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Cranial modification and the shapes of heads across the Andes

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ABSTRACT

This broad literature review considers advances in the study of cranial vault modification with an emphasis on investigations of Andean skeletal remains over the last two decades. I delimit three broad categories of research, building on Verano's synthesis of the state of Andean paleopathology in 1997. These are associations with skeletal pathological conditions, classification and morphology, and social identity. Progress is noted in each of these areas with a particular emphasis on methodological advances in studying morphology as well as the growth of contextualized bioarchaeology and the incorporation of social theory in the consideration of cranial modification as a cultural practice. The article concludes with avenues for future research on head shaping in the Andes specifically and paleopathology more broadly.

The practice of shaping the head (Fig. 1) occupies a liminal space in bioarchaeological and bioanthropological studies—it is both pathology *sensu lato* and direct evidence of culture imposed on biology. Cranial modification, particularly in the Americas, has been a source of fascination for centuries, with colonial writings extensively documenting this practice in both Mesoamerica and the Andes (see Zabala, 2014). Since then it has formed the foundation of a series of early works engaged primarily in documentation and classification exercises (i.e., Allison et al., 1981; Dembo and Imbelloni, 1938; Dingwall, 1931; Weiss, 1958, 1961) and over time become an increasing focus of study within the burgeoning field of bioarchaeology. In his assessment of the state of paleopathology in Andean research over two decades ago, John Verano (1997a, 251) dedicates a small section to what was then commonly referred to as “cranial deformation”¹ and focuses specifically on the intentional practices of head shaping. In this treatment of cranial modification within the Andean sphere, Verano (1997a) speaks primarily to the description and classification of the practice of head shaping, concluding by mentioning the innovative work by Hoshower et al. (1995) that provided a more nuanced approach to understanding head shape and social identity. The study of cranial vault modification remains an active field of inquiry in bioarchaeology and these investigations have expanded and diversified in the 20 years since Verano

turned his attention to it. In that time, we have continued to see only the occasional exploration of health and pathological effects tied to binding. Importantly, we have seen an ongoing and significant focus on morphology, integrating new technologies, and moving beyond simple classification. Finally, there has been a notable and important growth in work that considers cultural context writ large in the study of head shaping to provide a more nuanced read on what is ultimately a cultural practice. Framed by this early synthesis, below, I review some of these advances and highlight future prospects for work on cranial vault modification in the Andes.

1. Cranial modification as pathology?

The integration of the cultural practice of cranial vault modification into considerations of paleopathology has a long history, beginning with the volumes mentioned above and extending into modern treatments (e.g., Aufderheide and Rodríguez-Martín, 1998; Ortner, 2003; Ortner and Putschar, 1981; Roberts and Manchester, 1995). Ortner and Putschar, in their landmark volume on pathological conditions in human remains (1981:90), note that it is a form of “chronic, low-grade trauma” and explore it as such, arguing for the importance of differentiating this from pathological processes that can alter bone shape

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¹ The practice of artificially altering head shape has gone by many names, including being grouped as one of many body “mutilations” (Dingwall, 1931; Gerszten and Gerszten, 1995) and as a form of “deformation” for most of the Twentieth century. While not an inherently derogatory term, as deformation simply refers to a distortion of shape, it is frequently conflated with ‘deformity’ or ‘malformation’ whose implications do not coincide with our understanding of this common cultural practice. In consequence, most contemporary bioarchaeological work employs the more neutral ‘modification’ as a means of discussing the practice, thereby emphasizing alterations to form. These semantic choices frequently include adjectives such as ‘artificial’ or ‘intentional’ to further differentiate within modifications as appropriate. I choose here to also prioritize the use of ‘head shaping,’ to specifically draw attention to this as an act or social practice among these communities.

