Social Identity and Dental Modification at the Postclassic Maya Urban Centre of Mayapan

Stanley Serafin, Marilyn A. Masson, Carlos Peraza Lope, Douglas J. Kennett & Richard J. George

Dental modification represents one interesting aspect of corporeal adornment in human history that directly reflects personal social identity. Tooth filing choices distinguished certain individuals at the urban, Maya political capital of Mayapan from 1150 to 1450 AD, along with cranial modification, nose and ear piercings, tattoos and body paint. Here we examine how filing teeth, considered a beautification practice for women at Spanish Contact in the sixteenth century, is distributed across a skeletal sample of males, females, elites and commoners in this city. We evaluate the normative claim of the Colonial period and determine that while predominantly females filed their teeth, most women chose not to. Sculptural art further reveals that male personages associated with the city's feathered serpent priesthood exhibited filed teeth, and we explore the symbolic meaning of filed tooth shape. Assessing the practice in terms of associated archaeological contexts, chronology and bone chemistry reveals that it did not correlate with social class, dietary differences, or birthplace. Residents of Mayapan, a densely inhabited, multi-ethnic city of 20,000, engaged with multiple material expressions of belonging to intersecting imagined communities that crosscut competing influences of polity, city, hometown and family scale identity. Tooth filing reflects identities at the individual or family scale.

Body alteration in human history represents a permanent way for individuals to distinguish themselves from others. Altered appearances, at the same time, signify belonging to sub-groups of society. Tooth filing is one common cross-cultural aspect of embodied identity that preserves on human skeletal remains, unlike modifications to the skin. The Pre-Columbian Maya of the Yucatan peninsula engaged in dental modification, along with head binding, tattooing, piercing and body painting. These corporeal alterations complemented a broad array of adornments related to dress (Carter *et al.* 2020).

Here we examine tooth filing in the context of urban life at the last Pre-Columbian Maya capital of Mayapan, Yucatan, Mexico. This city of 20,000 people represented the nucleus of an expansive regional political domain in the Postclassic Period (1150–1450 AD: Hare *et al.* 2008b). Mayapan was a pluralistic, multi-ethnic urban archaeological setting. Our findings reveal that while females, exclusively, filed their teeth (in the skeletal sample), most women and men at the city chose not to do so. Sculptural art nuances the binary sex correlations of dental modification at the site. Mayapan tooth filing patterns highlight the complex interplay of decisions to emulate a general style, with fine-grained, individualized variations on a theme in terms of choice of teeth, style of modification and references to symbolic icons.

This study contributes to comparative archaeological research concerning clothing and adornment (Loren & Nassaney 2010; Mattson 2021). Adornment is a means of communication, visually conveying

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messages about belonging to various social sub-groups (Loren & Nassaney 2010, 8). Turner (2012, 486) refers to such presentation as a 'social skin', eloquently stating that the 'surface of the body seems everywhere to be treated, not only as the boundary of the individuals as a biological and psychological entity but as the frontier of social self as well'. Archaeologists have applied this concept to the study of the materiality of adornment (Loren & Nassaney 2010, 8).

Identity exists within complex, intersectional matrices of time, space and society (White & Beaudry 2009, 210). It is important to consider more than one dimension of personhood in society (Scott 1994). Material culture use, dress, adornment and modification shaped, reinforced and perpetually reproduced or transformed identities in the context of practice (White & Beaudry 2009, 211). Corporeal inscription, of which tooth filing is one variant, reflects voluntary or involuntary manipulation of the presentation of individuals (White & Beaudry 2009, 212). The body presents archaeologists with the best opportunities to studying the personhood of individual human beings (Joyce 2005). Bodies represent canvases for display (Meskell 1996) and were central in performances of sexual, racial and cultural differences (Loren & Nassaney 2010, 9). Bodies themselves, like things, are material entities, used by individuals to experience personhood (Hamilakis *et al.* 2002). Adornment is explicitly linked to embodiment of self, and to bodily experience (Loren & Nassaney 2010, 8).

