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NOTCHED HUMAN BONES FROM MESOAMERICA¹

ABSTRACT

Notched human long bones from Mesoamerica have attracted the attention of scholars for over one hundred years. However, despite all this attention there is still little agreement in regard to the role they played in the cultures of the Late Postclassic. The Nahuatl term *omichicahuaztli* is often applied to all notched bones since it is usually assumed that they are the same as the Aztec notched bones played on the occasion of elite mortuary rituals. Despite the common use of the term *omichicahuaztli* there appear to be two sharply different categories of notched bones: 1) those engraved with images and frequently notched with deep and regular striations, found in non-mortuary contexts in the Valley of Mexico and 2) those notched but not incised and recovered in great numbers from secondary burials west of the Valley of Mexico. Although formally sharing some similarities, it is concluded that these two categories served quite different functions in funeral rites. However, both categories can be understood in the context of Mesoamerican myths recounting Quetzalcoatl's gathering the bones of former creations to re-create human beings.

Notched human long bones from Mesoamerica have attracted the attention of epigraphers, ethnohistorians, artists and archaeologists for over one hundred years. Even ethnographic data have been brought to bear on the question of the function of these bones. However, despite all this attention there is still little agreement in regard to the role they played in the cultures of Late Postclassic Mesoamerica. Most frequently they are referred to as musical instruments, *raspas* in Spanish, or *omichicahuaztli* in Nahuatl.

The term *omichicahuaztli* is derived from *omitl* (bone) and *chicahuaztli* (strength or power); the verb forms *chicahu(a)* reflect the action of growing vigorous, gathering strength, living to an old age, and even animating something or someone (Karttunen 1992:46).²

The Nahuatl term *omichicahuaztli* is often applied to all notched bones from central Highland Mexico since it is usually assumed that they are the same as the Aztec notched bones described by the early chroniclers as being played on the occasion

of elite mortuary rituals (Alvarado Tezozomoc 1975[1878]:434, 561; Durán 1984:vol. 2:154). For example, during the funeral of the Aztec king Axayacatl, his mortuary bundle was serenaded by songs of the dead accompanied by the rasping of the *omichicahuaztli* (Alvarado Tezozomoc 1975[1878]:434). Tezozomoc's editor, Orozco y Berra, in his Note 3 to page 434 informs the reader that this was not a very agreeable sound, and also that the *raspas* were usually created from deer bones and only at times from human bones. In addition, in Capítulo XXV (Alvarado Tezozomoc 1975[1878]:301) it is recounted that at the funerals of fallen warriors sad songs were sung and dances performed, accompanied by *omichicahuaztli*, made of deer bone (cf. Seler 1992 [1898]:65).

Duran's (1984:vol. 2:154) account of the funerary ceremonies held for deceased Mexica warriors replicates Alvarado Tezozomoc's description of Axayacatl's mortuary ritual. Duran writes:

En acabando el canto, daban todos
muchas palmadas al son del
atambor, y luego
tomaban unos huesos que tienen
hechos unos dientecillos a manera
de escalerillas
y bailaban y bailaban al son de
aquellos huesos, raspando por
aquellos
escaloncillos otros huesezuelos, lo
cual no carece hoy en día de alguna
superstición, pues los usan el día
de sus bailes todavía.

[On finishing the song, they
clapped to the sound of the drum,

and then took some
bones on which they had made
notches like little staircases and
danced and
danced to the sound of those bones
rasping those little staircases with
other bones.

This continues in some superstitions for they still use them for their dances.

Translation by author.]

Note that Durán does not specify that these bones were human.

Despite the common use of the term *omichicahuaztli* for all notched bones, there appear to be two sharply different categories of Postclassic notched bones: 1) those engraved with images and frequently notched with deep and regular striations, and 2) those recovered in great numbers from secondary burials in the Valley of Toluca and further west in the state of Michoacan. Although formally sharing some similarities, it will be argued that these two categories served quite different functions in funeral rites. How and why they were produced, who played them and when and where they were disposed of is the subject of this article. Before dealing primarily with the latter category, a short discussion of the former is offered. In addition, examples outside the central Mexican highlands are noted.

***Omichicahuaztli* from the Central Mexican Highlands**

Incised and Notched Bones

Long bones, usually identified as femurs, have been recovered from the Basin



Figure 2. Polished, notched and incised human femur from the Dorenberg collection with drawing of the design (after Seler 1992 [1898]:66).

One of the earliest to be published is in the Prehistoric and Ethnographic Museum in Rome. The end of the bone is encrusted with mosaic (Pigorini 1885; cf. Toscano 1970:177-178).

Although there is considerable debate over the precise identification of the iconographic images, most appear to be related to manifestations of Quetzalcoatl.³ For example, Seler (1992 [1898]:66, Figures 9a and 9b) argues persuasively that the image on the femur from the Dorenberg Collection (Figure

2) is most likely an image of Tlahuizcalpantecuhtli (Venus as the morning star). At least two other examples carry this same image (Hamy 1897:314, Plate 54; Batres 1906:29, Figures 24 and 25). Two additional examples are described as carrying the image of Ehecatl (Henning 1913; Von Winning 1959) and the image of the Mixtec deity 9 Wind (Talavera, et. al. 2003:34, lower center). Other images reported are identified as a flower (Beyer 1934 [cf. Estrada 2000:68, lower left;



Figure 3. Polished and notched human femur ("bone rattle" length 30.5 cm.) from Culhuacan, Mexico, D.F. with notches grooved over incised design (after Von Winning 1959:87, figure 1, 88, figure 2; cf. Von Winning 1968, numbers 396/397).

Lagunas Rodríguez 2004: 44, center "a"), an eagle (Hamy 1897), Huizilopochtli (Boone 1989), and an iconographic program consisting of symbols of war and sacrifice ranging from heaven to earth (Von Winning 1959) (Figure 3).

It is important to note that deeply notched and incised bones have not been reported from burials, but instead appear either discarded in middens or in what may have been ritual contexts.



Figure 4. Notched human long bones excavated by Elizabeth Brumfiel from a Postclassic refuse deposit in Xaltocan, State of Mexico. Photo courtesy of Dr. Brumfiel.

Notched, But Not Incised Bones

Other notched, but not incised bones, found outside the Valley of Toluca and the Tarascan areas, are also not usually associated with burials. For example, Elizabeth Brumfiel's recent excavations at Xaltocan in the north of the Valley of Mexico (personal communication, 2001) uncovered two well preserved parts of notched bones in a refuse deposit (Figure 4). She dates them to 1300-1450 c.e. on the basis of associated pottery. Starr (1899:102) refers to eight from Tlatelolco and Xico in the National Museum of Anthropology in Mexico City that are labeled as being "marked to

record the hunt." Linné (1934:128, Figure 245) reports an exception, a notched bone with 17 grooves from a "dislocated grave" at Las Palmas (Teotihuacan) that belonged to the "Mazapan period." He also records two fragments of similar objects.

In other Mexican highland areas notched bones occur sporadically at Mitla and Cholula (Caso and Rubín de la Borbolla 1936; Romero 1937, Figure 21).

The Maya Area

Notched bones also have been recovered from several excavations in highland Guatemala. Seler (1992



Figure 5. Ixtlán del Río-style Late Preclassic/Early Classic ceramic figure of a seated musician playing a bone rasp with a shell implement. Mexico, Nayarit State (cf. Anawalt 1998:237); image courtesy of Worcester, MA, Art Museum (#1947.20).

[1898]:66, Figure 8) illustrates two “bone rattles” he excavated at Cave 1, Quen Santo, near Chacula on the Guatemala frontier. He gives no further information. More recently a section of a proximal right femur, polished and grooved has been identified at Iximché (Nance et al. 2003:221). It was found by Guillemain (1966) with the fragments of a censor on the floor of plaza C (?) near structure 5. It showed no evidence of incising (Stephen Whittington, personal communication, 2004).

In the Maya lowlands at Tikal (Moholy Nagy 2003) eight incomplete examples assumed to be percussive musical instruments (“raspas”) were recorded from the general excavations and two problematical burial deposits dating to the

Early Classic Period. Four bones were human, one deer, one tapir, one unidentified and one rabbit. Joyce (1933:xviii) excavated several at Lubaantun “corresponding to the Mexican type, with similar serrations.”