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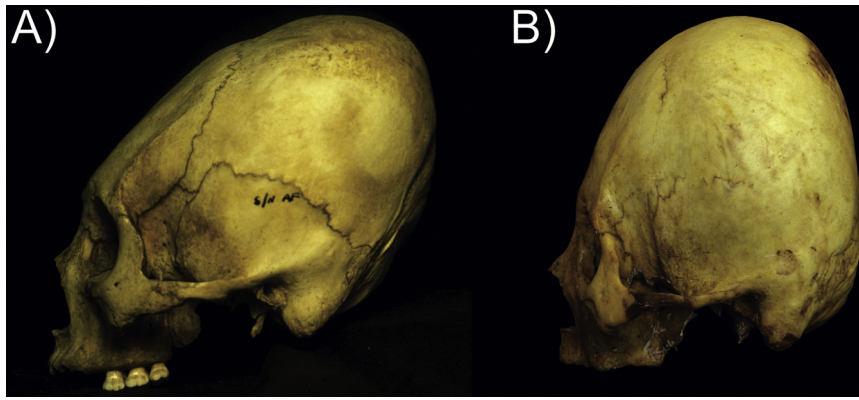


Fig. 1. Shaped heads from San Pedro de Atacama, Chile (A: Tabular oblique form, B: Tabular erect form, both Museo Le Paige s/n).

(1981:92) and making note of potential minor pathologies, which Ortner later classifies as “mainly cosmetic” (2003:164), that can result as complications from the practice. Subsequently, [Aufderheide and Rodríguez-Martín \(1998:34–36\)](#) also classify the practice as one of several “traumatic conditions” in their comprehensive treatment of human paleopathology, dedicating some discussion to the apparatuses and types of pressure involved in addition to speaking to the growth of the brain and the impact of associated pathologies resulting from the modification itself.

While cranial vault modification is not a disease process, the importance of correctly identifying the cultural practice of head shaping remains vital to studies of paleopathology because of the myriad ways that pathological conditions as well as life course events can alter head shape. That said, most alterations to natural head shape in contexts where cultural practices are seen likely result from these interventions on the body. Ortner (2003:163) speculates that some occipital flattening or asymmetry could be the result of sleeping on hard surfaces, a subject that has gained currency in the modern era as a result of the 1990s “Back to Sleep” initiative fostered as SIDS prevention, wherein infants are preferentially lain on their backs ([American Association of Pediatrics, 2019](#)). Nevertheless, these unintentional practices frequently involve only the back of the head and can be readily differentiated from intentional head shaping.

Broadly speaking, the intentional alteration of head shape is not easily confused with pathological conditions. However, some consideration can be given to micro-, macro- and hydrocephaly, osteomalacia, and, most importantly, craniostenosis. Micro- and macrocephaly are relatively rare conditions that affect head shape, but can also generally be differentiated from cultural cranial modification in that they typically retain the original shape of the cranial vault, affecting only size. Macrocephaly generally results in a “proportionately large, yet normal skull”, while the slightly more common microcephaly usually results from failure of the brain to grow and presents as “a proportionally enlarged face relative to the rest of the cranium” ([Mann and Hunt, 2005:63](#)). In contrast, hydrocephalus results from an “abnormal accumulation of fluid” and produces enlargement of the skull; however, it is also tied to the presence of expanded sutures ([Aufderheide and Rodríguez Martín, 1998:57](#)). Other possible points of confusion discussed in the paleopathological literature involve osteomalacia, a disorder related to a deficiency of vitamin D or malabsorption of vitamin D and calcium, that can cause some growth of the skull ([Ortner 2003:398–401](#)). However, most effects are visible on the trunk of the skeleton while the skull is typically only slightly affected with diffuse porosity and low weight bones.

Finally, craniostenosis (also craniosynostoses), or the premature fusion of cranial sutures can cause significant changes to the shape of the skull that, depending on which sutures are affected, can produce effects similar to intentional modification ([Aufderheide and Rodríguez Martín, 1998:52–54](#); [Ortner 2003:460–463](#)). Crania affected by this can

have evidence of limited development in a given direction as a result of which suture has closed and when during development it occurred, including dramatic cases of plagiocephaly as a result of asymmetrical suture closure. This can have varied etiologies, for example, hereditary disorders like Crouzon’s syndrome; however, in many cases there is no clear etiology. That said, barring complete obliteration of the sutures, the inconsistent patterning of suture closure can help determine the presence of craniostenosis versus the presence of intentional modification. This does raise an interesting consideration as to whether the presence of binding apparatuses may have promoted premature suture closure as suggested by [Guillén \(1992, cited in Aufderheide and Rodríguez Martín, 1998:52\)](#) and [White \(1996\)](#), a topic that has not been revisited in depth notwithstanding the growing volume of morphological work on head shaping.