Social identity and urban life

Cross-culturally, 'closing' is practised by sub-groups within society, particularly elites, who distinguish themselves through exclusionary consumption rituals, ornamentation, architecture and dress (Graeber & Sahlins 2017; Hinton 1999). Participation in an international elite culture was an important part of maintaining status, wealth and power for late Mesoamerican states, and it paved the way for lucrative cultural and commercial exchange dependencies over great distances (Pohl 2003; Ringle *et al.* 1998; Smith & Berdan 2003). Yet in certain contexts, stylistic trends originate from individual trendsetters (or grass roots subgroups), as Blumer (1969) argues for clothing styles in Paris in the 1960s and Lesure (2015) considers for ceramic figurines in Formative Period central Mexico.

The study of style in archaeology is a complex undertaking, confounded by a variety of factors affecting artefact attributes and exchange. Shared styles across different spatial and social contexts can sometimes reflect diametrically opposed historical processes (Dietler & Herbich 1998; Hodder 1982; Janusek 2004; Masson & Peraza Lope 2010; Plog 1983, 135). Styles can reflect conformity to established conventions, or alternatively, diversity and pluralism, witnessed at the household, site, or regional scale. In urban settings, material correlates of different social affiliations, such as hometown or polity identities, may change through time (Janusek 2004). States strive to inculcate and materialize a sense of unity among subjects, especially residents at urban capitals (Janusek 2004; Marken *et al.* 2017; Oudijk 2002; Paine & Storey 2006). Stylistic choices may counteract state efforts to enforce a normative identity, especially when household-scale activities and possessions constitute subtle acts of resistance (hidden transcripts) for subaltern groups (Chuchiak 2004a, b; Joyce *et al.* 2001; Liebmann 2013; Scott 1990).

The concept of authentic social identity is one that is flawed, subjective and dynamic, and minority groups may adopt the material culture of majorities for their own unique purposes (Nassaney 2012, 8–9, 15). Individuals, families and other groups may live with a 'double consciousness' involving masking difference (ethnic, racial) in intolerant social settings (Mullins 1999, 171). Yet, as Mullins observes (1999, 170), simple dichotomies such as authentic and 'false front' identity presentation do not do justice to the complex decisions and practices of historical peoples. Choosing to adopt mainstream stylistic culture in terms of material possessions or dress may represent a statement of equality that challenges social hierarchies, even if agents are mindful of status rigidity and biases (Mullins 1999, 171). Material and bodily social expression may have been regarded with ambivalence, in which agents experience simultaneous attraction and revulsion to the material trappings of a dominant or majority culture (Liebmann 2013, 31). Dress may constitute mimicry, or its extreme, mockery (Mambrol 2017).

Beyond style, membership in subgroups of urban places can be determined at settlements like Mayapan. Residential groups at the city differ according to relative wealth and degree and kind of occupational specialization (Masson & Peraza Lope 2014a). Certainly the city's elites distanced themselves from ordinary residents by their elaborate dwellings, restriction of literacy and knowledge, and oversight of production of the most precious, symbolically charged goods (Delgado Kú *et al.* 2021). In this respect, their behaviour generally resembles elites in complex societies cross-culturally,

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including earlier in Maya history (e.g. Inomata 2001a; Smith 2004, 89). The spatial arrangement and features of house groups, neighbourhoods, or communities may also distinguish social subgroups from one another (e.g. Aldenderfer & Stanish 1993; Ardren 2002; Ardren & Hutson 2006; Masson *et al.* 2014; Rice 2009; Rice & Cecil 2009; Santley *et al.* 1987). However, urban planning and architectural standardization may also be undertaken by state authorities with the goal of strengthening social ties to the urban built environment (Hare *et al.* 2014a; Pugh & Rice 2017; Smith 2007, 8).

