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Studying cranial vault modifications in ancient Mesoamerica

Vera Tiesler

Universidad Autónoma de Yucatán, Facultad de Ciencias Antropológicas, km 1.00 carretera Mérida-Tizimín, Mérida, C.P. 97305, Yucatán, Mexico
e-mail: vtiesler@yahoo.com

Summary - *The artificial modification of infant cranial vaults through massages or by means of constriction and compression devices constitutes a readily visible, permanent body modification that has been employed cross-culturally to express identity, ethnicity, beauty, status and gender. For those ancient societies that staged head shaping, these cultural correlates may be ascertained by examining cranial shapes together with other data sets from the archaeological record. Studies of skulls modified for cultural reasons also provide important clues for understanding principles in neural growth and physiopathological variation in cranial expansion. This paper focuses on head shaping techniques in Mesoamerica, where the practice was deeply rooted and widespread before the European conquest. It provides a comprehensive review of the Mesoamericanistic research on shaping techniques, implements and taxonomies. An up-dated, interdisciplinary examination of the physiological implications and the cultural meanings of artificially produced head shapes in different times and culture areas within Mesoamerica leads to a discussion of the scope, caveats, and future directions involved in this kind of research in the region and beyond.*

Keywords - *Artificial cranial vault modification, Ancient Mesoamerica, Body modifications, Interdisciplinary anthropology, Osteology, Bioarchaeology.*

Introduction

The human body, with its physical and psychological properties, figures both as a basis and mediator in cultural interactions and, as such, is affected by the social life it supports (Douglas, 1973; López Austin, 1989, p. 7). Thus, the anthropological study of the human body not only informs on the biological aspects of life, but more importantly, grants direct glimpses on ancient and modern societies and the incarnation, a sort of physical embodiment, of its cultures and subcultures. Namely, the bioarchaeology (or osteoarchaeology) of the skeletal record is informative in this regard, as skeletons are part of the archaeological (mortuary) culture and at the same time directly represent past societies' human actors.

Bioarchaeological approaches are especially well suited to examine those body modifications that leave permanent traces in the skeleton, as they are capable of granting insights on wide ranging aspects of aesthetics and beauty, culture, gender, ritual performance and social structure itself. It comes as a surprise, therefore, that studies on dental modifications, head binding or cradle boarding still remain either unmentioned or treated only marginally in the bioarchaeological literature and, in fact, in most resource compendia on archaeological and anthropological body theory, beauty concepts, embodiment, and gender (Classen, 1993; Joyce, 2000; Klein & Quilter, 2001; Lewis, 2007; Lock & Farquhar, 2007; Moore & Scott, 1997; Sofaer, 2006).

The scarcity of work is especially surprising in the case of artificial cranial vault modifications, given the highly visible and widespread nature of this practice, which holds interest for the bioarchaeologist examining those societies that

staged it. As head shaping leaves physical traces in the neurocranium, it can be studied and contextualized from the archaeological record. This possibility renders bioarchaeological approaches suitable for reconstructing past personhood, gender, aesthetics, and social structure (Blom, 2005; Tiesler, 2012; Torres-Rouff, 2002).

In this essay, the terms "head shaping", "cranial vault modification", "cranial modeling" and "molding" are used synonymously to refer to the artificial compression or constriction of the infants' head during the first months and years of life, when the skull is still malleable. After that, the skull vault hardens and the changes become permanent. The external distortion of the neurocranial growth vectors may be conducted on the infant by massages, hard compression devices and constricting wraps, bandages, and hats. Given the diversity of cultural practices that involve the shaping of the infant head, it is problematic to distinguish between intentional and unintentional modifications from the skeletal record, as has been advocated by some authors (Duncan, 2009; Neumann, 1942; Saul, 1972). Even conceiving the morphological changes as the expression of one single practice may be misleading in those cases in which more than one technique, implement or practitioner is involved. Additional problems in interpreting head shaping arise in cultural settings, like Mesoamerica, where infant head manipulation express diverse goals and meanings, some of which are clearly unrelated to the visible head morphology (Tiesler, 2011, 2012).

Shaping the cranial vault constitutes one of the most ubiquitous biocultural practices of the past, as it has been documented in all continents (or at least in suscribed territories within each continent). It also appears to be a very ancient practice. In fact, culturally induced changes in the cranial vault are not even limited to modern humans, but go back to hominid forms pre-dating *Homo sapiens* (Trinkaus, 1982, 1983; Weidenreich, 1938-39). Noticebly, two Neandertal skulls from Shanidar, Irak, dated at about 45,000 years B.P. (Trinkaus, 1982, 1983) show transverse grooving and artificial flattening of the forehead. In these cases, like in all other very early findings of cultural vault change, the intentionality of the grooves and flattened surfaces cannot be ascertained. It could be equally a fortuitious occupational byproduct, like that of carrying heavy loads during childhood.

Unlike most other practices that shape or decorate the body, cranial vault modeling bridges the generations, as it is performed by second or third generation adult practitioners (mostly females) on their infant kin who would carry the resulting artifical head mold for the remainder of their lives. This protracted, conservative quality of head shaping raises the cultural importance of this practice above that of more ephimeral, transitory body fashions and turns it into an enormously useful trait for examining long-lasting (*longue* durée) cultural dynamics, long-term expressions of group ancestry and ethnicity, social integration and embodied group identity.

The present essay, which centers around the forms, the meanings and the research approaches to ancient cranial vault modifications, is foremostly designed to contribute with an updated review of the academic literature on head shaping in Mesoamerica, where it once constituted a deeply rooted tradition performed at all levels of society over several millenia (Romano, 1974; Stewart, 1975, pp. 208-224; Tiesler, 1998, 2012). On a methodological level, I wish to delineate a set of interdisciplinary analytical parameters for the study of head shaping practices. These are anchored in concepts derived from craniometrics, concepts in neural growth and adapted taxonomic criteria, to be examined and interpreted within regional biosocial and ideological frames, the latter of which confer meanings to the head as an animical center (López Austin, 1989, 1998; López Austin & López Luján, 1996). This approach builds on my long-term academic commitment to the study of ancient head shaping practices among the ancient Maya (Tiesler, 1998, 1999, 2012). My inter-disciplinary data analysis is theoretically informed by biocultural models and cognitive approaches (see, for example, Houston *et al,*. 2006; López-Austin, 1989; Tiesler, 2007), which are combined to contribute fruitfully to the discussion of sociocultural and religious embodiment in Mesoamerica.

Studying artificial skull shapes

Given the multifold origins of morphological modifications among archaeologically retrieved human skeletons, it is problematic to infer *a priori* any cultural origin, let alone intentionality (Tab. 1). Morphological changes of the skull often occur posthumously in the form of taphonomic damage (due to earth compression or biochemical desintegration) (Hansen, 1919). In other relatively rare cases, the action of congenital defects mimics artificial modelling, as in dysostoses, caused by the premature fusion of skull sutures, or acromegaly, a hormonal disorder. Still other changes have a cultural origin indeed, but are not a custom *per se*, as they stem from habitual activities like crib positioning, tight hair ribbons, or tumpline use. The latter may be informative about day-to-day practices, but their morphological imprints on the neurocranium hardly communicate any voluntary choices taken by their practitioners. Therefore, distinguishing cultural (intentional) modifications of infant vault from unrelated conditions is not always easy and requires careful case-by-case examination of relevant morphological evidence and contextual patterning. Only after excluding all possible alternative causes of skull modifications can artificial infant shaping be inferred.

From the last centuries to the present, a host of taxonomic criteria have evolved to classify culturally induced head shapes. Some classifications have attempted to correlate specific head shapes to the ethnicity or social distinction of their human carriers (Weiss, 1967) or to their intentional or unintentional aesthetic nature (Neumann, 1942). Other approaches have aimed at infering specific compression techniques and apparatuses (Dembo & Imbelloni, 1938). Some recent quantitative taxonomic parameters have used landmark studies (Anton, 1989; Arnold *et al.,* 2008; Cheverud *et al.,* 1992; Cheverud & Midkiff, 1992; Falkenburger, 1938; Gómez-Valdéz *et al.,* 2007; McNeil & Newton, 1965; Romano, 1965; Stojanowski & Euber, 2011) (Fig. 1), while others are founded on detailed descriptions of overall skull form, or examine the anatomy of constriction grooves or compression planes (for example, Buikstra & Ubelaker, 1994, pp. 160-163, attachment 28).