2. Cranial modification’s association with pathology

Despite the discussion above about the practice of head shaping being classified as a pathological condition in synthetic pieces and potentially confused with other alterations to head shape, it is interesting to note that study of the health consequences of the practice itself are few and far between, especially in the last twenty years. In part, this likely stems from the relatively minor sequelae that have been noted in relation to head shaping—primarily porosities that may result from the pressure of the binding itself, potential oral-facial modifications, and a suite of potential complications resulting in premature suture closure ([Aufderheide and Rodríguez-Martín, 1998:36, 349](#); [Ortner and Putschar, 1981:92](#)). Further, other spectra of pathological effects may not be observable in skeletal remains.

In morphological studies, comments have also been made about changes to cranial form that may have health consequences. For example, alteration of orbital shape and symmetry, the presence of supra-orbital depressions, and even dramatic plagiocephaly resulting from uneven binding pressures may have related health consequences that are not clearly documented in skeletal remains (e.g., [Antón, 1989](#); [Björk and Björk, 1964](#); [Gerszten, 1993](#); [Lekovic et al., 2007](#); [O’Brien and Sensor, 2004](#); [Ogura et al., 2006](#); [Tiesler, 1998](#); [Tubbs et al., 2006](#)). A handful of publications tackle pathological concerns as they intersect with morphology, occasionally via examination of crania from the Andes. Not entirely surprisingly given the preponderance of head shaping in prehistory, they mostly conclude that these impacts, where present, are generally minimal. For example, in a survey of the patterning of cranial and oral health indicators in modified crania from Peru, [Okumura \(2014\)](#) found that patterns of cranial modification had no significant relationship to a suite of osteological markers (in this case, cribra orbitalia, cranial trauma, antemortem tooth loss, dental caries, and periodontal cavities). [Pechenkina and Delgado \(2012\)](#) compare cranial shape with health and status in their research at Villa El Salvador, Peru, finding that these patterns correlate and likely are

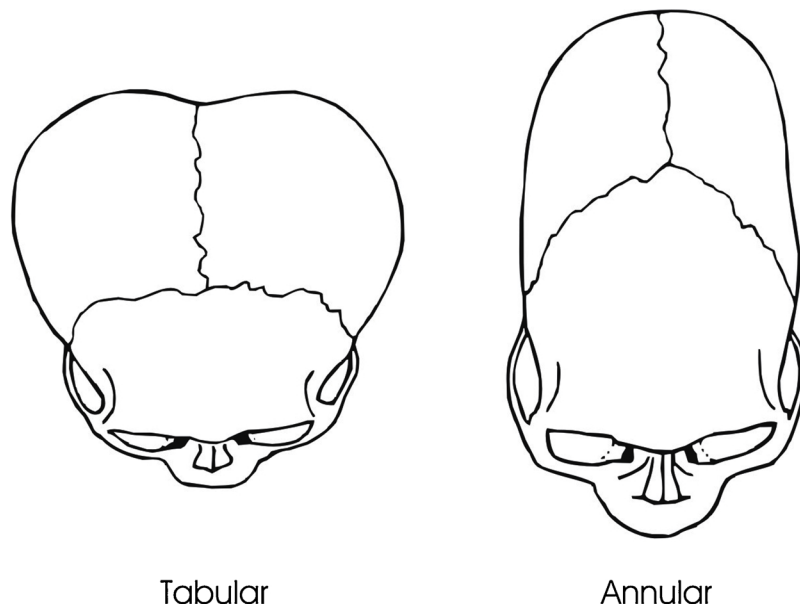


Fig. 2. Broad categories of Andean head shaping (after Antón, 1989).

related to the different populations occupying the formative central coast of Peru and are not directly related to modification. Other work focused more directly on morphological effects and their repercussions also demonstrate little in the way of pathological complications. For example, Jiménez et al. (2012) used a Peruvian collection to explore the effects of cranial shaping on dental occlusion finding little to no effect regardless of type or symmetry of the modification. Overall, these papers reaffirm earlier findings that attribute little observable damage to individuals as a result of the process of head shaping.