For urban centres with diverse and dynamic population compositions marked by ongoing replenishment by new arrivals, it is important to consider the origins of migrants and other arriving persons (Paine & Storey 2006). Commonly, urban places recruit residents from nearby towns and regions; Mayapan was initially populated in this way (Tozzer 1941, 23–6). Historically, migrants often join family already established in a city, or they move to a place with which they are familiar from visits to markets or other events (Russell 1972, 231). Cosmopolitan cities invite foreign allies, including military personnel or brides, into their ranks, as was the case for Classic Period Maya polities (Martin & Grube 2008). Mayapan's last regime is said to have invited Gulf Coast 'mercenaries' to settle into the city (Roys 1962, 80). Other migrants are attracted by work, trading, or religious opportunities (including the priesthood and pilgrimages) or apprenticeships, and artists and aspiring literati are also drawn by urban allure (Masson & Peraza Lope 2014b, 558). Cities with reputations as the premier, cosmopolitan centre of governance, learning and the arts, like Mayapan (Roys 1962, 50–51, 53, 56), attract talent from near and more distant locations. Enslaved persons represent an additional category of involuntary urban residents, which, in the Mayapan case, were captured in warfare (Roys 1962, 47; Scholes & Roys 1938). Evidence for Mayapan's multi-ethnic residential composition derives from historical sources and material archaeological remains (Masson & Peraza Lope 2010; Peraza Lope & Masson 2014a).

These processes provide multiple settings for Others to be present in the milieu of urban places, which in part, may be defined by their characteristic of social diversity and improved tolerance of interpersonal differences compared to small rural settlements (Janusek & Blom 2006, 233; Pounds 1973, 344–55). However, as much as governments may desire full conformity and polity-scale loyalty, they may not achieve it (Houston *et al.* 2020, 1). As Lesure (2011, 116) observes, stylistic expressions of human personages can reflect local identity divergence, or the opposite, convergence. Both patterns may be manifested in urban, pluralistic settings.

Social identity and body modification at different scales

Archaeological inquiry into the topic of adornment and corporeal presentation has been a fast-growing focus of research in comparative studies of social identity. Body modification represents one facet of intentional adornment. One variable that links family or individual agency is that of desired effect, specifically, the anticipated and perceived social signalling resulting from choices regarding presentation of self. To what extent do adornment and body modification indicate conformity and acceptance into identity dimensions broadly signalling belonging to social groups, and to what extent do they signal difference and social distance from others? One key aspect of body modification that we focus on in this paper is the social scale of practices, including regional, settlement, household (family), or individual persons. For example, the tabular erect form of cranial modification in the time period and region of our study conforms broadly to regional norms, given the standardization, frequency and widespread geographic distribution (Rosenswig *et al.* 2020; Tiesler 2014). In contrast, dental modification varies to a greater extent for Postclassic sites in the Maya lowlands, suggesting the importance of settlement (hometown) differences in expressions of self. Further, the variable frequency and standardization of tooth filing indicates differences at the family or individual level.

The concept of the imagined community bears directly on these considerations (Yaeger & Canuto 2000). Individuals potentially belong to multiple social groups, or communities, not all of which are spatially concentrated. Such groups include families, hometowns, supra-familial heterarchical organizations (age sets, gender, class, occupation, recreational pursuits, neighbourhoods and others), polity and other such cross-cutting bonds. Individuals may belong to multiple identity groups and change some aspects of their presentation situationally (Cohen 1994; Yaeger & Canuto 2000, 2, 6), although permanent markings such as shaped heads and filed teeth are not plastic forms of identity signalling. Social diversity may not always correlate with hereditary, hierarchically ranked social class. Mortuary patterns, for example, often express horizontal social distinctions (Tainter 1977), and Geller's (2006, 287)

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comparative study of Maya tooth filing suggests this practice did not correlate with social hierarchy.

Individuals may differ in their perceptions of communities of belonging; communities are fluid constructs, perpetually reproduced and interpreted by the actions (practice) of their members (Yaeger & Canuto 2000, 3, 5). Interactive communities of practice may be temporally fleeting, or long lived (Yaeger & Canuto 2000, 8). The study of ancient expressions of fashion represents a promising new avenue of research related to social identity expression, display and the desire to signal affiliation to subgroups of society (Lesure 2015).