Tab. 1 - Different origins of morphological changes of the human skull vault.

1.	Postmortem modification
	1.1. Taphonomic damage
	1.1.1. Mechanical pressure
	1.1.2. Biochemical substitution
	1.2. Faulty reconstruction of fragmented pieces
2.	Antemortem modifications
	2.1. Physiopathological changes
	2.1.1. Congenital defects
	2.1.2. Endochrinological defects
	2.1.3. Nutritional disease
	2.1.4. Circulatory defects
	2.1.5. Unknown etiology (primary premature surture closure, etc.)
	2.2. Morphological diversity of skull shapes
	2.2.1. Dolicocephalic populations
	2.2.2. Brachicefalic populations
	2.3. Cultural modifications of the infant skull
	2.3.1. Occupational causes (tumpline use)
	2.3.2. Modern therapeutical measures
	2.3.3. Cultural manipulation of the infant head (head shaping)

As regards the examination of New World cranial vault modifications, it was not before the 19th century that interest in native head shaping practices slowly arose, first in naturalists, anatomists, and curious travel reporters. Because head shaping had declined soon after European contact among most native groups, that research, most of which still appears in the form of curiosity reports or descriptions, was founded mainly on the analysis of skull collections (Armas, 1885; Boas, 1890; Morton, 1839, 1841; but see also Comas (1958) on modern Shipibo Conibo from Ucayali, Perú). These early accounts largely reflect the *Zeitgeist* of the times when antiquarianism thrived and filled the magazines of natural history museums, anatomy departments, and hospitals of the US and overseas. Soon, the New World became known as the main territory of head modifications (Flower, 1881) thanks to its near omnipresence in the Americas and the puzzling diversity of artificial head forms herein produced.

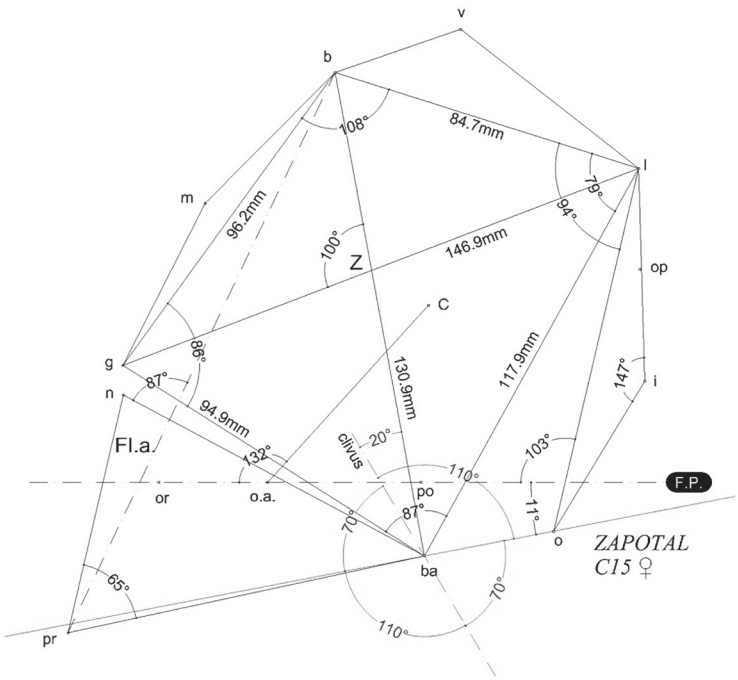

Fig. 1 - Klaatsch quatritateral on skull with corresponding measurements, obtained from digital 3D landmark recording, El Zapotal, Ossuary 1 (Skull 15), left lateral norm (drawing by J. Gómez Valdés).

Morton, in his pioneering volume *Crania Americana* (1839), destilled four formal types in the Americas: cylindrical and conical shapes, in addition to frontal and occipital flattening. Magitot distinguished ten types in a paper presented in 1880 at the Congress for Anthrpopology and Prehisoric Archaeology in Lisbone, Portugal. A few decades later, Hrdlicka would cut these down to two (Hrdlicka & Lumholtz, 1912). Alternative taxonomies, valid also outside the Americas, were established by Gosse (16 types and 2 varieties), Lunier (10 types), Tschudi (3 types), Wyman (2 types), Topinard (5 types), Virchow (3 types), Lehnossek (6 types), Sergi (4 types) (Gervais, 1989). Naturally, this inflationary number of classifications, which were established on specific regional, formal, and analytical grounds, was prone to cause unreconcilable confusions on broader scales of anthropological comparison.

As skull shapes were being meticulously described and measured during the 19th century, their geographic distributions were examined in the light of diffusionist theory. Lamarckian and Darwinistic ideas on evolutionary mechanisms inspired some authors to address the question of the heredity of aquired traits from the focus of cranial modeling. While Gosse (1855) still considered the possibility of hereditary transmission of artificially produced shapes, Delisle (1880, pp. 18-22) concluded his detailed parental analysis of French families, who still practiced head modelation, with the statement that artificial head form was not inherited. Additional questions regarding possible neurological side effects were analyzed, especially with the advent of neurological sciences in the second half of the 19th century. These were often correlated to phenomenological ideas by attributing a specific function to each area of the brain. Random speculations regarding

deformed skulls obviously led to interpretations which nowadays appear obsolete.

More recent, post WWII research on Old and New World cranial modifications has addressed an increasing number of specific morphological topics, most of them releted to anatomy and physiopathological cranial growth (see Moss, 1958; Pardal, 1938; Prestigiacomo & Krieger, 2010). Mostly conducted by medical practitioners, these studies generally draw on measurements or morphological observations obtained from series of artificially modified skulls, which are compared to the craniometric impact of pathological growth induced by premature suture closure for instance. In recent decades, Cheverud and colleagues (1992a, 1992b), Dietze *et al.* (2007), Kohn *et al.* (1993), Littlefield (2004), Ogura et al. (2006), Rhode & Arriaza (2006), among many others, have shown renewed interest in these functional, physio-pathological aspects of altered cranial growth, and secondary changes of the skull vault, the base, face, and mandible. They have examined morphological effects like the buldging of the posterior cranial base and the formation of sutural bones, prognatism and facial assymetry, or assimilated growth mechanisms of the mandibular condyles in the artificially modified head.

The foundation of modern anthropological studies on American head shaping were set during the 1930's, with such important works as that of Dingwall (1931), Dembo & Imbelloni (1938) and Falkenburger (1938). While Dingwall assembled more than 1200 publications to synthesize ethnological work on artificial head shaping, with important input also on the New Continent, José Imbelloni gathered metrical, osteological, and ethnic criteria to establish a comprehensive basis for studies on modified skulls, consigning importance, distribution patterns and changes through time in the Americas. Frédéric Falkenburger (1938), through a detailed analysis of 302 skulls from South America, contributed with metrical criteria. He correlated cranial indexes and angles with different modification technique and provided metric ranges for each. More specific studies on New World head shaping practices highlight regionally characteristic physical and cultural aspects, such as the work by Neumann (1842), Rogers (1975), and Stewart (1941, 1958, 1963) for North and Central America, by Stewart (1975) and Romano (1965, 1974), for Mesoamerica, and Pedro Weiss (1962) and Stewart (1943a, 1963), among others, for the Andean Region. In the last two decades, anthropological work on head shaping in the New World has relied increasingly on archaeological and social theory in the contextualized interpretation of skulls as part of the mortuary record (Tiesler, 1998, 1999), and has recurred to explicit conceptual frames anchored in native schemes of cosmology, semiotic and in general cognitive approaches, body theory, and embodiment (Blom, 2005; Lozada, 2011; Tiesler, 2012; Torres-Rouff, 2002; Yepez, 2006, 2009).