In contrast to these more benign points, Mendonça de Souza et al. (2008) argue that the act of modifying the head of an infant from the Chillón Valley in Peru was the cause of death, a relatively rarely documented event, although one spoken of by Spanish chroniclers. Tiesler (1998) has also noted a significant difference in age at death between modified and unmodified Maya individuals. She has later cogently argued that “daily modeling practices, which at least in pre-Hispanic thought were deemed a means to protect the infant’s health and integrity, sought to avoid any such side effects, although some nuisances may have been accepted by the practicing caretakers for the sake of the expected benefits” (2014:55). This aspect of head shaping is likely reflected in the few cases of death that can be tied to this practice. In all, while a relatively small amount of work continues in this field, it offers places for exploration that have relevance to our study of the practice, if less so to our specific understanding of the Andean context

3. Morphology

Explorations of morphology, be they exclusively focused on typology and classification or more broadly concerned with documenting the unaffected parts of the skull to assess utility for other studies, have been a constant in anthropological study of cranial modification (e.g., Antón, 1989; Antón et al., 1992; Björk and Björk, 1964; Cheverud et al., 1992; Cheverud and Midkiff, 1992; Cocilovo, 1975; Dean, 1995; Droessler, 1981; El-Najjar and Dawson, 1977; Gerszten, 1993; Gottlieb, 1978; Kohn et al., 1993, 1995; Konigsberg et al., 1993; O’Loughlin, 1996, 2004; Ossenberg, 1970; Pucciarelli, 1971; Sheets, 1977; Varela et al., 1993; White, 1996). Cranial modification is frequently documented by bioarchaeologists working in Andean skeletal collections; however, these are not consistently reported. At some level this reflects the substantive variation between geographic regions and the necessity

of different quantifiers and qualifiers for modification practices depending on the research questions in play. This has resulted in a breadth of approaches of typology from simplified (Fig. 2) to complex (Fig. 3) that have specific relevance to research questions posed by authors and to the patterns of any given region. In this way, attempts to create a standardized approach (i.e., Buikstra and Ubelaker, 1994) have mostly been used as a foundation upon which scholars build, modify, and re-focus their data collection. Consequently, much research is only comparable at the level of presence/absence or perhaps broad categories. However, this breadth of styles and the lack of cranial modification practices among some pre-Columbian groups stresses the need to document and classify inasmuch as possible the practices seen throughout the Andes.

The growth of digital technologies capable of characterizing morphology has also been reflected in a surge of recent work using these techniques. Nevertheless, it is also here that there are a substantial number of papers that simply use typically well-preserved Andean material to focus on questions of morphology without larger considerations of the cultural developments specific to these populations. Cheverud and Midkiff (1992:167) referred to head shaping as “a ‘natural’ experimental system in which to study developmental relationships between parts of the growing skull.” Not surprisingly, the Andes frequently serve as a laboratory for these morphological investigations due to its large, well preserved collections and variation in practices.

Assessment of shape and the morphological changes wrought by cranial modification have produced a suite of papers primarily focused on local cases. Employing traditional metric techniques, some scholars (e.g., Cocilovo and Costa-Junqueira, 2001; Cocilovo et al., 2011; Pomeroy et al., 2010) have presented means for defining and differentiating between categories and degrees of modification. This includes O’Brien and Stanley, 2013 interesting work on skulls from throughout the Andes that included assessment of normal variation and a quantitative approach to the analysis of whether a skull was modified. Research such as that by Soto-Heim and Quevedo (2005) exploring asymmetry in Chilean skulls also fits this mold. Concurrently, a number of scholars have adopted geometric morphometric techniques to get at these same questions of classification and documentation of modified head shape (e.g., Manríquez et al., 2006, 2011; Pérez 2007; Salazar et al., 2014; Serna et al., 2012) and used it to explore morphological differences among and between groups in the Andes. These works have served to document the utility of this technique for detailed analyses of

