a powerful model for bioarchaeological research on social identity. It is exemplary work. However, use of a more robust theoretical framework would increase the impact of such research by bringing bioarchaeology into broader dialogue with other social sciences and the humanities. In particular, bioarchaeology can address fundamental questions regarding the interaction between the individual and society and between nature and culture in the production of human lives.

Current social theory describes how identities are created through the continuous interplay between internal and external processes of identification. Individuals and groups define themselves and others according to perceived similarities and differences. For these categorizations to possess social meaning, they must be recognized both by the person or group they define and by those with whom that person or group interacts. Identity is thus constantly mediated through social relations. Collectivities and collective identities are constituted through the practices of individuals, while individual identities consist of unique combinations of collective identities that influence and inform each other (Jenkins 2008). Therefore, like the theories of structuration (Giddens 1979, 1984) and practice (Bourdieu 1977, 1990), identity theory aims to elucidate the relationship between agency and structure, between the individual and society.

Bioarchaeology can explore this interaction in past societies by comparing the analysis of individual skeletons to that of the population. The Andean case study clearly demonstrates how individual burials reflect intersecting collective identities, such as community membership, status, and gender. Missing from this analysis is explicit consideration of the ways in which these individuals produced, reproduced, and transformed their social world. Examination of both sides of this dialectic requires distinguishing between markers of identity created by the community and those created by the individual. Because the dead are buried by those who mourn them, mortuary treatment—including the location and form of the grave, position of the body, and quantity and quality of grave goods—is more likely to express an idealized representation of the deceased, based on cultural norms (or even to concern the identities of the living), than to accurately portray the interred individual (Parker Pearson 1982, 2000). Certain features of the skeleton formed in infancy or childhood, like cranial vault modification, also speak primarily to identities imposed by the larger group (as noted by Torres-Rouff and Knudson). In contrast, other skeletal features—such as isotopic evidence for mobility, degenerative joint disease, and traumatic injuries—allow insight into actions taken by individuals that would have reinforced or challenged their social roles and identities during life.

The theoretical understanding of identity formation, outlined above, does not support Torres-Rouff and Knudson's classification of identities as immutable or mutable or as characterized by biological and social aspects. Because identity is continually constructed through interaction between the self and others, all identities are social and mutable. Yet, the body does play an important role in the process of identification. Human beings both have and are bodies (Merleau-Ponty 1962). As a result, identities are (at least in part) experienced and expressed through the physical body. Social practices modify the body intentionally and unintentionally in the production of identity. In turn, the physical features of the body—whether biological attributes, deliberate modifications, or unintended changes—influence how one is perceived and treated in social contexts and consequently alter or sustain constructions of identity. The physical body and social identity are thus bound in a reciprocal and dynamic relationship; each acts to shape the other (Shilling 2012; Turner 2008).

By investigating the body as both biological and social, bioarchaeology can address the interrelation of nature and culture in the creation of human lives. This dual focus demands not only integrating multiple lines of evidence but also employing a holistic approach to the interpretation of skeletal data. For example, in the Andean case study, genetic relatedness is considered an immutable and biological aspect of identity. But genetic relationships are neither solely biological nor always incorporated in social identities. First, the patterns revealed through biodistance analysis result from the reproductive behavior of people in the past. Because such behavior is constrained by social norms regarding appropriate and inappropriate mates, genetic ties are shaped by social practices (Stojanowski 2013). Second, although biological relationships are themselves immutable, their impact on identity depends on whether they were viewed as significant for identification within the particular social and historical context. When biological relationships influence identity over long periods of time, this apparent immutability requires continual maintenance on the part of the individuals involved. In prehistoric northern Chile, the different community identities crafted by the inhabitants of the San Pedro de Atacama oases and the Loa River Valley correlated with greater biological distance. However, at the more local scale, the separate group identities of the people interred in the Middle Horizon cemeteries of Solcor-3 and Solcor Plaza contradicted their close genetic ties.

Over the last 40 years, bioarchaeology has developed from the specialist study of human remains and their mortuary contexts into an interdisciplinary field that addresses topics of larger archaeological and anthropological interest (Rakita 2014). Through deeper engagement with contemporary social theory, it can contribute to even broader discourse across the social sciences and humanities regarding fundamental questions about the human experience.

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What constitutes identity? In this thought-provoking and well-argued paper, Torres-Rouff and Knudson demonstrate the possibilities of an approach focusing on the intersectionality and multiplicity of identities. Indeed, as I have argued elsewhere (Zakrzewski 2015, in press), each body contains multiple stories of identity that together reflect the embodied individual. These multiple stories comprise multiple matryoshka-like identities for that person, as each person, like a matryoshki doll, has many of such overlapping and enveloping layers of identity. Bioarchaeologically, and as clearly demonstrated so elegantly by Torres-Rouff and Knudson, these multiple aspects of identity, written in varying degrees of archaeological detail, not only exist layered on top of one another but also crosscut each other.