Pre-Columbian Maya concepts of the body and corporeal presentation have received considerable attention in the interdisciplinary studies of art and writing (Halperin 2014; Houston *et al.* 2006; Looper 2009; Miller & Brittenham 2013; Taube & Taube 2009). Physical alterations represent an important aspect of self-presentation (Duncan & Hofling 2011; Geller 2006; Scherer 2015; Tiesler 2001; 2014). Head binding began in infancy because of choices made by caregivers. In contrast, dental modification, performed in early adulthood, may have involved a degree of individual choice, or perhaps a rite of passage that youths were compelled to or desired to endure (Rosenswig *et al.* 2020; Scherer 2015; Tiesler 2001). Cross-culturally, such rites of passage incorporate painful ordeals that bond initiates to one another through the shared experience. Pain was an intentional component of some of these experiences (Geller 2006, 285–6). Comfort has often been secondary to sacrifices made by women from various historical societies to achieve body alterations that signalled social status (Houston *et al.* 2020, 6).

Just over one century after Mayapan fell, clergyman Diego de Landa (1941, 125) reported on the custom of women filing their teeth in Yucatan. The Mayapan skeletal sample corroborates de Landa's assertion that females tended to file their teeth, with no males at the site exhibiting this modification. However, the practice was surprisingly rare. Other female adornments and modifications mentioned by de Landa included nose piercing (nose plugs), ear plugs, body tattooing from the waist up, anointing themselves in red ointment, as well as a perfumed substance referred to as liquid amber or *istahte* which they applied in patterned designs (de Landa 1941, 126). Yet very few nose or ear plugs have been recovered archaeologically at Mayapan. Apparently, older women filed the teeth of younger females who desired it, utilizing abrasion techniques with stone and water (de Landa 1941, 125–6). Cranial shaping was also performed by women (Tiesler & Lacadena 2018, 40). Colonial Yucatec language describes individuals with filed teeth as '*xah*', a saw-toothed person (Barrera Vásquez 1995, 931; Tiesler 2001), or alternatively as '*xaham*', one that is 'saw-toothed, like the spines of the back of an iguana' (Victoria Bricker, pers. comm. to Serafin 2017).

Referencing the gods

Body modification sometimes purposefully mimicked traits of supernatural entities. For the Aztecs, individuals exhibiting features of a specific deity, as the result of a congenital condition or intentional body modification, could be seen to embody that deity's supernatural essence (López Austin 1988). Houston and colleagues (2006, 57–81) similarly argue that an individual's unique identity was represented by the head and face, sometimes embodied in a mask or other work of art, suggested by their reading of the hieroglyphic term '*baah*'. The tabular oblique style of cranial modification so common in Classic Period art (and actual burials) is a referent to the Maize God, whose head is frequently represented as an ear of corn (Houston *et al.* 2006; Schellhas 1904, 24; Taube 1985). Similarly, teeth were likened to maize kernels (Scherer 2015).

Tooth filing patterns may also conform to specific symbolic referents. The 'T' shape is a common Classic Period (AD 300–1000/1100) pattern that references the Maya glyph 'Ik', meaning wind, breath, aroma, or soul (Houston & Taube 2000). The Maya Sun God of the Classic Period is often depicted with teeth—or a single, projected pointed tooth—bearing the 'Ik' referent (Blom & La Farge 1926; Geller 2006, 288). Tooth modification in this manner could have imbued the bearer with real world or spiritual benefits stemming from the properties or powers of the sun deity (Houston *et al.* 2006; Scherer 2015). Teeth with jade inlays probably carried similar meaning, given the close relationship of this material with wind and breath (Taube 2005). The fusion of the concepts of breath and soul is also indicated by the 'B5' tooth filing pattern that is present at Teotihuacan as well as in the Maya area. Scherer observes that the B5 pattern, which consists of a V-shaped notch in the distal corner of the tooth, resembles a stylized butterfly motif that commonly represented souls of the honoured dead in the art of Teotihuacan (Scherer 2015; 2018, fig. 4.6).