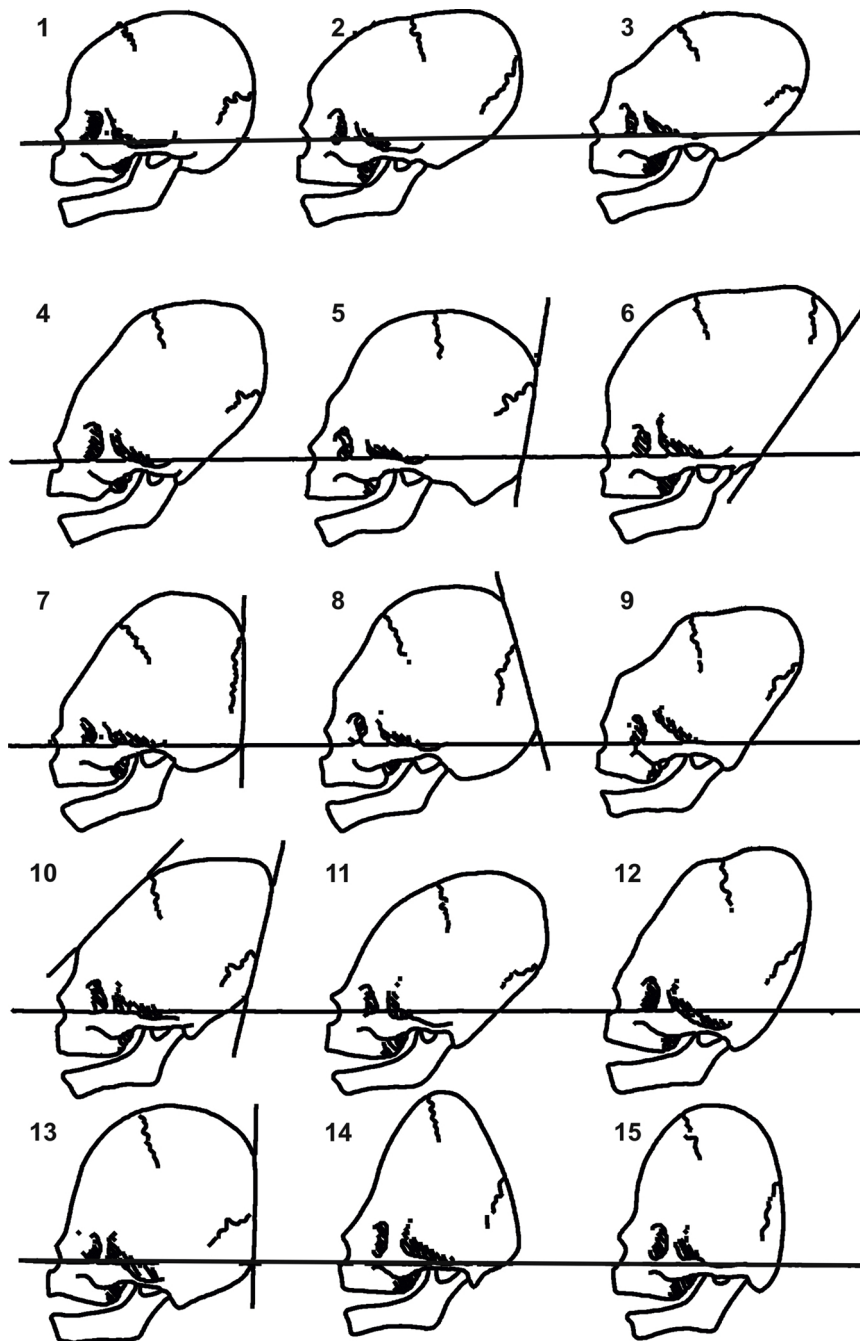


Fig. 3. Detailed taxonomy of Andean head shaping (after Allison et al., 1981).

modified shape. As Kuzminsky et al. (2016) note in their work employing 3D imaging and geometric morphometrics with remains from northern Chile and southern Peru, these techniques can be used not only to differentiate modified and unmodified crania, but also to establish degrees of standardization of the practice within type or within and between communities. This is an important advance and one that may have significant bearing when applied to broader contextualized studies.