Hammond (1972:223-225) provides a brief and useful review of “raspers” recovered from the Maya area. He concludes that “The wide distribution of rasps in the Postclassic together with evidence for their existence in the Classic suggests that they were probably a common feature of Maya music-making at the earlier period. Even if they were, they are not associated with burials and, if played in ritual contexts, images painted on walls and ceramic vessels fail to illustrate them.



Figure 6. Image of male deity 9Wind playing an *omichichuaztli* (after Plate 24 of the *Codex Vindobonensis*).

In his 1934 publication Linné (1934:204-207) reviewed “rasping bones” from both museums and sites in Mexico and adjacent regions, and offer a useful summary of their distribution (Linné 1934:206-208, Map and Table 6). In addition to the ones discussed above, he records two other archaeological examples from the Maya area: one from Lubaantun and the other from the Uluu Valley. His map displays the distribution of archaeological and ethnographic rasping bones and “scraping sticks” from the northwest coast of Canada to Honduras (32 locations).

West Mexico

West Mexico offers a special case of notched bones that occur as early as the

Late Preclassic. Muriel Porter Weaver (Porter 1956:562-63, Figure 22 [y-z']) excavated six fragments of bone rasps at Chupícuaro, two from burials and four from “digging.” Of these six, four were made from human femurs. Linné (1934:205-206) records a ceramic figure from Iztlan [sic], Tepic (State of Nayarit) illustrated in Lumboltz (1902, Vol. 2, 267), “which is executed in typical Tarascan style, [that] holds in its left hand, and supported by its left knee... the kind of [bone rasp] under review.”

A second example of a ceramic figure from the State of Nayarit in Ixtlán del Río style is a “musician” in the Worcester [MA] Art Museum (#1947.20) who plays what appears to be a notched bone (Figure 5). His *raspa* is comparable to the instrument

carried by the male figure illustrated in Anawalt (1998:237). It should be noted that although these "instruments" look like bone rasps, Robert Pickering (personal communication, 2004) has seen examples carved from stone. Until archaeologically documented examples from Late Preclassic shaft tombs in West Mexico are available, the question of what is being held and played (?) by these figures must remain an open question.

***Omichicahuaztli* in the Codices**

Only one image from a codex depicts a notched bone in ritual context. In the Mixtec *Codex Vindobonensis Mexicanus I* (1974:24; Furst 1978:204-205) a male deity identified as 9 Wind holds a (human?) notched bone with his right hand and scrapes it with what appears to be a deer (?) scapula held in his left hand. The instrument is placed on a human skull that serves a resonator (Figure 6). Nine Wind displays the insignia of the central Mexican deity Quetzalcoatl in his guise as the wind god Ehecatl. In his mythic origins and actions, 9 Wind is thought to be the Mixtec avatar of that Nahuatl deity.

In this painted scene, the playing of the *raspa* is associated with a hallucinogenic mushroom (*Psilocybe mexicana*) ceremony. Nine wind has brought the mushrooms to 7 Flower who is shown sitting on a jaguar dais, holding them and weeping. It is assumed that 9 Wind is providing musical accompaniment by singing or chanting a sad refrain. Although the meaning of this ceremony is far from clear, it fits well with the role of Quetzalcoatl as culture hero who first

brings maize to the people and then pulque. In fact, in the codex the mushroom ceremony immediately follows the pulque ritual that in turn is preceded by the growth of maize. This combination illustrates maize as the sustainer of life in this world, pulque that makes life tolerable, and hallucinogenic mushrooms that permit a glimpse of other worlds.

Jill Furst (1978:205) suggests that the mushroom ritual is connected with fertility. However, given the close connection between notched bones and funeral rituals discussed below these scenes may be more closely connected to death and rebirth. In fact, the chain of nine circles designating 9 Wind lead directly down to a mortuary bundle with the symbol for fire attached to its shoulder (cf. Beyer 1916:129-130, Figure 1). As Furst (1978:318) remarks, concerning the general Mesoamerican ideology about bones, "... skeletal remains were... regarded as the seat of the essential life force and the metaphorical seed from which the individual, whether human, animal or plant, is reborn."⁴

Notched Human Long Bones from the Valley of Toluca and from Michoacan

Notched bones have been found in greatest numbers in burials from the sites of Calixtlahuaca (García Payón 1936, 1941), Teotenango (Piña Chan, editor, 1973, 1975; Zacarías B. 1975), and Tlacotepec (Starr 1898), all Matlatzincan sites in the Valley of Toluca, State of Mexico. They are also frequently encountered at Purépecha (Tarascan) sites in the State of



Figure 7. Notched human long bones from Field Museum's Tlacotepec collection: a) (top to bottom): # 94710 (R. femur, 25 cm.); #94708 (R. femur, 32 cm.); #94712 (R. femur, 27 cm.); #94717 (L. tibia, 21 cm.); #94713 (R. tibia, 25 cm). b) #94703 (L. femur, 40.5 cm.). Photos by author, courtesy of The Field Museum.

Michoacan including Tzintzunzan (Rubín de la Borbolla 1939), Zacápu (Lumholtz and Hrdlicka 1898), Huandacareo (Macías Goytia 1989), and Tacámbaro (León 1923).

In September 2004, in the Toluca urban zone of Santiago Miltepec on the south slopes of Cerro Barrigón, secondary burials beneath

a probably plaza floor were uncovered by a group of workmen (Ramírez Castilla and Domínguez Rodríguez 2005:10). The deposit consisted of long bones, maxilar and skulls in six groups accompanied by many Matlatzinca ceramics. Burial number 6 was associated with a deposit of notched bones.

In the Field Museum's anthropology collections are 17 notched human bones, two un-notched tibias and one radius (Figure 7). They are part of the 35-40 notched bones Starr claimed to have in his possession in 1898 (Starr 1899:101). These bones were from excavations directed by missionary William Powell for Frederick Starr in 1895 at the site of Tlacotepec located southwest of the city of Toluca (Lambertino-Urquizo, et al. 1999). Starr donated some to the State of Mexico Museum in Toluca (Starr 1898:101) and brought the rest to Chicago. There were originally 24 bones in the Field Museum collection (#94700-94723), but four were sent in exchange to other United States museums (#94702, 94706, 94707, 94723), two to the Museum of American Indian, one to the Peabody Museum and one to the Middle American Research Institute at Tulane University.

In his Field Notebooks Starr describes how the bones were excavated:

In this district [Tlacotepec] some four or five spots have been excavated by Mr. Powell's direction. The objects are found at several feet depth. Two yards of Indians have been quite completely excavated and at one place in a cornfield very curious conditions were found - seven bodies, one over another, were taken out all with notched bones. In one yard seven dozen pieces of pottery were taken out in one hour. In one place a skeleton was found clutching two obsidian knives in hand...(SPFN 6:56).

When Starr looked over the results of Mr. Powell's labors, it was far more than he anticipated - Powell estimated that the Indians had dug up "a hundred dozen pieces" among which were an unspecified number of "bones curiously notched" (SPFN 6:55).

Starr sold his Mexican collections to Field Museum in 1904. On the back of the first accession card (#94700) for his collection of notched bones he typed:

Bones such as these are occasionally found in Mexico and have always attracted a great attention and been the cause of considerable argumen [sic]. They are found in burials together with skeletons and are almost invariably long human bones, generally femora - thigh bones. but sometimes tibiae-shin-bones - and humerus- arm bone. The notches vary greatly in number, depth and character, but were all made by sawing or filing operations.

It has been suggested that these bones were used to keep tally of slain enemies or other mnemonic records, but the generally accepted theory is that they were used as musical rasps as are similar notched sticks. One end was rested on a resonating ground [sic], the other end grasped in the left hand and a deer's scapula or some other bone or shell with an edge rubbed up and down over the notches, producing a rasping sound. On many of the specimens the wear of the rubbing can plainly be seen. Such implements were,

of course, used in religious ceremonies. The Aztec name *omichicahuaz* was applied to them (FMAF).