Filing frontal teeth to a point ('Pattern C'), as was common for the Postclassic Maya lowlands, and, indeed, much of Postclassic Mesoamerica, is not linked to the iconographic representation of a known god from the Maya codices. Yet it surely was of ritual symbolic import, and may have alluded

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to wind god/Quetzalcoatl imagery. Tiesler *et al.* (2017) suggest that the popularity of the 'C' tooth filing pattern during the Terminal Classic (800–1100) is linked to Chichen Itza's rise to power and its influence on style and identity. Chichen Itza, like so many later political and religious centres in Mesoamerica (including Mayapan), gave special regard to the Feathered Serpent deity Kukulcan, known as Quetzalcoatl in central Mexico (Ringle 2004). Modifying one's teeth according to referents to this deity would have symbolized, minimally, an affinity to the mythical founder of Chichen Itza, Uxmal and Mayapan, to whom the origins of statecraft and the fine crafts were attributed. Quetzalcoatl/Kukulcan manifested as a wind deity in his aspect of Ehecatl in Postclassic Mesaomerica (Taube 1992). Tooth filing in reference to the concepts of holy breath or wind (and this deity) is thus likely to have continued into the Postclassic Period.

Anthropomorphic ceramic artefacts

Female stone sculptures, figurines and effigy censers at Mayapan do not display filed teeth, suggesting that this was not a society-wide norm (Masson & Peraza Lope 2012; Peraza Lope & Masson 2014b, 431–40). Female portrayals in art at Postclassic Maya sites usually have pulled-back, centrally parted hair and simple dresses or *quechquemitl* [triangular shawls] and skirts. They present as youthful or aged, signifying two known female goddesses (Vail & Stone 2002).

Effigy incense burners are ubiquitous for the Postclassic period, and especially for Mayapan. They provide an additional window into concepts of appearance and presentation at the city. Carefully crafted through moulding, modelling and painting, these ceramic sculptures portray both standardized attributes of Maya gods and more unique ancestral deities. Anthropomorphic figurines at Mayapan, in contrast, tend to represent generalized ideal types of men and women, lacking recognizable deity attributes, as is also true elsewhere in Mesoamerica (Joyce 1993; Lesure 2011, 113–14; Masson & Peraza Lope 2010). This difference implies a contrast between ritual, public representations and figurines, which may be more relevant to the identities and needs of everyday life (Joyce 1993). Outside Mayapan, female ceramic effigies with filed teeth are known, although rare (Figs 1A & B). Examples include an effigy censer from the site of Zacbo, Yucatan (shared with the authors by Alfredo Barrera Rubio) and a figurine from Aguacatal, Campeche (Matheny 1970, fig. 52a).

Examples of male ceramic portrayals with filed teeth from Mayapan (Figs. 1C & D) contradict

Figure 1. *Late Postclassic artistic depictions of personages with pointed teeth: (A) female Chen Mul Modeled effigy censer from Zacbo, Yucatan (courtesy Alfredo Barrera Rubio); (B) female Matillas Fine Orange ceramic figurine from Aguacatal (redrawn by Wilbert Cruz Alvarado after Matheny 1970, fig. 52a); (C, D) male Chen Mul Modeled effigy censers from Mayapan.*

Landa's account that this was exclusively a female practice. Male effigy censer faces with pointed teeth are spatially concentrated, paralleling findings at Zacpeten, Guatemala (Pugh & Shiratori 2018, 245). Seven of nine ceramic effigy examples from Mayapan derive from one public monumental structural group, Temple Q-80 and its adjacent hall Q-81, and shrine structures Q-79/79a (Peraza Lope & Masson 2014b, 459, fig. 7.5c). These two buildings frame the northern border of the main plaza and face the site's principal Temple of Kukulcan (Temple Q-162). Temple Q-80 has a complex set of multiple vaulted rooms facing different directions and it is unlike the city's other temples in this regard. It clearly served a different function that called for private quarters in which multiple participants performed sacred acts. Peraza Lope & Masson (2014c, 88) suggest it served as the site's 'Turquoise House', a facility known as *Xiucalli* in Postclassic

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Figure 2. *Late Postclassic Mayapan burials exhibiting C pattern of tooth filing: (A) Maxillary incisors of young adult female burial 09-01; (B) Middle adult female burial 21.*

central Mexico, where councillors congregated who were members of the Quetzalcoatl (Kukulcan) priesthood (Ringle 2004, 210). A mural within Mayapan's Temple Q-80 features turquoise symbols (Milbrath & Peraza Lope 2003, 27), and the city's only four effigy censers decorated with Venus imagery are concentrated at Q-79 and Hall Q-81. Turquoise and Venus imagery are strongly associated in Postclassic Mesoamerican religious art and with Quetzalcoatl/Kukulcan (Milbrath & Peraza 2003, 27). Given this range of indicators that the Q-80 and Q-79 architectural cluster pertains to the activities of the Kukulcan priesthood, the concentration of effigy censer male faces with filed teeth at this group may signify body modification with members of that order, who filed their teeth in reference to wind/sacred breath. Alternatively, the filed tooth censers embodied the image of a patron god of this order.