The second broad category of papers speaking to morphology specifically explores the effects of the practice on the metric and non-metric characters of the skull. The suite of early work on crania from around the world, mentioned above, laid a foundation for this type of research. The cranial index, for example, was an early metric indicator in skeletal biology that was used for morphological classification, and cranial modification practices significantly impacted the range of

variation. While there is ongoing work on subjects such as sutural complexity, the strongest contribution of these pieces is in their assessment of the effects on metric and non-metric traits in an effort to provide a methodology for integrating these crania in other studies of evolutionary relationships and affinity (e.g., Boston et al., 2015; Del Papa and Pérez, 2007; O'Brien and Sensor, 2008; Rhode and Arriaza, 2006). In fact, Verano (1987) confronted these same questions in his dissertation work on Pacatnamu noting that the effects were significant. Such works have found between-population variation in metric traits, but less overall effects on the presence of discrete traits. As such, they have affected methods and research questions in some areas. Importantly, they have opened the door for significant work exploring the relationship between population groups and the complex migration history of the pre-Columbian Andes. For example, Sutter and Mertz (2004) successfully employ modified and unmodified crania in their

argument for biological continuity in northern Chile's Azapa Valley. The information derived from these morphological studies has significant value as scientific work for its own sake, therefore shaping our approaches to studying cranial modification and also allowing for the use of Andean skeletal material in studies of population biology. In recent years, these papers have yielded methodological refinements and approaches that are now foundational to much scholarly work with head shaping practices.

4. Social identity

In his survey, [Verano \(1997a\)](#) notes that head shaping serves as an important social marker in need of better cultural and temporal definition, something that a number of scholars have tackled. This includes those works focused directly on the practice at a particular site or in a region, but also those that integrate cranial modification into broader considerations of the lived experience including addressing questions about the intersection with other bioarchaeologically visible indicators of sex, violence, diet, or geographic origins. I would argue that this area has seen the most significant change in the study of cranial modification over the past twenty years. The contextualization of cranial modification as a cultural practice has significantly informed our understanding of the lives and societies of pre-Columbian Andean peoples. The works that approach this, incorporate contemporary thinking on social theory and the embodied life into scientific analyses of cranial shaping and Andean prehistory.

Within the investigation of cranial modification as a sign of social identity a series of articles have focused on it as an indicator of ethnicity (e.g., [Blom, 2005](#); [Torres-Rouff, 2002](#)), building on the pioneering theoretical work of [Barth \(1969\)](#), who argued that ethnicity was a social construction defined through regular interaction with other groups. More salient to the recent contextualized investigations into head shaping and its social implications have been theoretical considerations of the body as material culture (e.g., [Sofaer, 2006](#)) and embodiment (e.g., [Meskell and Joyce, 2003](#)). Considerations of the body as material culture focus on integrating the broader osteological and biological research that is key to bioarchaeological research with an understanding that the body is also a social construct ([Sofaer, 2006](#); see also discussions in [Agarwal and Glencross, 2011](#); [Joyce, 2005](#); [Meskell, 1998](#)). As such, [Sofaer \(2006\)](#) posits that an understanding of the individual body in its specific context can yield information on how bodies were used to express social lives. While this work has been successfully employed in cranial modification studies, it is well complemented by recent research embracing the perspective of embodiment. These approaches take influence from Bourdieu and numerous gender scholars, promoting a view that engages with the experience of lived bodies including movement, consumption, and practice (e.g., [Buikstra et al., 2011](#); [Meskell and Joyce, 2003](#); see also discussions in [Geller, 2009](#); [Perry and Joyce, 2001](#)). Similarly, there are potential future areas of growth in our study of head shaping through considerations of relational identity ([Hernando, 2015](#)) and intersectionality ([Cho et al., 2013](#)). Together these theoretical perspectives can provide a complex view on the interactions of the body with society and allowed for this to frame our understanding of head shaping practices as specific and in conversation with culture, identity and child-rearing practices.

The [Hoshower et al., 1995](#) article called out by Verano is a classic example of this earlier approach focused on self-definition of groups. They argue that the patterns of homogeneity they find internal to cemeteries in the Omo M10 cemetery complex in Peru's Moquegua Valley contrasts with heterogeneity between cemeteries and "represents clusters of kin groups or ayllus whose composition changed over time" (1995:161). We also see this perspective in more recent publications such as [Lozada's \(2011\)](#) work involving Chiribaya skeletal samples where she focuses on the social import of head shaping as a sign of ethnicity, as reflected in economic activity for these groups. Interesting recent treatments include [Prieto et al. \(2019\)](#) work on a mass child

sacrifice in the Moche Valley where cranial modification is used together with other indicators to argue for the multiethnic origin of these children.