As Starr noted, considerable debate has surrounded the use of *omichicahuatzli*. In fact, his article was written as a response to the Lumholtz and Hrdlicka article "Marked Human Bones from a Prehistoric Tarasco Indian Burial Place" published by the American Museum of Natural History. In this report Lumholtz and Hrdlicka (1898:65) described the unearthing together of "... 26 marked human bones dispersed among the skeletons," totaling 11 femurs, 3 humeri, 11 tibiae and 1 fibula (see Figure 8). The authors minimized the use of these bones as musical instruments and noted that they do not represent cannibalism or mere trophies, but instead were used for magical or shamanistic purposes (Lumholtz and Hrdlicka 1898:66). The authors concluded that "the marked bones of this Tarasco burial-place were the bones of enemies, kept as amulets or fetishes, and buried with the dead warriors who procured them" (Lumholtz and Hrdlicka 1898:70). They did admit, however, that "... the bones may have served some as yet undetermined religious or ceremonial purpose" (Lumholtz and Hrdlicka 1898:79).

Starr immediately challenged Lumholtz and Hrdlicka's conclusions in his own 1899 publication. He offered both archaeological and ethnological evidence to demonstrate that they were used as musical *raspas*.

In 1941, García Payón provided substantial new data for the study of

notched bones. He reported the excavation of 361 notched bones from secondary burials at Calixtlahuaca located north of the city of Toluca (Figure 9). For example, in front of the platform and stairs of Monument 3 and under the second superimposed floor, he encountered twelve burials which

contenían un número mucho menor de cráneos, que el de fémuras, húmeros y tibias, de los que un 81% se encontraban con ranuras (García Payón 65-66).

[contained a much smaller number of skulls than of femurs, humeri and tibiae, 81% of those found were notched. Translation by author.]

In addition, Monument 5 yielded one skull and a deposit of 54 notched bones without burial goods (García Payón 1941:66-67). García Payón (1941:73) proposed that they were not used as *omichicahuatzli* because the striations appeared to him to be in perfect condition. He then suggested that they were made expressly "... para cumplir con una costumbre que se repetía en cada entierro." [to follow a custom that was repeated with each burial. Translation by author.] García Payón (1941:75) concluded that they were possibly the bones of enemies kept as amulets or fetishes and then buried with their owners. He, too, refers to the ritual depicted in the Codex Vindobonensis, and asks if it might have been to frighten or kill the enemy or to hear the voices of the dead.

The excavations at Teotenango directed by Román Piña Chan also yielded a large



Figure 8. Notched human long bones from the site of Zacapu, Michoahuan State (after Lomholtz and Hrdlicka 1898, plates VII and VII).

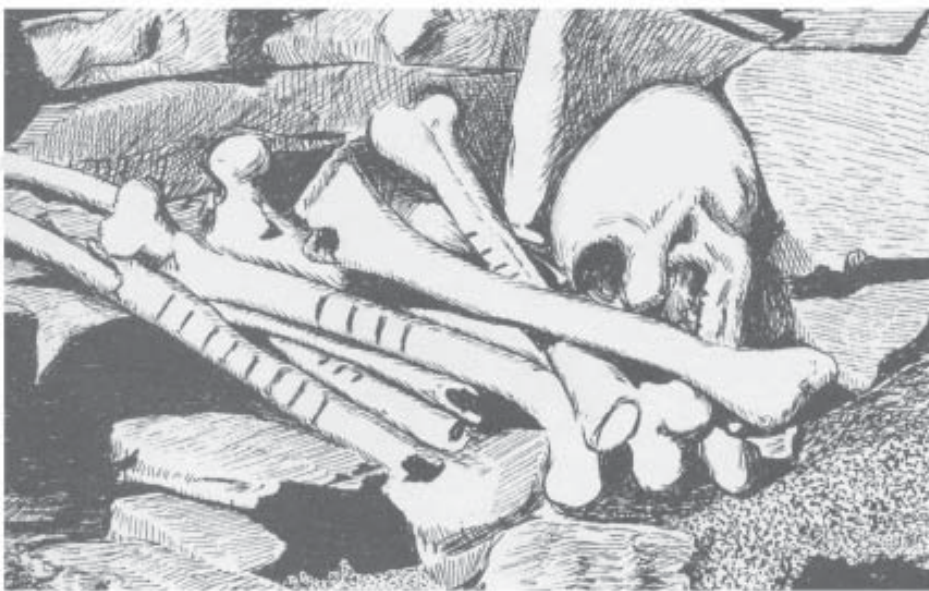


Figure 9. Notched human long bones in burial context from Calixtlahuaca, Toluca Valley, Mexico State (after García Payón 1981, Figures 112 and 113); a) burial number 1 (found in the terrace of Monument 3). b) burial located in Monument 3 [in García Payón 1941:67 this burial is labeled correctly as located in Monument 5)].

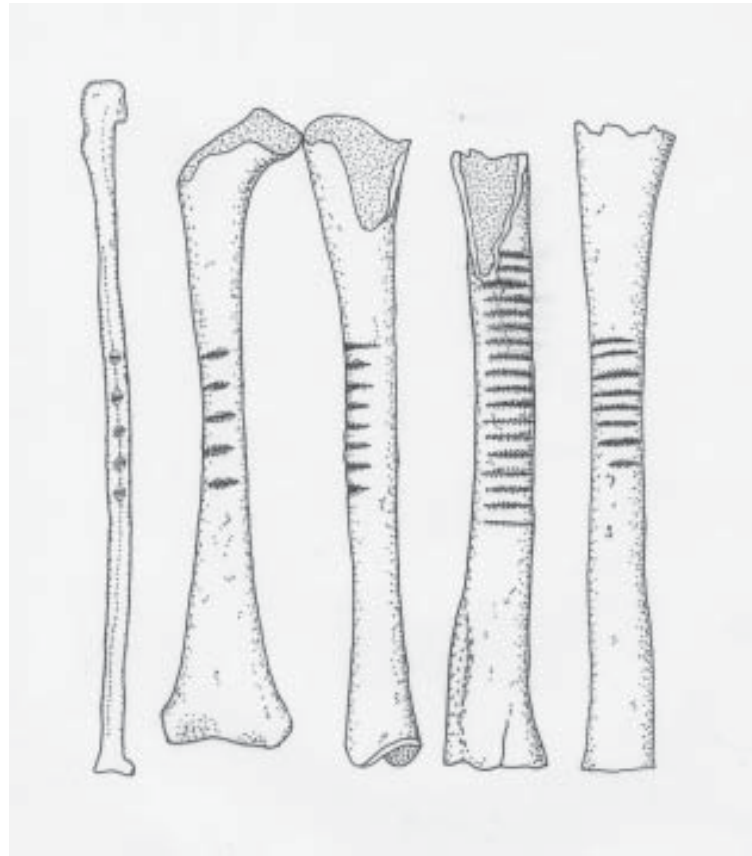


Figure 10. Various human long bones excavated from the site of Teotenango, State of Mexico, showing a variety of transverse grooves (drawing after photos from Roman P., 1975, Plate 38).

quantity of notched bones (Lagunas R. and Zacarías 1973; Romano R. 1975). Associated with burial offerings were both human and non-human worked bones that reminded the excavators of *omichicahuaztlis* (Lagunas and Zacarías 1973:40-42). But it was in the plaza trenches dug in front of staircases that numerous secondary burials with notched long bones were also encountered. For example, Trench 1 in front of Structure IA (west side) yielded 25 primary and 19 secondary burials: "En

algunos de ellos [los secundarios] se encontraron algunos huesos largos trabajados (*omechicahuaztli*)" [In some of these (the secondary burials) some worked long bones were encountered (*omichicahuaztli*). Translation by author] (Lagunas and Zacarías 1973:52, *croquis* 1, photo 69; see Figure 10).

In discussing these worked bones Piña Chan (1991:11) follows his colleague García Payón and suggests that they were kept as trophies by warriors and then buried with them:

... también se han sacado atados de huesos largos con muescas o ranuras, los cuales pudieron pertenecer a prisioneros sacrificados, guardados por los guerreros que los habían apresado en la guerra, como trofeos, y enterrados más tarde.

[...also they excavated bundles of long bones notched or grooved that could belong to sacrificed prisoners, guarded by the warriors who had captured them in the war, as trophies, and buried later." Translation by author.]