Artificial cranial modification in Mesoamerica

Considered jointly, the old and new regional studies are gradually closing the gaps for a coherent synthesis of distributions, meanings, and evolution of artificial head morphologies in many cultural areas. Such is the case for pre-contact Mesoamerica, an amazingly rich cultural territory that has been examined through a host of ethnohistorical, archeological, bioarchaeological and liguistic sources, together with art history and increasingly readings of hieroglyphs. In this study environment, the wealth of information lends itself to interdisciplinary research, which concedes culturally embedded interpretations of physical and social evidence (like cranial modifications in this case) that go beyond the purely descriptive work on morphological expressions and their distributions. The following discussion provides an integrated, up-dated synthesis of the research history and today's academic approach on artificial head shapes in this region, and closes with perspectives and caveats in this line of research.

Mesoamerica denotes a geocultural space encompassing parts of modern Mexico,

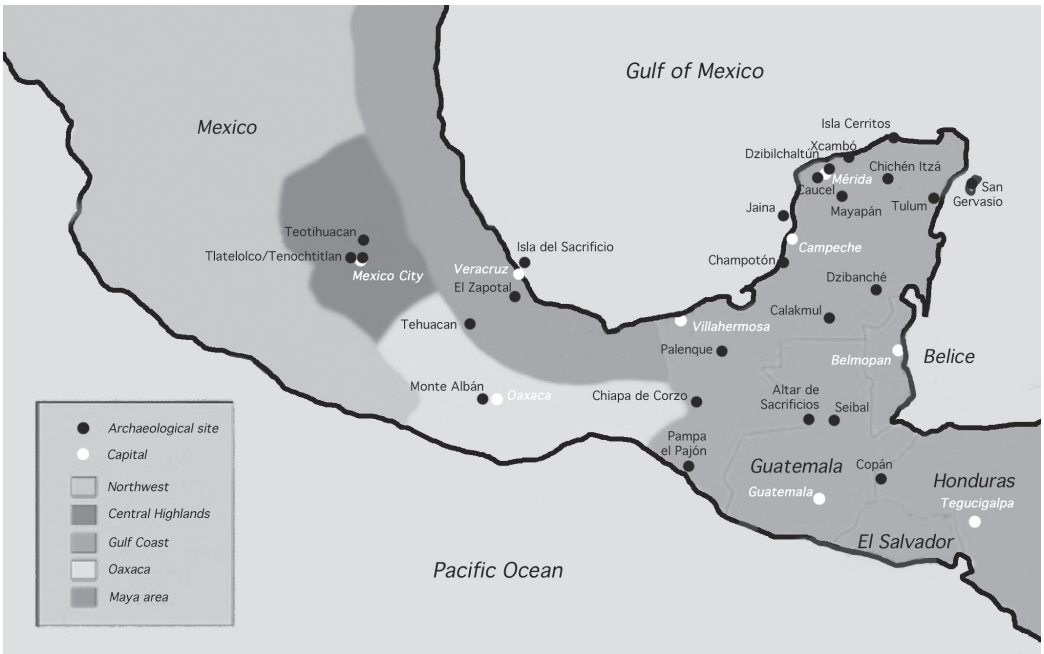

Fig. 2 - Map of Mesoamerica with sites mentioned in the text (drawing adapted from FAMSI website, www.famsi.org, by V.Tiesler).

Guatemala, Belize, Honduras, Nicaragua, and El Salvador, which was and still is the setting for impressive native high cultures, among them the Maya, Zapotec, and Aztecs and their predecessors (Kirchoff, 1943; Manzanilla & López-Luján, 1994; Sharer & Traxler, 2006; Weaver, 2009) (Fig. 2). This cultural sphere is defined by a set of shared material and cosmological elements, which includes pantheistic religious concepts, a cosmological notion of balance with the sacred world, and that of a cyclical evolution of the native universe. Mesoamerican civilization looks back to a continuous millenary cultural history, which staged sophisticated art and music, in addition to counting and writing systems. Its complexity was grounded on social stratification, urbanization, and economic surplus, thanks to the combined cultivation of subsistence products like maize, squash, beans, amaranth and chile, among others.

As in most other parts of the New World where scientific interest in artificial head shapes resurged during the 19th century, Mesoamerican studies on artificial head shapes have centered around the archaeologically retrieved skulls, focusing on the product (the modified skull) instead of the actual practice on infant heads itself. Extreme or "exotic" forms are still highlighted in the literature together with lingering efforts to identify specific head shapes for each of the Mesoamerican cultural territories.

Local scholarship on Mesoamerican head shaping practices has been suscribed from the start mainly (if not only) to Mexican physical anthropology, and has gradually evolved up from the individual-based, isolated and uncoordinated research effort, which still characterized it during the end of the 19th century, to its firm academic establishment half a century later (Comas, 1960). Until the mid 20th century, Mexican anthropological research on head shaping was still strongly eurocentric (León, 1991; Serrano *et al.*, 1991; Serrano & Villanueva, 1997), much of it being published directly by the *Société*

d'Anthropologie de Paris (Comas, 1970). During the second half of the 20th century, Mexican efforts on artificial head forms tended to focus on the distribution and cultural roles of different forms (Comas, 1960; Dávalos, 1951; Romano, 1965, 1974; Stewart, 1941, 1963, 1975; Weiss, 1962) and revolve around craniometric approaches, prominently craniotrigonometry, strongly promoted by Arturo Romano for measurable skulls (1965, 1972, 1974, 1977a, 1977b, 1980). These decades also witnessed a growing trend towards population studies in head shaping practices, which replaced the individual case examinations advocated before (Dávalos, 1951; Romano, 1965, 1973, 1979). The new collective, comparative approach made the necesity of consistent morphological taxonomies ever more patent. For this purpose, the Mexican academic community applied and adapted the classification criteria established by Imbelloni (Dembo & Imbelloni, 1938) and Federic Falkenburger (1938) (Romano, 1965, 1974, 1996) (Fig. 3).

Mexican research from the 1960's to the present has been heavily influenced by the prolific work of physical anthropologist Arturo Romano Pacheco. Romano engrained his detailed craniometric approaches with the adoption of Imbeloni's taxonomy to infer head apparatuses and techniques from the skeletal record. This approach allowed him to organize the kaleidoscope of different Mesoamerican head forms, where cultural changes in head shape were aligned with native cosmological schemes, as Romano concludes for a Preclassic "olmecoid" skull from Pampa el Pajón (Romano, 1977a, 1980), for superior flattenings in crania from El Zapotal (Romano, 1977b) and the conical head shapes of the Huasteca (Romano, 1987). He also notes that Mesoamerican compression gears corresponded almost exclusively to rigid devices and follows from here that cradleboards and head splints could be combined to produce "mimetic" shapes, their compression effect sometimes being enhanced with horizontal or saggital compression bandages (Romano, 1965, 1973).

Also scholarship north of the Mexican border has contributed substantially to the study of

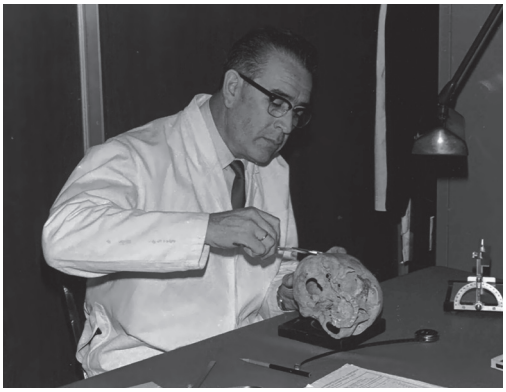

Fig. 3 - Prof. Arturo Romano Pacheco, 1960s; (photo M.T. Jaén Esquivel).