No male skeletons with filed teeth have been found at Mayapan that might suggest dental modification by members of the Kukulcan priesthood. The only examples, as we discuss below, are those of females (Fig. 2). Why females may also have modified their dentition in reference to the concept of wind represents a research question that is difficult to answer. The possibilities that women with filed teeth were in some way related to males (or other communities) engaged with the Kukulcan priesthood or that they were ritual specialists merit future investigation.

Mayapan

The city was founded as a new regional political capital in the latter half of the twelfth century AD by regional elites formerly associated with collapsed Terminal Classic (AD 800–1100) centres of Chichen Itza and Uxmal. Founding lords of Mayapan formed a council government of a regional confederacy comprised of smaller states across much of the northern peninsula that endured for three centuries (AD 1150–1450). Mayapan's governors rekindled the mythic charter of its Terminal Classic predecessor capitals, with an emphasis on feathered serpent origin mythology and other outward-looking political art that tied it to important commercial and political centres at least as far as the Gulf Coast, Honduras and the Guatemalan highlands (Milbrath & Peraza Lope 2003; Peraza Lope & Masson 2014c; Smith & Berdan 2003). Commoner residents also engaged this inter-regional trade to a significant degree, with non-local possessions forming large percentages of the household goods deemed essential to daily life (Masson & Freidel 2012; 2013). The city was abandoned and the confederation dissolved around 1448 AD, succumbing to cycles of climatic catastrophes and the unrest that ensued from droughts and famines experienced regionally (Masson & Peraza Lope 2014c; Peraza Lope *et al.* 2006; Roys 1962). Archaeological investigations of the site began with the Carnegie Institution of Washington in the 1950s (Pollock *et al.* 1962) and continued more recently from the 1990s onward (Brown 1999; Hare *et al.* 2014b; Masson *et al.* 2020; 2021; Milbrath & Peraza Lope 2003; Peraza Lope 1999; Peraza Lope & Masson 2014c; Russell 2008).

Archaeological enquiries into ethnicity at the household or settlement cluster scale have met with little success, largely due to the mixture of trade goods from all parts of the peninsula at households studied. The city's residents' tastes for belongings acquired in the marketplace masked material signatures of ethnicity. Similarly, burial patterns at Mayapan vary considerably, with different types of mortuary features present at individual house groups (Hutchinson 2021; Masson *et al.* 2014, 263; Serafin & Peraza Lope 2007; Smith 1962). Elite dwellings and burials tend to have a more diverse array of objects (compared to commoners), sometimes with specific references to central Mexican religious icons (ceramic deity effigies or masks, for example). Such

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items are invariably mixed in the same contexts with more common, locally or regionally acquired ceramic or stone sculptures, portraying traditional Maya deities. Masson and Peraza Lope (2010) concluded that newcomers to the city from distant destinations assimilated relatively quickly, resulting in the majority of material goods at most contexts conforming to styles, function and symbolism characteristic of Postclassic Maya sites across the peninsula (Masson 2001; Masson & Rosenswig 2005; Smith 1971). Some pottery types represent exceptions in that they are widely found at the city of Mayapan but not elsewhere (Cruz Alvarado 2010; Peraza Lope & Masson 2014a). One pottery type, Pele Polychrome, may signify a social group with ties to the Peten Lakes (Peraza Lope & Masson 2014a; Rice 2009).