Ethnohistoric evidence supports Piña-Chan's and García Payón's hypothesis. Juan Bautista Pomar's 1582 account describes how bones of sacrificial victims were kept as trophies as a sign of strength and valor, and were displayed in houses (Pomar 1941 [1891]:17). Pomar may be following Sahagún (1981, Bk. 2:59-60) who describes how, after the flesh was removed, warriors would suspend a flayed captive's thighbone from the "flaying pole" as a trophy; whether these bones were notched or not is unknown.

Grégory Pereira informs the author (personal communication, 2005) that he, in collaboration with Carmen Pijoan, is conducting a systematic analysis of the more than 200 *omichicahuaztli* from Teotenango in Mexico's National Museum of Anthropology. They plan to publish their study in the near future and their examination of this large number of bones will yield important information regarding

their cultural contexts, manufacture, and use.

Striated bones are discussed fully in Rubín de la Borbolla's 1939 report on the first and second excavation seasons at Tzintzuntzán-Ihuatzio. After tabulating the seven bones recovered from an ossuary at Tzintzuntzan (Tabla I) and the seven from Tacámbaro (Tabla II), Rubín de la Borbolla (1939:114-115) reports that Nicolás León (1923) examined more than 200 striated bones, but could not find evidence of rubbing [*frotamiento*] on a single one. He postulates that some examples from outside the Tarascan area may have been musical instruments, but believes that it would be "... aventurado y erróneo clasificar todos los huesos estriados bajo esa denominación. [risky and in error to classify all the striated bones in this category. Translation by author.] Rubín de la Borbolla (1939:118-119) concludes:

Todos los datos ya analizados, llevan a la conclusión de que los huesos estriados de la región tarasca no fueron usados como instrumentos musicales y que las estrías... tuvo otro fin."

[All the data now analyzed supports the conclusion that striated bones from the Tarascan region were not used as musical instruments and that the striations had another intent. Translation by author.]

He also speculates that those bones that show wear and tear along their edges,

although not true *omichicahuaztli*, were used to produce noise as part of ceremonies.

Later excavations at the Tarascan site of Huandacareo reinforce Rubín de la Borbolla's conclusions. In describing the results of digging Platform 2, in the cemetery area Angelina Macías Goytia (1989:535, 539:504, fig. 9) remarks

Otros elementos culturales de gran importancia encontrados fueron los huesos largos de entierros secundarios a los cuales se les han labrado muescas... El material óseo trabajando es un elemento característico de la época postclásica.

[Other cultural elements of great importance that were encountered were long

bones from secondary burials that had worked grooves... Worked bone is a characteristic element of the Postclassic epoch. Translation by author.]

Also uncovered was an "área de sacrificios," which yielded secondary burials placed

among deposits of rocks. This is similar to the collections of bones encountered at Teotenango (Lagunas R. y Zacarías 1973).

The question of use-wear is critical when statements are made about the use of notched bones. Because this variable has never been quantified nor the effects of rubbing measured, all such statements are impressionistic. For example, although Rubín de la Borbolla (1939) does not think Lumholtz and Hrdlicka report use wear and he too believes that the Tarascan bones show

few signs of rubbing. Grégory Pereira (2005:302) interprets the evidence in a contrary manner. Periera contends that there are use-wear markings on most of the bones in the Lumholz collection at the American Museum of Natural History, although he admits that the use-wear markings indicate substantial variability in the intensity and/or duration of use. In the case of the Starr collection at Field Museum (Figure 7), Starr states that "On many of the specimens the wear of the rubbing can plainly be seen" (FMAF). However, on reexamining non-eroded and non-battered surfaces of bones in the Field Museum collection the signs of extensive use appeared on two, seven showed some or slight wear, and two evidenced no use at all.

Functional Interpretations of Notched Bones

Grégory Pereira (2005:299-305) uses a taphonomic focus in his reanalysis of the American Museum of Natural History's Lumholtz collection from Zacapu. His work provides data essential to discussions of the function of notched bones. First, Periera presents evidence that the bones were defleshed and then scraped to remove ligament and tendon residue, and then the grooves were made by cutting away with a sharp instrument fine enough that it left numerous striations both on the base and sides of the grooves. Use-wear markings are clearly present in the majority of cases, the bevels being created by rubbing with a hard material. However, the observable differences in the wear on each piece indicates a diversity of utilization. Finally

most of the bones appeared to have been broken (ritually killed?) shortly after their use and then placed in the burials.

Overall, Pereira concludes that his data support the *raspa* hypothesis that refers to the Aztec use of *omichicahuaztli* to create percussive sounds at funerals (cf. Malvido and Pereira 1997). He also finds it likely that the grooved bones were manufactured from the limbs of sacrificial victims or enemies killed on the battle field (Pereira 2005:310) and were buried with the bones of dead warriors. Yet the Central Mexican ethnohistoric sources clearly state that the bones were of deer, rarely human, and were rubbed by a conch shell. Notched deer bones and conch shells are not recorded in the Matlatzincan and Purépecha archaeological records. In the Mixtec *Codex Vidobonesis* an association between rasping bones and death seems apparent. But the bone being used is only assumed to be human; it could as well be deer bone. The worked human bones from Tlatelolco and Xico in the National Museum in Mexico, according to the catalogue of the anthropological collections (Starr 1899:102), were used to record hunts and mark the number of people killed. They are described as having as many as 28 or more notches.

Variation in the number of notches may prove significant for determining the function(s) of worked bones. This and the variation in location and context may indicate that some are associated with sacrificial rituals, some served as offerings, and some were part of an individual's mortuary rites. For example, Starr's (1899:103) Tlacotepec samples range from 5 to 10 notches, with the majority having

8 (9 examples). García Payón (1941:73) states that those he excavated had not less than 4 nor more than 9. The number of notches are not recorded for the sample from Teotenango, and the partially excavated bone in Foto 69 (Lagunas R. y Zacarías 1973) shows only 3.

Outside the Valley of Toluca the number of striations increases greatly. The fine example from Cholula has 32 notches (Romero 1937, fig. 21). Rubín de la Borbolla's (1939:115, Tabla I) sample of 7 bones from Tzintzuntzan range from 3 to 11 striations (with one extreme having 22); his sample of 7 bones from Tacámbaro (1939:119, Tabla II) range from 7 to 18. "The number of grooves on the different bones [from Zacápu at the American Museum of Natural History] are entirely irregular, and range from 7 to 36, only 2 or 3 of the bones bearing the same number. Apparently, fixed ritual numbers played no specific role in the production of the grooves" (Lumholtz and Hrdlicka 1898:72-74).

Several authors use ethnographic parallels to support their functional interpretations of notched bones. Frederick Starr leaps to the Tonkaway and Pueblo peoples of North America and claims that notched wooden sticks rubbed with scapula "are the exact representation, still in use among living tribes, of the ancient notched bone - the *omichihuaz* - of the old Mexicans" (Starr 1899:105). The example illustrated by Starr on page 106 has 22 notches. In a later publication Starr (1903:306) reports that the use of these marked bones survives in Mexico during the Holy Week fiestas at Tonantzintla, Puebla, "where the bone used is a human femur."

Lumholtz and Hrdlicka (1898:67-68) use attitudes toward the dead and disease among the Zuñi, Tarahumara and Cora to speculate that the bones of the deceased would be cut to release pain and/or to prevent malevolent actions on the part of the dead. However, in *Unknown Mexico* (Lumholtz 1902) Lumholtz refers to the present use of notched rattles among the Tarahumara and Huichol (cf. Starr 1903:306). Beyer (1916:132-135) quotes extensively from Lumholtz' description of the use of deer bone rasps during the *fiesta del jícucul* among the Tarahumara and a similar use among the Pima. These instruments are notched wooden sticks with resonator and deer bone rasps; they reveal little about the function of notched bones among the Matlatzinca and Purépecha.

All the debates reviewed above regarding function are framed in terms of closed categories, e.g., notched bones were or were not musical instruments. These debates do violence to Mesoamerican categories that are unbounded. In shamanistic contexts notched bones may incorporate references to warfare, hunting, death and rebirth. In many cultures, since they belong to a class of objects that make rhythmic and percussive sounds, they are associated with rites of passage, particularly funeral rituals (Needham 1967:315). As sources of rhythmic and percussive sounds *omichicahuatzli* could be played as *raspas*, beaten against resonators or struck with other objects.