Mesoamerican artificial cranial modifications by establishing patterns of distribution of specific techniques and head forms. One such study is Thomas Dale Stewart's seminal work on Maya head practices published in 1975 under the title *Human Skeletal Remains from Dzibilchaltún, Yucatán, Mexico, with a Review of Cranial Deformity Types in the Maya Region* (Stewart, 1943b, 1953, 1975). In his work, the author compares artificial head forms between different time periods and between regions and concludes that the distribution of head forms varies significantly between the horizons.

Comparing the scholarly approaches between both sides of the border, the lack of integration between local work and international studies becomes quite apparent. This separation is underlined by the inreconciliable taxonomies employed in classifying head shapes; still today, the international community has only reluctantly adopted the prominent Mexican classification system, based on Imbelloni´s taxonomy (Duncan, 2009; Saul, 1972). Other English speaking contributions only distinguish the custom in dicotomical terms of presence vs. absence. A noticeable lack of cross references between Hispanic, French, and Anglosaxon publications on Mesoamerican head shaping has come to limit the amount of comparable data, a restriction already noted by Stewart (1975; see also Gervais, 1989; Tiesler, 2012).

Other problems in studying artificial head shapes in Mesoamerica relate to the topic itself rather than language barriers or national boundaries. Placed at the interstice between physical anthropology and archaeology, biocultural/ bioarchaeological studies on head shapes depend both on contextual information and the anatomical knowledge of the observer. This disjunction has separated the interpretation of head shapes from that of the surrounding cultural information derived from conventional archaeological reconstruction.

Naturally, this separation holds true also for other sources of data, namely the written record. The data-rich Mesoamerican research environment probably is unique in that it permits the use of complementing additional sets of written information, derived from ethnography, ethnohistorical accounts, iconography and even prehispanic writing (epigraphy). Jointly, they confer culturally embedded "*emic*" meanings for ancient head practices in a way that probably no other ancient archaeological culture permits (see, for example, Lozada, 2011, pp. 237-238, on the limitations of interpreting head shaping in the ancient Andes). Unfortunately, besides isolated efforts in this direction, these data sources are still underemployed sofar (albeit see Bautista, 2004; Bonavides, 1992; Duncan, 2009; García & Tiesler, 2011; Houston *et al.,* 2006; Romano, 1987; Sotelo & Valverde, 1992; Winning, 1968, 1969, for alternative approaches to the subject of ancient Mesoamerican head shaping).

Taxonomy of artificial skull shapes in Mesoamerica

To characterize ancient artificially modelled skulls *per se*, both formal (morphological) and procedural (technical) criteria apply. In the following, I will summarize briefly the classification scheme used in Mexico, which goes back to the work of Argentinian anthropologist José Imbelloni (Dembo & Imbelloni, 1938) and whose taxonomy is presented in an adapted version in Table 2. Although not suitable for the characterization of most annular shapes, common in Europe, Melanesia or Africa, it has proved useful in the description of most tabular modifications in the Americas and specifically for Mesoamerica.

Procedurewise, a set of non-metric and metric criteria have been employed to determine the presence, degree, and type of cultural modification in the skeletal record. The shape, extent, degree, and anatomical relationship are ideally described for each compression plane and constriction groove. Relevant morphological attributes are also included: basic vault measurements, foraminal *clivus*, anatomical location of *vertex*, distance of *opistocranium* from *lambda* and *opistion*, bilateral bulging vs. reduction of bilateral width, the degree and side of vault asymmetries (bipolar *plagiocrania*), and the presence, form and severity of supra-inial lesions.

The classifications of head modification established by José Imbelloni (Dembo & Imbelloni, 1938) have been adjusted to the specificities of Mesoamerican modification practices by Arturo Romano (1965) and, specifically for the Maya area, by Tiesler (2012) (Tab. 2; Figs. 4a and 4b). This scheme (now commonly used in Mesoamerican scholarship) basically distinguishes between tabular compression forms, attributed to the application of hard compression devices, and annular modification, accomplished by constriction bands, single strings, bandaging, or tightly fitted hats (Dembo & Imbelloni, 1938; Dingwall, 1931). While the fitting of free compression boards on the infant head usually leads to the receding tabular oblique forms (Fig. 4a), cradleboards originate tabular erect shapes that are equivalent to short and broad heads (Fig. 4b). The duration of compression forces and the amount of pressure determine the severity of the morphological changes. Besides intermediate and extreme modifications, slight forms of anterior-posterior reduction describe either lambdic (tabular erect occipital plane), occipital (tabular oblique frontal curve) or frontal flattening (tabular erect frontal plane or tabular oblique occipital curve). In these slight modifications, the opposing compression plane is much less visible and might not even be recognized (see Dembo &

Tab. 2 - Taxonomic criteria, adapted from Dembo & Imbelloni (1938).

TABLA TAXONÓMICA DE LAS DEFORMACIONES INTENCIONALES DEL CRÁNEO INTENCIONAL DEL CRÁNEO (según Dembo e Imbelloni 1938:275, ampliado, adecuado y desglosado según diferentes parámetros técnicos y formales)					
TIPOS ESENCIALES DE LA PRÁCTICA	CARÁCTER DISTINTIVO DEL PROCESO DEFORMANTE	VARIEDADES EN GRADOS	VARIEDADES EN FORMAS (GRADOS: '0.5'-'3')	PRESENCIA DE VENDAJE CIRCULAR	PRESENCIA DE BANDA SAGITAL
Deformados TABULARES OBLICUOS	Compresión occipito-frontal mediante tabletas libres	Extremos Intermedios	Intermedias Curvo-occipitales Curvo-frontales Paralelepípedas Miméticas	Ausencia Presencia ('pseudo-circular')	Ausencia Presencia de banda ['0'-'2'] Separación bipolar (bilobado) ['>2']
Deformados TABULARES ERECTOS	Compresión posterior por plano de decúbito	Extremos Intermedios	Intermedias Plano-lámbdicas Plano-frontales Paralelepípedas Miméticas Cónicas	Ausencia Presencia ('pseudo-circular')	Ausencia Presencia de banda ['0'-'2'] Separación bipolar (bilobado) ['>2']
Deformados ANULARES	Compresión simétrica anular, por vendas o correas elástica	N.A.	N.A.	N.A.	N.A.

Imbelloni [1938] and Dingwall [1931] for ethnographic and ethnohistorical references). The loose or faulty fit of compression devices may lead to severe cranial asymmetries, most noticeably in cradleboard use, while pads put underneath the compression boards may lead to sinuous skull contours. It is noteworthy that besides the antero-posterior compressions that are seen in Mesoamerican skulls, there are also cases of tabular lateral compression, described mainly from North American contexts (Rogers, 1975).

The duration of compression forces and the pressure applied greatly determine the severity of formal changes in the skull cap, being either weak, medium, severe, or extreme. It should be emphasized that the extreme erect forms also called *Cuneiform* modifications (Dembo & Imbelloni, 1938). *Flatheads*, not to be confounded with "longheads", are the extreme forms of tabular oblique modelling (Dembo & Imbelloni, 1938). Conversely, slight forms of anterior-posterior flattening are labeled *lambdic* or *frontal flattening*, (as the opposing compression plane cannot be recognized; Dembo & Imbelloni, 1938). These appear frequently in archaeological contexts and their intentional nature is often questionable.