The distinction between mutable and immutable aspects of identity is a novel approach and one to be lauded. It enables aspects of the multiplicity of identities to be disentangled. Furthermore, I am pleased to see their arguments that such group and individual aspects form sites along a spectrum of expression of identities. This connects with the other innovative aspect of this paper, and that is the use of multiple scales of analysis and resolution. Studying group identities using cranial modification, nonmetric trait analysis, and isotopic analysis is the norm, but this paper moves beyond the norm by synthesizing this both with studies of funerary archaeology and with studies of the individual. Despite the groundbreaking work of Duday (2009) and Nilsson Stutz (2003, 2008), it is surprising that funerary archaeology has so rarely been integrated with more laboratory-based bioarchaeological studies. The dual-layer approach, studying both groups and specific individuals through osteobiography, is highly commended. The focus on lived experience, fusing these two scales of archaeological investigation, nuances the bioarchaeology of the distinctive. How do individuals who are different from their contemporaries correlate or interact with those who appear to follow more normative convention? Given that the individuals described all exhibit healed lesions indicating skeletal trauma, is traumatic experience of importance in contemporary identity construction?

Cranial vault modifications, as with most other forms of skeletal modification, are unusual in that they represent the imposition of aspects of social identity upon juveniles by others within a community. It is usually assumed that this is done by kin or members of some community grouping, but it may have some other unknown social prescription. I hope that, in future, this will be further explored through anthropological study of current practitioners, as use of such social work has not yet commonly been integrated within bioarchaeology. I thus view this paper as demonstrating a call for such activity. Torres-Rouff and Knudson comment on the apparent extra work in the construction of the tomb of the young male (352 from tomb 31 on the Quitor-6 cemetery) and form a tentative association with his youth. This focus on youth identity is interesting when such discussions tend to revolve around ascribed or attained status (e.g., Babić 2005) and is deserving of further research.

A key temporal trend noted by the authors is the decrease in heterogeneity, both in apparently more sociocultural markers, such as grave goods and cranial modification, and in other more biological markers, such as determined from craniometrics and nonmetric biodistance or isotopically determined geographic origins. Viewing the research presented with experience of working only in other parts of the globe, such chronological trends from heterogeneity to increasing homogeneity are of note, as this appears to contrast with many other areas, such as the Dynastic periods in Egypt. The authors argue convincingly that the homogeneity in funerary practice acts as a complementary marker for the focus on group identity. Does this conversion from focusing on the individual toward the group occur in association with changes in the life-history experience of violence and/or warfare? It is notable that the osteobiographies presented all exhibit skeletal markers of such activities. These interactions clearly impinge upon the life histories of both the relevant individuals and their kin groups and potentially act as serious social stressors to either the individual or the group. I very much hope that this paper will initiate future studies comparing the patterning in the relative importance of the group in comparison with individual identity in other stratified and socially ranked archaeological groupings. Furthermore, this discussion should instigate wider bioarchaeological analyses evaluating whether such patterns can and do occur in the absence of markers of violence or other social stresses.

Torres-Rouff and Knudson are commended for having produced such clear research establishing both the multiplicity of identities at the individual level and the importance of approaching identity at different scales of analysis. Having argued for the adoption of such an approach, I am delighted to see the method demonstrating its research benefits in a geographic locale so different from my own.

Reply

We are extremely grateful to the commenters for their time as well as their substantial and varied expertise. Their thought-provoking and constructive responses have opened up a number of different lines of inquiry that will, we hope, continue to push bioarchaeology in new and exciting directions. The comments explore several themes that derive from the diverse backgrounds of and research agendas pursued by these scholars; many of these thoughts and queries are ripe for further exploration, and we hope that they can serve as fodder for more than our own projects. Notably, the commenters raise several potential avenues for research in this arena that integrate social and evolutionary theory as well as applications in other contexts. These were gratifying to see, as we think that the broad-scale integration of multiple data sets and multiple

scales of analysis that we present and advocate for can only serve to strengthen arguments made about the past in any theoretical framework.

It was particularly important for us that our model not only speak to the value of a multiscalar approach for studying identity but also emphasize the value of a bodily perspective for understanding the past, regardless of approach. To this end, we were particularly happy to see Barberena's comments about the implications of our model for archaeology writ large and DeWitte's similar suggestion that there is potential in this approach for understanding health in contemporary as well as past settings. Here, however, we would like to focus our reply on themes that arose in several places: the question of the mutability or immutability of identity, the importance of intersectionality, and finally the concept of scale.