Therefore, rather than attempting to define and categorize *omichicahuatzli* on ethnohistoric and ethnographic analogies, it might be better to closely examine the archaeological contexts within which

notched human bones have been found. Then these contexts may be interpreted in terms of Mesoamerican beliefs about death, rebirth and deities associated with these beliefs.

Creation Myths

The wide-spread Mesoamerican myth of the deity Quetzalcoatl/Ehecatl includes the tale of his descent into Mictlan, the abode of the dead, to recover the bones of humankind destroyed at the end of the previous sun (Moreno de los Arcos 1967; Taube 1993:37-39). There he encounters Mictlantecuhtli, lord of death, who at first seems to be willing to give up the bones following a series of trials. However, once Quetzalcoatl gathers up the bones and starts for the surface, Mictlantecuhtli sends his quail to frighten Quetzalcoatl and make him drop the bones. They succeed, but Quetzalcoatl manages to gather the now broken bones and escape to the surface. He then takes them to Tamoanchan where a manifestation of the earth goddess (Cihuacoatl) grinds them on her metate with the blood of Quetzalcoatl. From this mixture of maize meal and sacred blood is created the new inhabitants of the fifth sun era.

Bierhorst (1992a and 1992b:146) translates Quetzalcoatl's escape from the underworld as related in the *Leyenda de los soles* as follows:

[p. 76, l. 44] so he
[Quetzalcoatl] fell into the pit,
stumbled and fell, and quail
frightened him and he lost con-
sciousness. [p. 76, l. 46] Then he
spilled the precious bones, and the
quail bit into them, nibbled them.

In Nahuatl the same passage reads:

...niman contalallilito in [p.

76, l. 45] *ic oncan motlaxapochui*
motlahuitec . ihuan quimauhtique
cocol [p. 76, l. 46] *tin mictihuetz .*
auh in chalchiunomtl niman ic
quicemantihuetz [p. 76 l. 47]
niman quiquaquaque in cocoltin
quiteteizque.

Nahuatl scholar Francis Karttunen, and a reviewer of Bierhort's publication, offers the following close reading of the above passage in a letter to the author dated July 7, 1993:

niman contlallilito
then he came for the purpose of
settling it (transitive 'it', not reflexive 'himself')

inic oncan
so that there

motlaxapochui motlahitec
he fell into a hole he banged
himself up (possibly: he experienced a fall)

ihuan quimauhtique çoçoltin
and they frightened him the
quail

mictihuetz
he fell in a faint

auh in chalchiuhomtl
and the precious bone(s) (The
bones are treated as inanimate,
hence no plural form)

niman ic quiçemantihuetz
then he suddenly spilled it
(them)

niman quiquaquaque in
çoçoltin quiteteizque
then they nibbled it (them) the
quail they pecked it (them)

Dr. Karttunen then comments:

These are the verbs you are looking for; *cuacua*: is 'to chew or gnaw at something', and *cuahcua*: is 'to nip at something'. The verb *tei:tz:tli* 'glass', literally 'stone-obsidian' and the reduplicated verb means something like 'to repeatedly strike something with a piece of glass' (author's emphasis).

Dr. Karttunen cautions:

I guess you could make a case for striation with the *tei:tza* verb, but one can't be sure from the verb that they were making lines. They could have been making pits.

Even with Karttunen's caution, her translation offers another piece of evidence that the bones could have been notched in a resurrection ritual when bones were gathered up for secondary burials. The association of femurs and other long bones with death is apparent in the codices as well as in Postclassic iconography. In Classic Maya hieroglyphs and art, long bones have similar connotations of death, sacrifice, ancestor and deity worship, and resurrection. J. Furst (1978:318) sums up the general Mesoamerican ideology concerning bones, "... the skeletal remains were... regarded as the seat of the essential life



Figure 11. The Raiment of Quetzalcoatl in his guise as Ehecacatl: note his conch shell pectoral and shell ear ornaments (after Caso 1967:19 [Codex Borbonicus 22]).

force and the metaphorical seed from which the individual, whether human, animal or plant, is reborn.”

Quetzalcoatl in the Valley of Toluca

It is proposed that the Matlatzinca and Purépecha peoples shared this myth of a creator deity traveling to *Mictlan*, the realm of the lord of the underworld, collecting the bones of the dead and carrying them back to earth where they were used to recreate new humanity. This myth can provide the key to understanding secondary burial rituals and the notching of human bones. If the notching of bones mimics the striking of the bones by underworld quail, then

when placed in graves they may magically recall the mythic events leading to the rebirth of humanity.

García Payón’s excavations at Calixtlahuaca yield strong evidence for the presence of a major cult of Quetzalcoatl in the Valley of Toluca, associated with the Late Postclassic Aztec influence and ultimate occupation of the area. He identifies one of the major structures at the site as a round temple to Quetzalcoatl (Monument 3), and assumes that the life size stone statue of a male deity with bucal mask recovered from Calixtlahuaca (Paszatory 1983:212, Plate 160) represents Ehecacatl.

Ceramics offer additional evidence for a significant presence of the Quetzalcoatl cult in Valley of Toluca. Certain bichrome

and polychrome types are decorated with Quetzalcoatl's "wind jewel" motif or *ehcailacoacozcatl* - a term derived from *ehca[tl]*, wind and *cozcatl*, jewel (Hodge 1992, nos. 35, 36, 33). The middle term (*ilacoa*) is probably derived from the word for twisted, since the "wind jewel" is a cut conch shell pectoral (Figure 11).

A close inspection of the image in Figure 11 reveals another significant depiction of bones associated with the Quetzalcoatl complex of deities (Quetzalcoatl, Ehecatl, Nine Wind, Xolotl). The distal end of a bone perforator (*punzón*) is clearly shown fixed in the brim of Nine Wind's hat over his forehead. These objects were commonly used in rituals of autosacrifice. The same perforator is shown in Figure 11 as part of the headdress of Quetzalcoatl/Ehecatl. Nearly 60 images of these bloodletters are painted on the pages of the Codex Borgia (Andrés et al. 1993). The majority are either held in the hand or stuck in bowls or braziers. However, only the figures with Quetzalcoatl/Ehecatl attributes display them as part of their headdresses (for example, Codex Borgia leaves 19, 22, 23, 56, 58, 60, 62).

Whether the bone is identified as a femur or a sharpened radius, or is even human does not diminish its symbolic importance. In the Aztec myth of the Five Suns it is Quetzalcoatl who travels to the underworld to recover the human bones of past creations. When he reaches the surface of the earth the bones are ground up and he perforates his penis to offer his own blood to give them life (cf., Graulich 1997:109). From that point on Quetzalcoatl is associated with

autosacrifice and in his human form as Ce Acatl Topilzin, king of Toltec Tula, carries on the tradition. It is also of note that on leaves 15 and 16 of the Codex Borgia various deities, including Ehecatl, are shown using *punzones* to poke the eyes of humans to give them life and vision. This association between Quetzalcoatl and resurrection will be more fully developed later in this paper.

Other designs frequently associated with Quetzalcoatl are those classified as step-frets (*xicalcolihqui*) (Hodge 1992, no. 22). For example, Reinhold (1981:40) discusses the step-fret as a symbol of Quetzalcoatl and interprets two ceramic vessels he excavated in the Valle de Bravo as an offering to Quetzalcoatl in his guise as the morning star (*Tlahuizcalpantecutli*). Aztec black-on-red bowls from the Valley of Mexico too, are painted with these symbols. In her study of 126 black-on-red Aztec pottery designs Heidi King (1981) noted 76 low bowls of which 69 were decorated with the "wind jewel" motif. This motif only occurred on redware with black designs.