Of note are the particularly thoughtful and well-researched considerations offered by Blom and colleagues exploring cranial modification practices and the embodiment of identity among the Tiwanaku ([Blom, 1999, 2005](#); [Blom and Knudson, 2014](#); [Blom et al., 1998](#)). In these works, Blom overlays biological relatedness to explore the ways that cranial modification practices reflected social organization and tracks meaningful comparisons across the Tiwanaku territory in Bolivia and Peru. For example, she demonstrates that the contrast between homogenous patterning of head shape in the Tiwanaku colonies and the tremendous diversity in the core likely reflect the power of the core to draw people from disparate parts of the Andes. My own research owes a debt to this model ([Torres-Rouff, 2002, 2003, 2007](#)), which I then expanded through collaborative work to explore cranial modification as one aspect of social identity in conversation with material culture and other aspects of bioarchaeological analysis, including biological affinity (e.g., [Torres-Rouff et al., 2013](#)) and geographic origins (e.g., [Knudson and Torres-Rouff, 2009, 2014](#)). Cranial modification in Chile's Atacama Oases therefore, is not a monolithic display of "Atacameño-ness" but rather a more complex reflection of one element of identity that intersects with numerous others in the mortuary context. In my work, this ultimately lead to the presentation of a model for an integrative and contextualized view of identity in the Chilean Atacama that goes beyond solely cranial modification to consider the body and the grave in myriad ways ([Torres-Rouff and Knudson, 2017](#)).

In this vein, the recent work of [Velasco \(2016, 2018a, 2018b\)](#) and [Kurin \(2014, 2016; Kurin et al., 2016\)](#) in Peru succeeds in presenting a complex and intersectional consideration of the practice. Velasco incorporates some of these more established approaches regarding biological heterogeneity in the Colca Valley (2018a), but also successfully explores the role of head shaping in ethnogenesis and social differentiation. He argues that the standardization of the practice may well have masked varied life experiences ([Velasco, 2018b](#)). [Kurin \(2014\)](#) also tackles this topic by correlating head shape with changing group boundaries, and interestingly, with warfare and mobility, as well. Ultimately, she argues that among the Chanka, head shape may have marked a social affiliation that led to "excessive, repeated, often lethal violence" ([Kurin et al., 2016:100](#)). The recent work of [Mannheim et al. \(2018\)](#) took a broader look at head shaping across time in Peru, arguing for ties not only to personhood and social differentiation but also as a means of crafting a social landscape. This type of work not only documents varied cranial modification practices, but also addresses issues of greater significance to our understanding of Andean prehistory.

Verano's own investigations into cranial modification on the north coast of Peru suggest that the practice there did not embody social information in the same way that we see it elsewhere in the Andes. He documents an unintentional and frequently asymmetric flattening of the crania that may reflect social practices of childrearing but not serve the function of conveying group identities ([Verano, 1997b:673, 1997c:192-193](#)). Klaus' work (2008:250, 497) reinforces these assertions, documenting an overwhelmingly frequent presence of head shaping that is not tied to definable aspects of identity in skeletal samples from the Lambayeque Valley. That said, these works also contribute to a contextualized bioarchaeological approach to our understanding of cranial modification by alluding to the daily practice of individuals and caregivers in this region.

This shift towards contextualized research is not limited to the Andes. A similar movement is seen in Mesoamerica, where the study of cranial modification has been enhanced by focusing on a social conception of the body and the integration of records and archaeological analyses that situate the practice within its cultural context (e.g., [Duncan, 2009](#); [Duncan and Hofling, 2011](#); [Duncan and Veil, 2018](#); [Geller, 2006, 2011](#); [Tiesler, 1998, 2010, 2011, 2014](#)). This body of

work has developed a number of sophisticated approaches, and as such, represents a strong influence and parallel to approaches in the Andes. The recent publication of an edited volume that unites considerations of social aspects of the head, including and beyond head shaping, in both the Andes and Mesoamerica (Tiesler and Lozada, 2018a) is testament to this burgeoning intersection and research field focused on the head as a nexus of social practice and perhaps suggests the possibility of future work with a broader view of cranial modification.