Primarily, the issue of the mutability of social identity was stressed by nearly all the commenters and arose in several places; it also forms a core tenet of our argument. There was less consensus on the value of the category of immutable or fixed elements of identity, with Scott raising important points concerning the interaction of the body and the self. We also struggled with this conceptually, ultimately landing on this phrasing because we felt it best conveyed the spectrum between elements of social identities that were or were not under individual control. Disentangling the distinction between these two is somewhat problematic, and Boutin, Nystrom, and Scott all highlight spaces where elements classed by our model as immutable might change over the life course, such as through a shift toward a nonbinary gender identity, or that the meaning associated with a particular signifier, such as origin in a particular outside region, may change over time.

These are important ideas and speak to the complexity of working with social identities. We especially hope to be able to parse this in future work on these collections, as head shaping, in particular, remains a salient point of focus for our research, and the complications of generational shifts in practice, together with changes in the social environment, make it particularly ripe for detailed exploration. The intersection of head shape with all of the factors at play in our model as well as broader concerns suggests that it can reveal interesting aspects of not just social identities but also child rearing practices and conceptions of childhood. While the reality of immutability versus mutability is certainly a facet of our model that merits consideration, we think that the distinction can serve as a usable framework for analysis. Similarly, we use our research into what we term community identity as well as the deeper exploration of individual lives as a way to take those mutable and immutable aspects of identity and integrate them into a more holistic view. Together, these approaches allow for the understanding that all forms of social identity are subject to intersectionality and the multiplicity of issues at play.

Beyond the broad categories through which we explore aspects of social identity, Boutin, DeWitte, and Zakrzewski highlight the fact that our approach allows us to address issues of intersectionality, because the varied aspects of identity that we analyze can be overlain on the individual to greater and lesser degrees. In particular, we note that our data set allowed us to address certain aspects of intersectionality in the past and that other data sets may open broader doors into different aspects. Of note in our work, integration into the ritual sphere is an area where we continue to explore the intersections of sex, age, and access to certain material goods. As noted by Nystrom and Boutin, the application of our model revealed an interesting intersection of skeletal sex, gender identities, and snuff paraphernalia that merits further consideration. While our work in this region will continue to be impacted by past excavation strategies that prioritized adults and cranial remains, we look forward to work in other regions that has the ability to explore both intersectionality and changes over the life course in more detail. For example, where there is the possibility of stronger control over chronological age, future studies of infant and youth identity, as noted by Zakrzewski, may be very fruitful.

Finally, the multiscalar approach that we advocate allows us to argue for, as DeWitte states, "the value of both broad patterns and rich descriptions of individual characteristics and experiences." Importantly, we feel that bringing together a large suite of data allows the use of multiple scales to make more nuanced interpretations. Barberena raises an equally crucial point in noting that there is "feedback between the levels of individual lived experiences and identities and the larger patterns recorded at the level of populations." While the commenters highlight intersectionality in the individual, we also think that the interactions between societal level changes, the community, and individual lived experiences may ultimately be accessible through a multiscalar approach. In addition, while we do not explicitly investigate Atacameño concepts of personhood, simply because we do not feel that our data sets can effectively address this complex question, we are particularly grateful to Boutin for pointing out the importance of rejecting terms and concepts that are culturally specific to our own Western models. Similarly, we appreciate Zakrzewski's note on the importance of how the tenets of our model would play out in other regions, even those with distinct or opposing patterns in their data, and we look forward to these applications.

We found it interesting, nevertheless, that the insights regarding life course and personhood that we presented were the most thought provoking for our commenters. We feel it merits noting that several commenters highlighted the detail we can access with these collections vis-à-vis the mortuary context. However, we would like to stress that many bioarchaeological collections bring with them the possibility for this type of detailed individual or osteobiographical and community-level work that hinges on different factors. The case we present, with numerous individual burials and elaborate grave contents, provides more support for an analysis of the individual than might be the case elsewhere; however, this situation is not entirely unique. Collections-based research is frequently not given the same scholarly attention as research involving recent excavations because of perceived limitations inherent to the earlier material. While there are certainly constraints in working with

collections that were excavated long ago, there are always constraints in working with archaeological material, regardless of the excavation techniques used and when the material was excavated. We argue that an approach that integrates multiple sources of information with varied methodology allows even legacy material to speak to our understanding of lived experiences in the past.

Using a contextualized, multiscalar bioarchaeological approach such as the one we present, we can examine the complexities of social identities in the past and contribute to discussions on such varied and important topics as the intersections of health and identities, intersectionality in the past and present, and, as Scott notes, "even broader discourse across the social sciences and humanities regarding fundamental questions about the human experience." The responses to our work suggest that there are numerous places where this kind of research can develop. We note that there is a possibility that this type of model can not only address the issues raised here about social identities and intersectionality but also help explore, in the interstices between the identities of one person, their integration into social groups and community and, ultimately, the reflections between people and the events of their time. In conclusion, we appreciate the chance to contribute to larger conversations about current and future directions in bioarchaeology and anthropology more generally. The importance to our field of iterative work, like the discussions held in these pages, cannot be overstated.

—Christina Torres-Rouff and Kelly J. Knudson

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