Mayapan was successful in fostering a normative housing style adopted by its residents that is largely unique to the city (Masson *et al.* 2014, 194, 202, 209; Masson & Peraza 2014b, 550; Smith 1962, 217). Monumental architecture and public buildings at the site reveal complex combinations of conformity to standardized stylistic types, while at the same time builders of specific groups added idiosyncratic decorative motifs, sculptures, murals and wall features (Delgado Kú 2004; Delgado Kú *et al.* 2021; Hare *et al.* 2014a, 189; Masson *et al.* 2014, 263; Peraza Lope & Masson 2014b, 126; 2014c, 102).

The conflicting identity politics of kin, hometown, ethnic and city-wide identities have long concerned anthropologists studying the nature of urban life (Janusek & Blom 2006, 233). Ironically, despite clear historical testimony to the pluralistic social milieu, and despite the centripetal pull of the hometown (*cah*) as the primary field of social identity at Contact (Restall 2001), the material signatures of Mayapan's residential groups seem to mostly mask inter-family and inter-personal differences. These findings suggest that the city's governors were reasonably successful in casting the urban centre itself as the *cah*. In this context, the uncommon practice of tooth modification stands out against a general backdrop of conformity and belonging at the city, especially when considered alongside widely practised cranial shaping, a form of corporeal alteration that characterized not only Mayapan residents, but a broader geographic distribution of Maya peoples across the peninsula. Mayapan, by defining itself as a confederacy of *cahob* [plural of *cah*], may have successfully inculcated at least a complementary sense of belonging to state, capital city and hometown. Janusek and Blom (2006, 249) make similar arguments for socially diverse Tiwanaku, pointing out the fact that polity (political and urban centre) scale identity was accorded prestige within the city. Like Mayapan, Tiwanaku tolerated differences in the form of body modification, while at the same time encouraging buy-in through the use of ceramic feasting vessels that cross-cut diversity and fostered the unification of diversity.

Materials and methods

The composite Mayapan burial sample includes at least 288 individuals, deriving from sacrificial contexts, mass graves resulting from warfare and violence, and funerary contexts in residential and public settings, within and outside the city's monumental centre (Serafin & Peraza Lope 2007). This study includes 742 incisors and canines representing 61 adult dentitions from Mayapan dating to the Postclassic period. Determination of age and sex of associated skeletal remains followed Buikstra and Ubelaker (1994). All teeth were scored for the presence or absence of dental modification. None was observed in subadults or in premolars or molars; as a result, only incisors and canines of adults are considered in this study. The styles observed were classified for each tooth individually using the system of Romero Molina (1986), and for relatively complete dentitions as a whole we followed Tiesler (2001). Dentitions were considered complete if at least one maxillary central incisor was present, as this has previously been shown to be the most commonly modified tooth (V. Tiesler pers. comm. to SS, 2017). Within the Mayapan collection, each adult considered complete had on average seven out of twelve anterior teeth.

Accelerator Mass Spectrometry (AMS) dating of the human skeletal samples by Douglas Kennett's lab at the Pennsylvania State University allows for chronological comparisons of the results of this study. Kennett *et al.* (2016) have provisionally analysed these results according to three arbitrary temporal intervals within the Postclassic period (AD 1200–1250, 1250–1400, 1400–1450). The site's historical chronology loosely corresponds to these intervals, with the establishment of the city toward the latter part of the 1100s, its apogee from 1200 to around 1310, a difficult period fraught with droughts, famine and unrest from 1310 to 1400, and a weakened, if resilient state from 1400 to 1450 (Masson & Peraza Lope 2014c, table 8.1). The majority of AMS dates fall between 1150 and1400 AD, which can loosely be considered the height of Mayapan's power. Ceramic chronology is not subdivided within this 250-year period at Mayapan, given that the city's major types of pottery were made

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Table 1. *Frequency of dental modification by tooth. n = number of modified teeth. N = number of teeth present and observable for modification. % = number of modified teeth divided by number of teeth present and observable for modification, calculated for each tooth type.*

UI1			UI2			UC			LI1			LI2			LC		
n	N	%	n	N	%	n	N	%	n	N	%	n	N	%	n	N	%
17	137	12.4	17	110	15.5	8	170	4.7	9	76	11.8	11	102	10.8	6	147	4.1

throughout its existence. However, it has long been noted that Chen Mul Modeled pottery is associated with perhaps the second half of its occupation (Masson 2000; Peraza Lope *et al.* 2006; Pollock 1962).