Although the designs are not specified, García Payón (1981, *Tabla Número 6*) recovered 258 sherds of black-on-red pottery from his excavations at Calixtlahuaca. He places them in the Aztec-Matlatzincan period, and assigns them no Matlatzincan type number (García Payón 1981:Table 6). Because black-on-red bowls are considered "Aztec," Sodi Miranda and Herrera Torres (1991) do not include them in their catalogue of Matlatzincan objects from Mexico's National Museum of Anthropology. However, they do include one example of an *ehcailacoacozcatl* design



Figure 12. Symbol of Quetzalcoatl painted on an Aztec Black-on-Red bowl from Tlacotepec Locality 2 #93938; Field Museum Tlacotepec collection, State of Mexico; photo by author, courtesy of The Field Museum.

on a Late Postclassic bowl described as the type fugitive white/red on buff (Sodi Miranda and Herrera Torres 1991:58, no. 174). They also illustrate a miniature model of an Ehecatl temple (Sodi Miranda and Herrera Torres 1991:124, no. 273), although the piece is assigned to Malinalco, and not to the Matlatzinca.

Perhaps the most provocative evidence for bowls carrying a symbol of Quetzalcoatl comes from Tlacotepec (Lambertino-Urquizo et al. 1999:29-30). Of the two main localities investigated at this site in the late 1890s, only Locality 2, which may have been an Aztec colony, yielded Aztec black-on-red bowls. Seven of these were painted with the wind jewel as the primary motif (Figure 12). Significantly, these bowls were absent from Locality 1 where

the notched bones were found. Perhaps symbols of Quetzalcoatl were more important in mortuary rituals among the Aztecs, while notched bones were important components of comparable rituals among the Matlatzinca.

Similarly at Teotenango, red ware types with Quetzalcoatl symbols are absent although some Aztec pottery types have been reported from the site. As at Tlacotepec Locality 1, when notched bones are present Aztec black-on-red bowls are missing (Vargas 1975; Tommasi 1978).

At Calixtlahuaca, García Payón (1941) excavated two similar burials from his Quetzalcoatl temple, Moument 3. Burial number 1 was well-stocked with funerary goods and included an Aztec Type 4 vessel inverted over a human skull (Figure 8); the

second burial was without grave goods but was accompanied by a large number of long bones, almost all with striations. García Payón (1941:65, 66 Figure 6) remarks, "...digno es de mencionarse que estos dos entierros tenían un crecido número de fémures, tibias y húmeros, casi todos ellos con ranuras." [It is worthy of mention that these two burials had a large number of femurs, tibias and humeri, almost all of them with incisions. Translation by author.] In his excavations in front of the platform and staircase of the Quetzalcoatl temple, he encountered under a second floor 12 poorly preserved burials, "... como en el segundo caso, contenían un número mucho menor de cráneos, que el de fémures, húmeros y tibias, de los que un 81% se encontraban con ranuras" [As in the second case, they contained a much fewer number of skulls than of femurs, humeri and tibias, of which 81% were found with incisions. Translation by author.] (pp. 65-66, Figure 6). This pattern was repeated during the explorations in monuments 4, 5 (p. 67, fig. 7 [Figure 9b]) and 6.)

The evidence from Calixtlahuaca and Teotenango indicates that there were at least two, if not three, burial patterns being practiced during the Late Postclassic in the Valley of Toluca: a primary burial pattern emphasizing skulls often accompanied by secondary burials (or deposits) of femurs, humeri and tibias, and a cremation/urn burial. The former pattern has a long history among the Matlatzincans, and the latter is clearly the Postclassic pattern introduced from the Valley of Mexico. The possible third pattern, deposits of notched bones and no skull or grave goods, is unknown from Aztec sites in the Valley of

Mexico but widespread in sites from the Valley of Toluca and from the adjacent Tarascan territory.

Rituals of Resurrection

Reinhold's (1981) excavations and interpretations of notched bones from the Valle de Bravo offer particularly strong evidence for the use of notched bones in rituals of resurrection associated with Quetzalcoatl. In the upper platform of the main pyramid he encountered a multiple burial (Reinhold 1981:21). This burial is remarkable similar to the multiple burial found in front of Structure 1 of Group A at Teotenango (see above, p.). Reinhold (1981:25) describes bundles [*atos*] of long bones that appear to have been cleaned before being placed in the burial.

Reinhold (1981:40) also identifies the decorative use of the *xicalcolihqui* (step-fret) as a symbol of Quetzalcoatl on the pottery from the site. He interprets the vessels as offerings dedicated to Tlahuizcalpantecuhtli (Quetzalcoatl as the morning star), concluding that:

Como se ve en esta leyenda [León-Portilla *Los antiguos Mexicanos* (20-22)] el hombre fue creado por Quetzalcóatl de los huesos preciosos, que éste sacó del Mictlán haciendo con ellos un ato. Como el muerto regresaba a ese Mictlán, el rito de depositar sus restos fue cabalmente el mismo como el de la creación, es decir que se depuso los huesos largos en los entierros en forma de ato ((Reinhold 1981:49).

[As one sees in this legend... men were created by Quetzalcoatl from the precious bones having been made into a bundle that were taken from Mictlan. When the dead were returned to Mictlan the ritual of depositing their remains was completed like the ritual of creation, that is the long bones were deposited [in the grave] in the form of a bundle. Translation by author.]

Conclusions

Mesoamerican funeral rituals varied greatly across time, space, ethnicity and social position (c.f. *Arqueología Mexicana* vol. VII. No. 40 [Nov-Dic 1999]; López Austin pp.4-10; Matos Moctezuma pp. 11-19). Even in the central Mexican highlands, sharp distinctions can be made between the Postclassic Valley of Mexico and non-Nahuatl-speaking areas to the west. Among the Matlatzincans and the Purépecha notched bones from multiple burials were part of mortuary rituals which symbolized Quetzalcoatl's (re)creation of humankind. During the ritual it was the "performative" act of notching the bones that gave symbolic power to their use during funerals and as offerings in graves. In the rite of passage for the dead their value as musical instruments was secondary; of primary importance was the percussive sound produced by notching and then rasping them.

Among the Mexica, however, notched bones may have been played by participants in funeral procession of the elite, and later cached, discarded or "cremated" along with

mortuary bundles. It should be noted that in the recently excavated burial of a Mexica dignitary from the precinct of the Aztec Templo Mayor (Román Berrelleza y López Luján 1999:36-39). There was no evidence of rituals involving notched bones placed as offerings in graves.

Rather than insisting on ethnohistorically documented Aztec models to explain all central Mexican Postclassic phenomena, it is better to look at the principles underlying the variation in mortuary rituals. Regardless of the specific practices, all funerals reflect the hope for a safe journey to an appropriate afterlife and, at some level, relate to rebirth. Funerals reflect the relevant mythic content of the celebrants, and they involve performative acts, some of which involve percussive sounds. Notched bones could serve many of these functions whether they were played at Aztec funerals as *omichicahuaztli*, carried as bone rattles, carved as part of the mythic beliefs expressed in funerary acts, or ultimately placed in the grave of the deceased.

Acknowledgments

Many colleagues have contributed to the discussion of the functions of *omichicahuaztli* over the years. In particular, Helen Perlstein Pollard who directed me to the significant examples of excavated notched bones from the Tarascan region and Laura Cahue who first brought to my attention the work of Grégory Periera, and then spent time with me closely observing the notched bones in the Field Museum's Starr Collection. Grégory Periera was kind enough to provide me with permission to

quote from his as yet unpublished article. Joel Palka called my attention to the bone perforator that appears stuck in Ehecatl's hat. Last, but far from least, the careful

reading and astute comments by an anonymous reviewer were essential to the clarification of my ideas and my ability to communicate them to a wider audience.

Notes

1. This paper is an extensively revised version of a paper "Them Bones, Them Bones, Them Notched Bones: *Omichichauztli* and Quetzalcoatl's Journey to Mictlan" presented at the 21st Annual Meeting of the Midwest Mesoamericanists Conference, East Lansing, Michigan State University, March 7, 1998.
2. Since the Nahuatl term *Omichichauztli* is used by all authors, no references are given to the term used for notched bones in other central Mexican highland languages. For example, would Tarascan and Matlatzincan populations have used terms that would have the same connotations as the Nahuatl verb *chicahu(a)*?
3. The relationship between Quetzalcoatl, bones and music is concisely summarized by Estrada (2000).
4. A striking example of an image of a notched bone was noted during the course of this research. In a collection of Jean-Frédéric de Waldeck's works held by the Newberry Library, Chicago, is a drawing of a "Sacrificer in the Skin of the Victim" (Ayer Art Box D2 [#50]). This remarkable illustration shows a Xipe Totec priest dancing in the flayed skin of the sacrificed and brandishing a notched human femur. Unfortunately, Waldeck confused his ethnohistoric references. The use of a rattle staff in Xipe Totec rituals is well documented, however, this instrument with a hollow rattling head usually filled with pebbles or seeds is quite different than a rasping bone. However, the rattle staff is referred to by the same power word *chichauztli* as is used in the compound form *omi[bone]chichauztli*. Obviously, there is a relationship between Xipe Totec as a deity of agricultural rebirth and Quetzalcoatl as a deity of human resurrection (Neumann 1976; cf. Headrick 2003).