Generally speaking, the varieties of each tabular category relate to technical variations, like the combination of a free occipital compression board with a frontal constriction band in the occipital plane variety of tabular oblique modification, or the superior contention of the parallelepiped variety of tabular erect modeling, which leads to a cubic-like shape (Dembo & Imbelloni, 1938). Cushionings under the compression boards produce concave planes, while the joint application of free boards with circular bands results in what is called "pseudoannular" or "pseudocircular" tabular shapes (Romano, 1965). Imbelloni mentioned this variety for the tabular erect type (Dembo & Imbelloni, 1938, pp. 271-272); however it has also been described for the oblique form (Romano, 1965). In Mesoamerica, the pseudoannular erect shapes caracterize the pear shaped "olmec" head form, which visually divide the vault into an upper and lower part. Technical hybrids of head devices generally lead

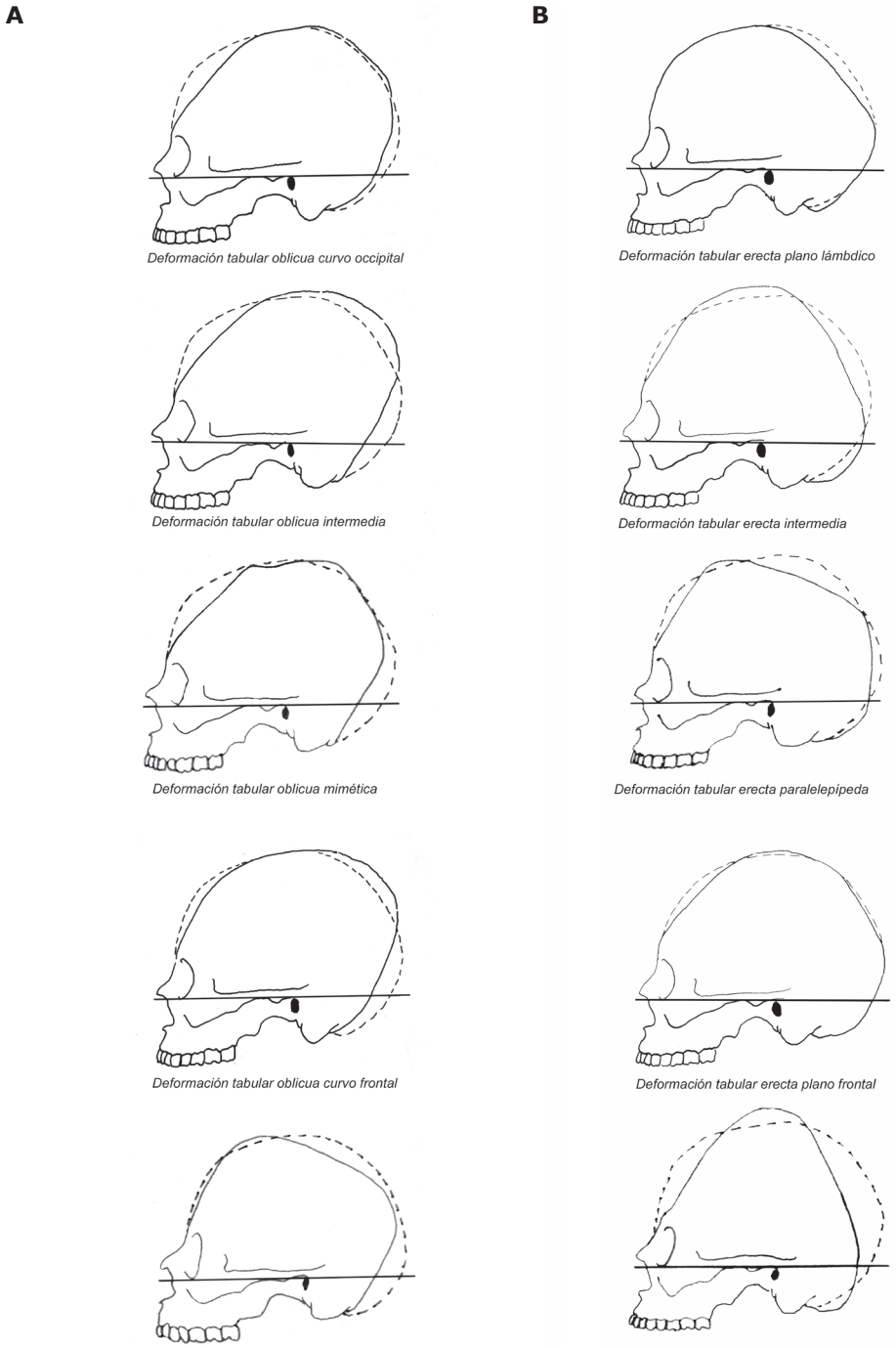

Fig. 4 - Different formal varieties of the (a) Tabular oblique modification type (b) and Tabular erect modification types (drawings, V. Tiesler).

to intermediate forms. Secondary application of bands can create bone furrows or grooves, like the postcoronial groove (which is also interpreted as a secondary bone reaction to frontal compression) or sagital groove, which visually divides the vault in two hemispheres on the level of the sagital and/or coronal sutures. Imbelloni (Dembo & Imbelloni, 1938, p. 271) called these shapes bilobate (one groove) or trilobate (two grooves). Irregularities in the application of the head aparatus can lead to assymmetries in shape, called *plagiocrania*, which is caused mostly by cradleboard use (Romano, 1974; Tiesler, 1998).

Another frequent trait related to head shaping corresponds to a bony depression in the central part of the occipital squama, as described by Weiss (1981). This depression sometimes appears pathologically altered, sometimes in the form of complete penetration of the skull vault above the *inion*. This trait, called "supra-inial" depression or lesion, has been interpreted as the imprint of the compression device on the infant skull, although other possible etiologies have been proposed, including trephening through abrading the back of the head (Holliday, 1993; Stewart, 1976; Tiesler, 2006; Weiss, 1981). In Mesoamerica, where these marks are common, also paired, regular, lateral depressions on the occiput have been documented; they are probably imprints of the protruding margins of the posterior compression tablet. Other more centrally located occipital lesions from the Mesoamerican Highlands and the Maya area recall similar cases reported from the Andes (Lagunas, 1974; Tiesler, 2006; Weiss, 1981).

In addition to the information regarding head form also biographic (sex and age-at-death) and associated archaeological data for each specimen are crucial in order to contextualize each osteobiography. In each burial context, a set of correlatives for social distinction is scored either individually or processed as part of a multivariate variable matrix. In Mesoamerican burial contexts, relevant status markers include the presence of tomb architecture, or inclusions of exotic materials, such as cinnabar, jadeite or obsidian (Krejci & Culbert, 1995; Tiesler, 1999, pp. 106; Wright, 2006).

Head modeling in ancient Mesoamerica

If we believe the archaeological record, infant head modeling has been practiced in the broader Mesoamerican territory for almost ten thousand years. An early case of marked tabular erect modification has been dated to 8,500 to 7,000 years B.P. (Lagunas, 1989, p. 33). It was found during an archaeological exploration in the Basin of Tehuacan in the Central Highlands of Mexico, at that time occupied by early Neolithic hunters-and-gatherers. Another early specimen from the Valley of Valsequillo, Puebla (Mexico), which shows strong lambdic flattening, has been attributed an antiquity of 5,000 years B.P. (Romano, 1972, 1974).

Overall, Mesoamerican head modification practices are evident in up to a hundred percent of prehispanic skeletal populations, which exhibit a large variety of artificial changes of their skull morphology. The diversity in artificial head shapes was already noted by the American anthropologist Earnest Hooton who described the artificial morphologies in the skulls retrieved from the Sacred Cenote of Chichén Itzá, noting that "the varieties of cranial modification are so numerous that they are bewildering" (Hooton, 1940, p. 273). This appraisal has been echoed by more recent Mesoamerican scholars (Stewart, 1975, p. 222; Tiesler & Romano, 2008) (Figs. 5a-5d).