5. Conclusion

In sum, there has been productive growth in research in all three of these major areas over the past 20 years, contributing much to our understanding of the lived experience for individuals in Andean prehistory. Tiesler and Zabala (2017) take this further in their survey of head shaping practices in the pre-Columbian and post-contact Americas writ large. They argue, that in using this broad geographic approach, what they see is a “diversity in meanings and outcomes” suggesting that even with the colonization event acting as a homogenizing force, the diversity that existed in these practices before conquest was enough to lead to myriad paths of transformation and persistence. In their recent introductory chapter to *Social Skins of the Head*, Tiesler and Lozada (2018b) explore the importance of the head in life and in ideology during the pre-Columbian period and after in a way that may serve as a model for this type of broad and synthetic consideration of head shaping in prehistory and in the Andes. That said, most published research focused on the practice of intentional head shaping in the Andes tends to be locally focused, and at this point, we have no major syntheses of the practice in the Andes or among widespread Andean groups along the lines of what has been developed for the Maya (e.g., Tiesler, 1998, 2014). At some level, this corresponds well with current understandings of the practice in most parts of the Andes, as head shape serves as a locus of local social identities or local social practices and clearly has significant variation across the region. Moreover, this also supports our current understanding of social identities that embraces the intersectional nature of identity and thus leads us to consider more than just the forms but also the ways in which those forms were made and read.

The tremendous advances in the study of cranial vault modification do not preclude the need to consider areas where this research could be expanded in the future. For example, there is no clear consensus as to whether crania must be complete to assess the presence of modification and papers often shy from detailing this, yet it could provide insight if the practice were visible on certain fragments but not others. This would facilitate comparisons and work in regions outside the Andean deserts where preservation is often excellent. Beyond more work in the areas detailed above, it is worth coming back to Verano’s article, where, for example, he highlights that cranial modification is inherently tied to the “complex interplay between a specific deformation device and a growing infant cranium” (1997a:251). This consideration, not just of the malleability of the infant cranium, but of the potential compensatory growth and alterations to intended shape that are the natural product of growth and development, merit study such that our understanding of cranial modification might have a stronger grounding in anatomy and physiology. The new techniques employed in 3D imaging and geometric morphometrics might come into play here, allowing for documentation of age series and different shape progressions.

It is also worth exploring another area Verano mentions in passing, the unintentional flattening of the head resulting from cradleboards and other child-rearing techniques. As Tiesler and Zabala, 2017:305) this distinction may oversimplify “the multi-layered meanings of most native head-compression practices, some of which were clearly unrelated to the visible head morphology.” While cradleboarding practices have not been considered in depth in recent decades, these practices likely produce modifications to head shape that differ from those produced through intentional binding in degree and potentially in symmetry and

similarly may contribute to our understanding of Andean prehistory (e.g., Clark et al., 2007; Kohn et al., 1995).

However, exploration of the nature of this child-rearing practice might yield varied and applicable insights to our understanding of the role head shaping played in prehistory. In his publication, Verano (1997a) notes the presence of these apparatuses in the material record; however, there has been little to no research on this since then and this avenue provides a strong complement to work on intentional modifications and may ultimately help define them. Similarly, other than the occasional work (e.g., Soto-Heim, 1987), very few scholars have touched on the significance and association of head shaping practices with headdresses and hairstyles. Of course, the study of these, as well as of cradleboards and modifying apparatuses, are impeded by variation in preservation. However, they are an important avenue of complementary research, especially in the Andes, as these may well have also served as highly visible and emblematic markers of identity and social practices. Here is a place where, in the absence of preserved apparatuses, 3D modeling may be able to help discern the nuances of pressure points and angles to give shape to a conception of the devices used to obtain these varied forms of cranial modification.

In sum, there continues to be importance to the studies of pathological consequences, morphology, and classification, especially given the broad impact they may have on studies of head shaping globally. In this role, the important space occupied by the Andes for documenting and detailing this practice should not be undervalued. Of more relevance to Andean archaeology, however, inquiries into the role of cranial shaping in social identity have provided more nuanced understandings of the past in the Andes. This work has gone beyond the skeletal material to integrate findings from across bioarchaeology and archaeology in holistic appraisals of life and change in the past. As Mannheim et al., 2018:223, “cranial modification, then, is the outcome of social processes differentiated by locality, gender, and age rather than simply a classificatory device.” Of importance moving forward as we consider the multifaceted nature of this practice, is the great potential for advancing the field when technologies and quantitative advances focused on morphology can be integrated with the more social questions raised by a contextualized bioarchaeology and paleopathology.

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