References Cited

- FMAF: Field Museum, Department of Anthropology Accession Files
SPNB: Starr Papers, Field Note Books. Regenstein Library Special Collections Research Center, The University of Chicago.
- Alvarado Tezozomoc, Hernando
1975 *Crónica Mexicana escrita por D. Hernando Alvarado Tezozomoc hácia el [1878] año de MDXCVIII* (edited by Manuel Orozco y Berra). Imprenta y Litografía de Ireneo Paz, México.
- Anawalt, Patricia Rieff
1998 They Came to Trade Exquisite Things: Ancient West Mexican-Ecuadorian Contacts. In *Ancient West Mexico: Art and Archaeology of the Unknown Past*, edited by Richard F. Townsend, pp. 233-249. The Art Institute of Chicago, Chicago.
- Andrés, Ferdinand, Maarten Jansen, and Luis Reyes García
1993 *Códice Borgia*. Fondo de Cultura Económica. Facsimile, Akademische Druck und Verlagsanstalt, Graz, Austria.

DONALD McVICKER, "Notched Human Bones from Mesoamerica"
Mesoamerican Voices, 2 (2005)

Arqueología Mexicana

- 1999 La Muerta en el México Prehispánico. Vol. VII, Núm. 40.
- 2000 El Valle de Toluca. Vol. VIII, Núm. 43.
- 2003 El Sacrificio Humano. Vol. XI, Núm. 63.

Batres, Leopoldo

- 1906 *Teotihuacán*. Memoria que presenta Leopoldo Batres al XV Congreso Internacional de Americanistas [Quebec]. Imprenta de Fidencio S. Soria, México, D.F.

Beyer, Hermann

- 1916 Una Representación Auténtica del Uso del Omichicahuaztli. *Memorias y Revista de la Sociedad Científica "Antonio Alzate"* 34:129-136 [translated and reprinted in Beyer 1934].
- 1934 Mexican Bone Rattles. *Middle American Research Series* Vol. 5, No. 7, pp. 321-49. Tulane University, New Orleans.

Bierhorst, John (translator)

- 1992a *History and Mythology of the Aztecs: The Codex Chimalpopoca*. Translated from the Nahuatl by John Bierhorst. University of Arizona Press, Tucson, AZ.
- 1992b *Codex Chimalpopoca: The text in Nahuatl with glossary and grammatical notes* by John Bierhorst, University of Arizona Press, Tucson, AZ.

Boone, Elizabeth H.

- 1989 *Incarnations of the Aztec Supernatural: The Image of Huitzilopochtli in Mexico and Europe*. Transactions of the American Philosophical Society No. 79, Part 2.

Caso, Alfonso

- 1967 *The Aztecs: People of the Sun*. University of Oklahoma Press, Norman.

Caso, Alfonso and Rubín de la Borbolla, Daniel.

- 1936 *Exploraciones en Mitla 1934-36*. Instituto Panamericano de Geografía e Historia, Pub. 21.

Codex Vindobonensis Mexicanus I

- 1974 Facsimile edited by O. Adelhofer. Akademische Druck und Verlagsanstalt, Graz, Austria.

Durán, Fray Diego

- 1984 *Historia de las Indias de Nueva España e isla de la Tierra Firme*, escrita por Diego Durán (edited by Angel Ma. Garibay K.), 2nd edition, 2 vols. Editorial Porrúa, México.

Estrada, Julio

- 2000 Identidad y mitología en la música prehispánica. *Arqueología Mexicana* VIII(43):64-69.

Furst, Jill Leslie

- 1978 *Codex Vindobonensis Mexicanus I: A Commentary*. Institute for Mesoamerican Studies, State University of New York at Albany, Albany, NY.

García Payón, José

- 1936. *La Zona Arqueológica de Tecaxic-Calixtlahuaca y los Matlatzincas* (Primera Parte). Secretaria de Educación Pública, México.
- 1941 Manera de disponer de los muertos entre los Matlatzincas del Valle de Toluca. *Revista Mexicana de Estudios Antropológicos* V(1):64-78.

DONALD McVICKER "Notched Human Bones from Mesoamerica"

Mesoamerican Voices, 2 (2005)

- 1981 *La zona arqueológica de Tecaxic-Calixtlahuaca y los Matlatzincas: ilustraciones, tables y planos de la segunda parte*. Revisada por Leonardo Marique Castañeda. Toluca, México, Biblioteca Enciclopédica del Estado de México, Vol. XXXI.

Graulich, Michel

- 1997 *Myths of Ancient Mexico*. University of Oklahoma Press, Norman, OK.

Guillemin, George. F.

- 1966 *Iximché, capital del antiguo reino Cakchiquel*. Instituto de Antropología e Historia de Guatemala, Guatemala.

Hammond, Norman

- 1972 Classic Maya Music Part II: Rattles, Shakers, Rasps, Wind and String Instruments. *Archaeology* 25(3):222-228
Hamy, E. T.
1897 *Galérie Américane du Musée d'ethnographie du Trocadéro: choix de pieces archéologiques et ethnographiques*. Duc de Loubat, Paris.

Hendrick, Annabeth

- 2003 Seeing Through Sahagún: Observations on a Mesoamerican Staff of Office. *Mesoamerican Voices* 1:23-40

Henning, P.

- 1913 El Femur Esgrafiado de Tlahuac. *Anales del Museo Nacional de Arqueología, Historia y Etnografía*, Epoca. 3a, Tom. 5, Num. 4:263-78. México.

Hodge, Mary G.

- 1992 Bibliography of Aztec Ceramic Decorative Motifs Coded in Aztec Ceramic Mapping Study. English version of the Appendix to "Los Motivos Decorativos de la Cerámica y los Sistemas de Intercambio en la Sociedad Azteca." In *Entre Lagos y Volcanes: Chalco-Amecameca, Pasado y Presente*, edited by Alejandro Tortolero Villaseñor. El Colegio Mexiquense, Toluca, México.

Joyce, T. A.

- 1933 The Pottery Whistle-figurines of Laubaantún. *Journal of the Royal Anthropological Institute of Great Britain and Ireland* LXIII:xv-xxv.

Karttunen, Frances

- 1992 *An Analytical Dictionary of Nahuatl*. University of Oklahoma Press, Norman, OK.

King, Heidi

- 1981 Aztec Pottery Designs. Unpublished M.A. thesis. Graduate School of Arts and Sciences, Columbia University in the City of New York.

Lagunas Rodríguez, Zaid

- 2004 El uso ritual del cuerpo en el México prehispánico. *Arqueología Mexicana* XI(65):42-47.

Lagunas Rodríguez, Z. and Patricia Zacarías B.

- 1973 Los enteramientos en Teotenango. In *Teotenango, segundo informe de exploraciones arqueológicas*, edited by Román Piña Chan, pp. 31-50. Gobierno del Estado de México, Dirección de Turismo

Lambertino-Urquiza, Donald McVicker, Michael Glascock and Hector Neff

- 1999 Regional Production for the International Market: Aztec Black-on-Orange Ceramics from Tlacotepec, Valley of Toluca, Mexico. Paper presented at the symposium *Postclassic Systems of Production, Distribution and Consumption in Central and Western Mexico*, annual meeting of the Society for American Archaeology, Chicago, March.

DONALD McVICKER, "Notched Human Bones from Mesoamerica"
MesoamericanVoices, 2 (2005)

León, Nicolás

1923 *Catálogo del Departamento de Antropología Física del Museo Nacional de México, con anotaciones hechas por el mismo Dr. León*. México.