Also, the first important hierarchically-administered Olmec society, which flourished during the Early Preclassic period (1,400-1,000 B.C.), already practiced head shaping (Romano, 1974; 1977a; Saul, 1972). Back then, the predominant technique, consisted in cradleboarding, which produced a variety of erect shapes, among them the narrow erect pseudo-circular forms, which emulated the pear shaped head form seen in the anthropomorphic head sculptures of the Gulf Coast (Romano, 1977a; Tiesler, 2010). This shape, which figures prominently in Olmec head portraiture and has been documented in the Mesoamerican cranial record until the end of the Preclassic (around the beginning of the modern era), implies a rounded, bulging forehead and

Fig. 5 - Different Mesoamerican skull shapes: (a) pseudocircular tabular oblique modification (Jaina, Classic period, DAF-INAH, photo, V. Tiesler); (b) intermediate tabular erect modification (Chichén Itzá, Yucatan, Mexico, Postclassic period, DAF/INAH, photo V. Tiesler); (c) tabular erect shape with superior flattening (El Zapotal, Veracruz, Mexico, Classic period, DAF-INAH, Photo, V. Tiesler); (d) Extreme tabular erect modification in its bilobal modality (Argelia, La Angostura, Chiapas, Mexico, DAF-INAH; photo, V. Tiesler).

a noticable horizontal separation between the upper and lower neurocranium. Judging from the eastern Mesoamerican skeletal record, this form spread from the Gulf Coast coastal plains of Veracruz (El Manatí) and Tabasco northward towards Yucatan (Dzibilchaltún and Caucel) and southward to the Usumacinta (Altar de Sacrificios and Seibal) and the Isthmian region towards the Pacific Coast (Pampa el Pajón and Chiapa de Corzo), emulating the sacred Olmec

feline representations and the head silhuette of the early maize god (Saturno *et al*., 2005; Tiesler, 2010; see also Cyphers & Villamar, 2006).

The centuries before the onset of the Classic period also witnessed a diversification of artificial head shapes, as different modeling techniques and devices were introduced both in the Central Highlands (Tlatilco; Ecatepec) and further south (Bautista, 2004; Peña & López Wario, 1989; Romano, 1972, 1974). Specifically in the Maya territories, oblique and intermediate tabular erect forms appear along with the "olmecoid" pseudo-circular erect shapes (Romano, 1977a; Saul, 1972; Saul & Saul, 1991, 1997; Tiesler, 2010). The evidence of horizontal, circular and sagittal wraps on the skulls in some territories, but not others, reflects upon the growingly diverse choices in artificial shapes of each cultural area. It is noteworthy that, unlike the collections from the regions north and south of Mesoamerica, the overwhelming majority of Mesoamerican skulls do not sport true annular forms. When used, compression bands or wraps were almost always combined with tablets or boards.

During the first millenium A.D., it was clearly the eastern and southeastern parts of Mesoamerica (with Veracruz, Oaxaca and the Maya area) which harbored the strongholds of artificial head shaping in terms of popularity, severity and diversity in culturally produced shapes (Winter, 1995). To their north, cradle-boards were predominantly used, sometimes producing solely a weak lamboid flattening. In other cases, like in Teotihuacan (north of Mexico City), the use of cradle devices resulted in conical forms (Yepez, 2001). In Early Classic Teotihuacan, the documented variety of oblique and erect shapes, including superior flattening, appears to derive from Gulf Coast traditions in Veracruz (Serrano *et al.,* 2003; Yepez, 2001).

During this Classic period (A.D. 250-900), broad preferences for distinct head forms change across the cultural landscape, most visibly across the Maya area. Here, extremely arrow and slanted heads were preferred in the western sphere of the Maya Lowlands, namely in the Lower and Middle Usumacinta region (Palenque, Chiapas) and along the Gulf coast fringes (Jaina, Campeche; Tiesler, 2012). Conversely, tabular erect forms were in vogue among the dwellers of the Caribbean coast of Yucatán, and in the Guatemaltecan and Chiapanecan Highlands (Tiesler, 2012). Here, the proportions follow roughly the linguistic divisions, as inferred from the epigraphic record (Lacadena & Wichman, 2002; Tiesler & Cucina, 2010), suggesting that the practitioners' choices in artificial head form could have related to ethnic identity. The Mexican state of Veracruz is recognized for a preference of pronounced superior (obelical) flattenings, as witnessed at the Site of El Zapotal, which was settled during the Late Classic Period (Martínez, 2007, 2009; Romano, 1965; Tiesler *et al.,* 2010a). Apart from superior compression, the cranial record of El Zapotal and other sites in Veracruz (Fig. 2) show other extreme oblique end erect skull modifications, among which the literature highlights the *bilobée* and *trilobée* forms (Comas & Marquer, 1969; Gosse, 1855; Romano, 1965). These were produced by combining hard compression devices with strong sagital constriction, which left the growing infant skull with strong saggital and post-coronary grooves, giving the vault a trilobal appearance (Comas & Marquer, 1969; Gosse, 1855).

Interestingly, in those sites that staged diversity in artificial head shapes, the skeletal record does not point to any significant difference in head form between elite and non-elite sectors of society (based on the amount and characteristics of burial accoutrements and archaeological context), therefore denying the role of status distinctions in the choice of head shape (Tiesler, 1999, 2012). In Palenque, for example, the head of the paramount Maya lord Janaab´Pakal was shaped the same way as some ninety percent of other Palenque locals. In other large Maya Classic period sites that harbored dynastic elites, like Calakmul or Dzibanché, the proportion of specific head shapes appears similar among the differet social sectors.

Therefore, it appears more likely that the forms, which were cast by females, were passed on through family traditions to express ethnic

identity and possibly clanic statements. This is evident for example in the distribution of different head morphologies in the large Maya site of Copán, where different urban sectors sport different preferences in head shapes (Tiesler & Cucina, 2010). Also the residents of the long distance trading port of Xcambó, on the northern fringes of the Yucatan peninsula, exhibit changes in artificial head forms that may relate to immigration and, more so, assimilation. This is specifically evident in Xcambo´s Late Classic period burial population where an overwhelming proportion of subadults showed the locally produced shape (tabular oblique in its mimetic variety). This head morphology stands in contrast to the broader variety of head forms exhibited by adult women and men, who, given their greater age, were more likely to have grown up in other parts of the Maya world before arriving and integrating into the population at Xcambó. This scenario points to a prompt assimilation of the local ways of shaping the infant´s head by incoming female kin, as argued in another work (Tiesler & Cucina, 2010).

Iconography from various parts of Mesoamerica illutrates the implements used for cranial shaping. Mostly round compression boards are represented, to which the infant would be neatly tied, and, as for the Preclassic and Classic Maya, free tablets, directly compressing the head in an anteroposterior sense (Bautista, 2004; Romano, 1973, 1987; Tiesler, 1998; Tiesler & Romano, 2008). Knots seem to play and important part of the shaping devices. The use of knots or other means to eliminate or reduce the occipital protrusion is suggested by the many supra-inial depressions, leading to an array of healed and unhealed occipital lesions in the skeletal record, sometimes even complete bone penetration above inion (Lagunas, 1974; Weiss, 1981; Tiesler, 2006).

In the course of the Postclassic period (A.D. 900-1,519), diversity is gradually replaced by uniformity in artificial head forms. This tendency is most evident in those areas that staged diversity in head wear before the Postclassic, like Veracruz or the Lowland Mayas. I will refer to the latter as an example. During the close of the first millenium, and surrounding the years of collapse of the Classic Maya civilization, the former diversity in techniques gave way to a uniform look of high and broad head shapes. The reclined head silhouettes that formerly dominated the Classic period were replaced gradually by a uniform choice of short and broad head styles produced by cradle devices, the type of apparatus still described by the hispanic chroniclers during the 16th century. An overwhelming ninety per cent of skulls recovered from Postclassic archaeological Maya sites were artificially modified this way. The hundreds of skulls recovered from the central *cenotes* (waterholes) of the Posclassic Maya sites of Mayapán, San Gervasio, Champotón, and Tulúm, for example, all show a broad tabular erects form (Tiesler, 2012). Similar are the skulls documented in the Postclassic Maya Highlands, which uniformly sport tabular erect shapes (Dávalos, 1951; Lagunas, 1989).

The increasing uniformity in head appearance probably indicates that the specific vault shapes were loosing their value as distinctive ethnic or family attributions (Tiesler, 1999, 2011, 2012). It must be stressed that it was the techniques in modeling the head and not the popularity of the body practice itself that suffered important changes at the onset of the Postclassic. This progressive trend towards homogenization is evident in almost all parts of eastern and southern Mesoamerica during Postclassic times. In this light, the broad headed "unilook" vaguely denoted Central Highland cultural assimilation (first to the Toltecs, later to the Aztecs), now signalling a pan-Mesoamerican identity.