Linné, Sigvalt

1934 *Archaeological Researches at Teotihuacan, Mexico*. Ethnographical Museum of Sweden, n.s., Pub. No. 1, Stockholm.

López Austin, Alfredo

1999 Misterios de la vida y de la muerte. *Arqueología Mexicana* VII(40):4-10.

Lumholtz, Carl

1902 *Unknown Mexico: a record of five years' exploration among the tribes of the western Sierra Madre; in the tierra caliente of Tepic and Jalisco; and among the Tarascos of Michoacan*. Two Volumes. C. Scribner's Sons, New York.

Lumholtz, Carl and Ales Hrdlicka

1898 Marked Human Bones from a Prehistoric Tarasco Indian Burial Place in the State of Michoacan, Mexico. *Bulletin of the American Museum of Natural History* X:61-79 (Plates V-IX). New York.

Macías Goytia, Angelina

1989 Los entierros de un centro ceremonial Tarasco. *Estudios de Antropología Biología* IIA. Serie Antropológica:100. UNAM-INAH (IV Coloquio de Antropología Física Juan Comos 1986).

Malvido, Elso, Grégory Pereira, et al.

1997 *Tratamiento mortuario*. Colección científica, Serie antropología social. Instituto Nacional de Antropología e Historia, México.

Matos Moctezuma, Eduardo

1999 Costumbres funerarias en Mesoamerica. *Arqueología Mexicana* VII(40):11-19.

McVicker, Donald

1992 The Field Museum's Collections from Mexico/*Las Colecciones de Arqueología de México del Field Museum*. In *México la visión del cosmos: three thousand years of creativity*, edited by Donald McVicker, pp. 65-67/68-70. Mexican Fine Arts Center Museum, Chicago.

Moholy-Nagy, Hattula

2003 *The Artifacts of Tikal: utilitarian artifacts and unworked material*. University Museum Monographs, 118, Tikal reports, no. 27 pt. B. University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia.

Moreno de los Arcos, Roberto

1967 Los cinco soles cosmogónicos. *Estudios de Cultura Náhuatl* VII:183-210.

Nance, Charles Roger, Stephen L. Whittington and Barbara E. Borg

2003 *Archaeology and Ethnohistory of Iximché*. University Press of Florida (Maya Studies), Gainesville.

Needham, Rodney

1967 Percussion and Transition. *Man* II:606-614.

Neumann, Franke, J.

1976 The Flayed God and his Rattle-Stick: A Shamanic Element in Pre-Hispanic Mesoamerican Religion. *History of Religions* 15(3):251-263.

DONALD McVICKER "Notched Human Bones from Mesoamerica"
Mesoamerican Voices, 2 (2005)

Pasztory, Esther

1983 *Aztec Art*. Harry N. Abrams, New York.

Pereira, Grégory

2005 The utilization of grooved human bones: a reanalysis of artificially modified human bones excavated by Carl Lumholtz at Zacapu, Michoacán, Mexico. *Latin American Antiquity* 16(3):293-312.

Pigorini, Luigi

1885 *Gli antichi oggetti, Messicani incrostati de mosaico esistenti nel Museo preistorico ed etnografico di Roma*. Reale Accademia dei Lincei, Vol. XII.

Piña Chan, Román

1991 Proemio. In *Estudios de los objetos arqueológicos de la cultura Matlatzinca: catálogo de las colecciones arqueológicas del museo nacional de antropología*. Sodi Miranda, Frederica and Hugo Herrera Torres. Instituto Nacional de Antropología e Historia, México.

Piña Chan, Román, (editor)

1973 *Teotenango, Segundo Informe de exploraciones arqueológicas*. Toluca, Gobierno del Estado de México, Dirección de Turismo.

1975 *Teotenango, el antigua lugar de la muralla: memoria de las excavaciones arqueológicas*, Tomos I y II. Toluca, Gobierno del Estado de México, Dirección de Turismo.

Pomar, Juan Bautista

1941 Relación de Texcoco, In *Nueva colección de documentos para la historia [1891] de México*, edited by Joaquín García Icazbalceta 3:1-64. Editorial Chávez Hayhoe, México.

Porter, Muriel N.

1956 *Excavations at Chupicuaro, Guanajato, Mexico*. Transactions of the American Philosophical Society 46, Part 5, Philadelphia.

Ramírez Castilla, Gustavo A. and Irán Roxana Domínguez Rodríguez

2005 Restos óseos de varios individuos... fueron encontrados en Santiago Miltepec, Toluca, Estado de México. *Arqueología Mexicana* XII(71):10.

Reinhold, Manfred

1981 *Exploraciones Arqueológicas en el Valle de Bravo*. Biblioteca Enciclopedia del Estado de México (CVIII), México.

Román Berrelleza, Juan Alberto and Leonardo López Luján

1999 El funeral de un dignatario Mexica. *Arqueología Mexicana* VII(40):36-39.

Romano P., Arturo

1975 Doliocráneo Prehispánicos de Teotenango, México. In *Teotenango, el antigua lugar de la muralla: memoria de las excavaciones arqueológicas*, Tomo II, edited by Román Piña Chan, pp. 417-463. Toluca, Gobierno del Estado de México, Dirección de Turismo.

Romero, Javier

1937 Estudio de los Entierros de la Pirámide de Cholula. Sobretiro del Museo Nacional, México *Anales 5a*, Tomo 11, Núm. 1-2.

DONALD McVICKER, "Notched Human Bones from Mesoamerica"
Mesoamerican Voices, 2 (2005)

Rubín de la Borbolla, Daniel

1939 Antropología Tzintzuntzan-Ihuatzio: temporadas I y II. *Revista Mexicana de Estudios Antropológicos* 3(2):99-121.

Sahagún, Fray Bernardino de

1981 *Florentine Codex: General History of the Things of New Spain*. Translated by C. D. Dibble and A. J. O. Anderson. Book 2, The Ceremonies. Monographs of the School of American Research #14, Part III. Santa Fe, NM.

Seler, Eduard

1992 Ancient Mexican Bone Rattles. In *Collected Works in Mesoamerican [1898] Linguistics and Archaeology*, Vol. III, edited by Frank E. Comparato, pp. 62-73. Labyrinthos, Culver City, CA.

Sodi Miranda, Frederica and Hugo Herrera Torres

1991 *Estudios de los objetos arqueológicos de la cultura Matlatzincas: catálogo de las colecciones arqueológicas del museo nacional de antropología*. Instituto Nacional de Antropología e Historia, México.

Starr, Frederick

1899 Notched Bones from Mexico. *Proceedings of the Davenport Academy of Sciences* VII (1897-1899), pp. 101-107.

1903 Notes on Mexican Musical Instruments Past and Present: What was the Tecomapihoa? *The American Antiquarian* XXV(5):303-309.

Talavera González, Jorge A. and Juan M. Rojas Chávez

2003 Evidencias de sacrificio humano en restos óseos. *Arqueología Mexicana* XI(63):30-34.

Taube, Karl

1993 *Aztec and Maya Myths*. University of Texas Press, Austin, TX.

Tommasi de Magrelli, Wanda

1978 *La Cerámica Funeraria de Teotenango (La Cultura del Valle de Toluca)*. Biblioteca Enciclopédica del Estado de México, México.

Toscano, Salvador

1970 *Arte Precolombino de México y de la América Central*. Universidad Nacional Autónoma, Instituto de Investigaciones Estéticas, México.

Vargas Pacheco, Ernesto

1975 La cerámica. In *Teotenango, el antigua lugar de la muralla: memoria de las excavaciones arqueológicas*, edited by Róman Piña Chan, Tomo I, pp. 189-265. Toluca, Gobierno del Estado de México, Dirección de Turismo.

Von Winning, Hasso

1959 A Decorated Bone Rattle from Culhuacan, Mexico. *American Antiquity*:25(1):86-93.

1968 *Pre-Columbian Art of Mexico and Central America*. Abrams, NY.

Zacarías B., Patricia

1975 Los enterramientos. In *Teotenango, el antigua lugar de la muralla: memoria de las excavaciones arqueológicas*, edited by Róman Piña Chan, Tomo II, pp. 365-409. Toluca, Gobierno del Estado de México, Dirección de Turismo.