After the Spanish conquest and as European culture was imposing itself on long standing indigenous traditions, also the millenary native practice of cranial modeling was doomed (Tiesler & Oliva, 2010; Tiesler & Zabala, 2011). Like many other body traditions that formed the Mesoamerican cultural heritage, they were forgotten and were gradually replaced by cultural models introduced from Europe. This change raises questions on the social roles that these practices represented in the new social fabric.

What were the mechanisms of oppression that did effectively trigger the abandonment of such practices? What kind of transformation did cradleboard uses undergo during the "hispanization" process in the newly founded towns of the region? Did they follow the same transformation also in the rural communities?

We think that the key to evaluate the colonial impact on head shaping and other autochthonous biocultural practices resides in their highly visible nature. They were much more obvious than other, more secluded traditions and, therefore, more easily subjected to the pressure from the dominant social sectors that were pushing for the cultural assimilation of the non-Spanish segments of society. Our study of the urban coexistence of Maya groups in the town of Campeche during the XVIth century highlights the close contact and the direct imposition by means of punishment for, or at least disapproval of native cultural heritage (Tiesler *et al*., 2010b). In this new social fabric, the visual message of artificial head forms would soon undergo a radical transformation in the urban carriers' eyes to denote exclusion and "otherness" in the new colonial multi-racial and multi-cultural fabric under Spanish rule.

Meanings and roles of ancient Mesoamerican head shaping

The widespread practice and the millenary persistence of cultural head modeling trace it at the "hard core" of autochthonous ideology and its enactment in Mesoamerica (López-Austin, 1998, 2001). Apart from the specific roles that head shaping might have expressed in each of Mesoamerica's cultural spheres and epochs, according to each woman practitioner, each family and local tradition, it is probable, therefore, that its practice expressed a set of more generic Mesoamerican beliefs, which should engrain with much boarder collective worldviews and coherent religious schemes. My own research on native head shapes and head modeling has distilled three frames (or cultural dimensions) to encompass the cultural meanings for this practice: firstly its "organoplastic" role, secondly its ritual dimension or performance, as part of the upbringing and social integration of infants, and, thirdly, the visible or "emblematic" connotation, signaled by the produced head form itself (Tiesler, 2011, 2012).

Organoplastic motifs

The first set of motives corresponds to the treatment of the head as a means to prevent the infant from falling ill and loosing its spiritual energy or *tonalli*. Despite the breadth in Mesoamerican beliefs concerning the role of the head as a spiritual receptacle, most Mesoamerican groups shared the belief that the *tonalli* had its seat in the forehead or the top of the head, where reason and concience of a person resided (Boremanse, 1998, pp. 81-84; Guiteras, 1986, p. 235; López-Austin, 1989). Native Mesoamericans believed that the bony skull vault, especially the soft spots of the fontanellae and the occiput, was vulnerable in newborns, whose animical energies herein contained still were frail. Here, the vital energy of the little ones could volatize easily and get lost, or the harmonious flow between the *tonalli* and the sacret spirit (*yóllotl*), another animical center believed to reside in or on top of the heart, could be interrupted (Guiteras, 1986, p. 235; López-Austin, 1989, pp. 211-212).

The loss of spiritual energy or heat ("*calor*") could be induced also by extrinsic forces, like by "malignant winds" or "*mal de ojo*" (staring at a person), or be produced by intrinsic emotional states (fear or shock: *susto*; López–Austin, 1989; Martínez-González, 2007; Pitarch Pliego, 2005). In babies, these states of mind could take possession of and harm the vulnerable body. They were deemed capable to separate the volatile spiritual components of the infant body. Mesoamericans believed that through the occiput and the open fontanellas, the little one´s still volatile vital energy could escape out of its body and contribute to frailty, sickness, vital energy loss, and, ultimately, death (Martínez-González, 2007; Pitarch Pliego, 2005). From this perspective,

Fig. 6 - Mother carrying her baby on the back who sports three hair strands (redrawn by M. Sánchez from Fig.1.53, p. 50, in Houston et al., 2006, K7727).

the flattening of the occipital bone was a means to protect the baby's spirital and physical integrity. Chronicler Francisco del Paso y Troncoso describes the handling of Mexican baby heads during the 16th century, whose "... neck (was) practically non-existent because the midwife compressed it by applying a weight (on it) from the moment of birth, when the skull is tender and maintains this (artificial) form when the child lies in its cradle ... " (Paso y Troncoso, 1926; chap. 25; translation by the author). The testimonies on the Maya natives of Highland Guatemala of those years are similar, as Francisco López de Gómara describes in his *Historia de la conquista de México:* "The midwives assure that the little ones don't grow the back of the head and the mothers put them inside the cradle so that they don't grow it, as they take pride in not possessing it" (López de Gómara 1987, p. 246; translation by the author). The various means to elimine the back of the head probably explains the ample presence of supra-ineal lesions in many prehispanic occipital bones (Fig. 6). Other measures taken by Mesoamerican mothers consisted in protecting the baby's head by seclusion, hiding and wrapping, or simply by letting its hair grow to cover the vulnerable spots (Reilly, 2006).

The performance of head shaping

The procedural dimension of this practice, just like its organoplastic meanings, was imbued with cultural meaning and symbolism. Its daily performance dominated the initial months or years of life of the nursing baby and toddler, considered a "prospective" human until the spiritual energy was anchored, and thinking and reasoning "entered the body" (Boremanse, 1998; Cervera, 2007; Duncan, 2009; Duncan & Hofling, 2011; Guiteras, 1986, pp. 229-34; Tiesler, 2011; Vogt, 1965, p. 29). The daily performance on the baby's cranium was produced by actively and passively compressing the front and the back of the head with the help of solid compression boards, which were sometimes combined with repetitive massages or tight wraps (Romano, 1974; Tiesler, 1998). In this respect, the cradle was a multipurpose device. Here, the babies were nursed and cleaned, their bodies swaddled and their heads compressed and ultimately shaped.

Thus, head practices were part of the preparation of children to later social integration, a process that was often marked with festivities, such as the first hair cut, naming rituals, destiny (*tonal*) rites and so-called *hetzmek* (Yucatec Mayan) ceremonies during which the infant was sat astride on the hip for the first time (Bonavides, 1992; Boremanse, 1997; Duncan, 2009; Nájera, 2000; Redfield & Villa Rojas, 1967; Roys, 1940). These rituals consecrated social integration, the act of becoming a person, once the spiritual energy had been fixed inside in the infant's body.

Head shapes as visible emblems

The visible result of shaping practices —the third cultural meaning to be examined in this review— appears to be better documented in the Andes, where the chroniclers witnessed and described different head shapes, each one related to a suscribed social sector or an identified ethnic group. Centuries after the initial colonization of South America, this very visible, distinctive attribute of cranial vault modifications proved to be an invaluable resource for the cultural osteology of artificial head shapes (Weiss, 1962), along with their synamic distribution on the geopolitical landscape (Torres-Rouff, 2002, 2003; Weiss, 1962).

Further north, in Mesoamerica, the visible result of native cradleboarding was probably too uniform in shape to be noticed by the European colonizers (Tiesler & Zabala, 2011). It is unsurprising therefore that the focus of the colonial chroniclers' report of this native tradition was not the artificial shapes seen in the natives' heads, but the daily head practice itself along with neck reduction, which is repeatedly cited as a motif. From the above it follows that at the time of contact, in the 16th century, it was the longstanding ritual and "organo-plastic" motifs, both elements of the "hard core" of Mesoamerican ideology and ritual, and not the visible outcome of cranial modification, which motivated the practice.

This was probably different in the centuries before the Postclassic period, which staged an enormous diversity of artificial shapes in parts of Preclassic and Classic Mesoamerica. Back then, there were probably other, more "resilient" purposes for head shaping, prompted by their highly visible nature and its form linked to potential cultural identifications with ethnic or religious entities. As mentioned above, it is no coincidence that artificial pear-shaped head forms, reminiscent of Olmec head rendering, are ascribed to the Preclassic era in what has been documented for Mesoamerican skull shapes, as pictorial renderings of the human head and the anthropomorphic portraiture of sacred forces (Tiesler, 2010). Apart from broad ethnic divisions in the head choice for the Maya area, there is no palpable evidence for status or gender divisions so far.

Its follows that beyond ethnicity and unspecific cultural identification or aestetic choice, the visible outcome of head shaping must have been imbued with deeper aggregated emblematic meanings in those areas that staged diversity, like in most parts of Oaxaca, Veracruz and the Maya area. As regards the Maya, evidence points to their emulation of different venerated patron deities (García & Tiesler, 2011). Young gods, like the Maize God (God E) are consistently represented with a slanting oblique head in its Classic anthropomorphic representation, which should conform to an aestetic ideal of the Classic Lowland Maya. Prehispanic portraiture renders the aristocracy without an occiput, with slanting foreheads and receding hairlines, an elongated almost tubular vault and a prominent, protruding facial profile (Fig. 7). This iconographic convention, which should reflect the beauty ideal among both commoners and elites (Houston *et al.,* 2006, p. 18), exagerated the visible effect of artificial oblique shapes. These head forms were produced especially in the Usumacinta region by combining head splints with tight cranial wraps. Differently from the Maize Deity, the artistic conventions of rendering the Old Gods, like Chac (the God of Rain and Lightning) mostly prescribes tabular erect head forms, or even a natural rendering of the head profile, as is the case for God A (García & Tiesler, 2011).

Also God L, the patron deity of Maya merchants (García & Tiesler, 2011; Tiesler *et* al., 2010) is represented repeatedly in the native imagery. This sacred force is portrayed with a pronounced superior flattening of the head, a rendering that comes close to the head forms described for the Classic period Mixtequilla populations from El Zapotal in Veracruz and resembles the head form of merchant god L, providing a strong motif of emulation of this sacred patron deity. This form was to became also popular among the merchant folk that settled on the traditional trading routes of the Río Grijalva valleys, where I documented it in series of crania dated from the Middle Classic period onwards. Also, the trader communities on Yucatan's coastal fringes from the centuries before the Maya collapse well into

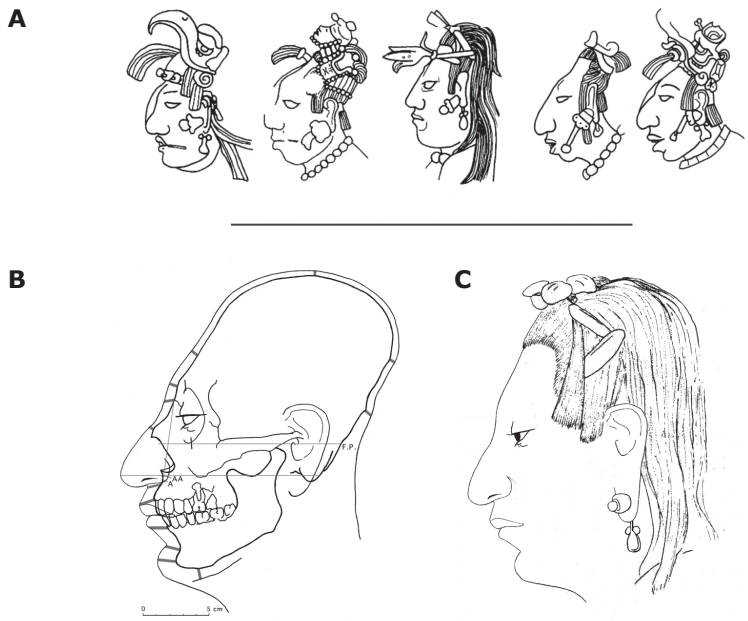

Fig. 7 - Classic Maya portraiture: (a) Dynastic ruler Janaab' Pakal (redrawn by M. Sánchez from Greene 1991); (b) Profile of female dignitary from Palenque, shaped in the tabular oblique fashion, with schematic reconstruction of bland tissues and (c) artistic rendering of facial profile (drawings V. Tiesler).

the Postclassic also reproduced this head form in their little ones (Tiesler, 2012; Tiesler & Cucina, 2010; Tiesler *et al.,* 2010a): During the second half of the first millennium A.D., superior flattenings made their appearance in the heads of the coastal populations of Jaina, Uyamil, Xcambó, Isla Cerritos, and San Gervasio, where they constitute between 5 and 20 percent of the recorded skull forms. Conversely, no case of superior flattening has been documented in the large skull series of inland Petén and Yucatán, except for specific, large settlements in relative proximity to the coast and active in trading, like Copán, Kohunlich and also Chichén Itzá, the latter known to have controlled most of the Maya coastal trade at the closing of the first millenium A.D. Chichén's artificially modified skulls record is made up of an astounding 28 per cent of superior cranial flattenings (Tiesler, 2012; Tiesler & Cucina, 2010; Tiesler, *et al.,* 2010a).

Concluding remarks: Mesoamerican head shaping and the study of past body modifications

The deeply rooted cultural reproduction of artificial head shapes by generations of women not only grants unique insights on the many ways in which Mesoamerican cultural and religious traits were adopted and incorporated into daily life, but also lends powerful insights into the ways the female practitioners passed on family and group identity to younger generations through this ubiquitous Mesoamerican body tradition. In contrast to the Andean world, where cranial vault modifications convey consistently meanings as ethnic and status markers (Blom, 2005; Torres-Rouff, 2002), the artificial head shaping conducted in Mesoamerica seems to adhere more to its perfomance and to a native phrenology of vital and harmful body centers. More ephemeral

motives were examined for the Olmecs and the Preclassic and Classic Maya. Among the latter, the produced head shapes seem to emulate different supernatural forces, possibly impersonated by distinct patron deities, which probably accompanied and promoted ethnogenesis and forged kin group identities at different times.

The approach to native Mesoamerican head practices, advocated in this review, has strived to clarify definitions and taxonomic criteria used in classifying artificial head shapes and compression instruments for bioarchaeological research. The second part of this work has reviewed the contextualized craneological information from Mesoamerica, and specifically the Maya area with its systematic coverage. I have also relied on other data sets and a regionally derived conceptual frames of ideology, ritualized performance and sociocultural evolution. The fruitful combination of material, artistic and historical (written) information on heads and skulls, interpreted within coherent regional ideological frames and long-standing undercurrents of Mesoamerican ritual expression, consents a general reconstruction of the cultural undercurrents and an understanding of what kept this body tradition alive over the centuries. In this vein, I believe that only such an confrontation of different data sets, scaled levels of analyses (household, community, region and epoch), and an *emic* point of departure, has a true potential of conceeding solid insights into the deeper cultural motifs and meanings of these long vanished body practices, which go beyond ascribing their sheer presence and distribution in a given cultural setting. In this respect, I hope that this research strategy might be feasible also in the study of head shaping practices witnessed in other cultural settings of the past, especially those that harbor abundant and diverse data sources.

The approach advocated here also goes beyond the life history approaches and individual life narratives that have become popular in recent (bio)archaeological scholarship on agency, body theory and embodiment (Meskell & Joyce, 2003; Sofaer, 2006). Their applications on different prehistoric cultural settings, which also include Mesoamerican body practices (Geller, 2004, 2006), build on tentative hermeneutical, cognitive "readings" of the material record, which ascribe meanings to long vanished cultural dynamics. Some of these efforts are laudable in that they foster new points of departure, research directions, and invite novel reflections on ancient, long forgotten cultural meanings. However, most of these studies still await confirmation by apt objective data sets, whose importance cannot be over-emphasized for solid academic work. Interpretations and authoritarian argumentations without proper feedback from critically scrutinized direct evidence are at risk of generating dynamics of their own, which may turn out to be terribly out of touch with the ancient reality. In this vein, I consider that bioarchaeological reconstructions, like the ones presented in this review on ancient Mesoamerican head shaping, make exceptional "reality checks" for anthropological research.

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