Analysis of stable carbon and nitrogen isotope ratios in bone collagen was used to assess differences in diet among individuals with different patterns of dental modification. Stable carbon isotope ratios provide information on the ecology of the consumer, distinguishable by the photosynthetic pathways (i.e. C_3, C_4 and CAM (Crassulacean acid metabolism)) of plants at the base of the food web (DeNiro & Epstein 1978) and between terrestrial *versus* marine ecosystems (Chisholm *et al.* 1982). Stable nitrogen isotope ratios reflect the trophic level of the organism within the local food chain and distinguish between terrestrial and aquatic ecosystems (DeNiro & Epstein 1981; Schoeninger & DeNiro 1984). Strontium isotope ratios measured in tooth enamel reflect the local geological and bioavailable signature during the time of tooth development in the first few years of life (Bentley 2006). To identify non-locals, we compared local strontium baselines at Mayapan and the surrounding regions (see George *et al.* n.d.b). Additional details of the methods can be found in George *et al.* (n.d.a,b).

Results

Below we summarize an array of findings that indicate stylistic patterns of tooth filing, patterns by sex, temporal trends, geographic origin of individuals, and diet. We also consider the spatial distribution of tooth filing among social contexts across the city. Sixty-eight of 742 (9.2 per cent) of the teeth in our sample were deliberately modified. Most commonly, the lateral and central maxillary incisors exhibit filing (Table 1), without significant differences between the maxillary teeth (10.1 per cent; 42/417) and mandibular (8.0 per cent; 26/325) teeth ($\chi^2 = 0.942$, $p = 0.332$).

All observed cases of dental decoration represent tooth filing; inlays are absent (Fig. 3). The styles include filing one or more grooves in the middle section of the occlusal surface (Romero Molina's A1 and A2), filing just one corner of the occlusal surface (Romero Molina's B1) or filing both the mesial and distal corners of the occlusal surface (Romero Molina's C1, C2, C4, C5, C6, F3 and F4). The latter group predominates, in particular C5 (30.9 per cent), F4 (26.5 per cent), C6 (14.7 per cent) and C4 (13.2 per cent). The modification in the vast majority of cases shaped the tooth into a single large point, although variation occurs in the contour of the mesial and distal edges.

Ten of 61 adults with relatively complete dentitions have filed teeth (16.4 per cent: Table 2). All cases except one exhibit Tiesler's (2001) C pattern; the remaining individual exhibits pattern A. Of these 61 adults, 29 are female and 24 are male, with the others undetermined. The sexed skeletons reveal that tooth filing was exclusively a female practice in the sample (27.6 per cent, or 8/29); none of the 24 males exhibited this modification. This distribution among the sexes is statistically significant (Fisher's Exact Test, $p = 0.015$). An additional female with four filed teeth (exhibiting the C pattern) was excluded from the above tallies because the central incisors were absent. For two individuals with filed teeth, sex could not be determined.

Table 2 summarizes dental modification trends through time. This practice was more common earlier in the site's history, although this trend is not statistically significant ($\chi^2 = 1.800$, $df = 2$, $p = 0.407$). From 1200 to 1250 AD, 25 per cent of the sample exhibited filed teeth, more than samples of individuals dating between 1250 and 1400 AD (9.5 per cent) or to the fifteenth century (14 per cent).

Strontium isotope analyses permit the assessment of the childhood origins of 19 individuals out of the 61 with relatively complete dentitions (George *et al.* n.d.b, table 1). Similar low frequencies of tooth filing occur among individuals from northwest Yucatan (12.5 per cent, 1/8) and individuals born outside this region (9.1 per cent, 1/11). Analysis of stable carbon ($\delta^{13}C$) and nitrogen isotope ratios ($\delta^{15}N$) in 22 females with relatively complete dentitions by George *et al.* (n.d.a, table 3) indicate that similar diets were consumed by females in the sample, whether their teeth were filed or not. Females with filed teeth had mean values of –9.8‰

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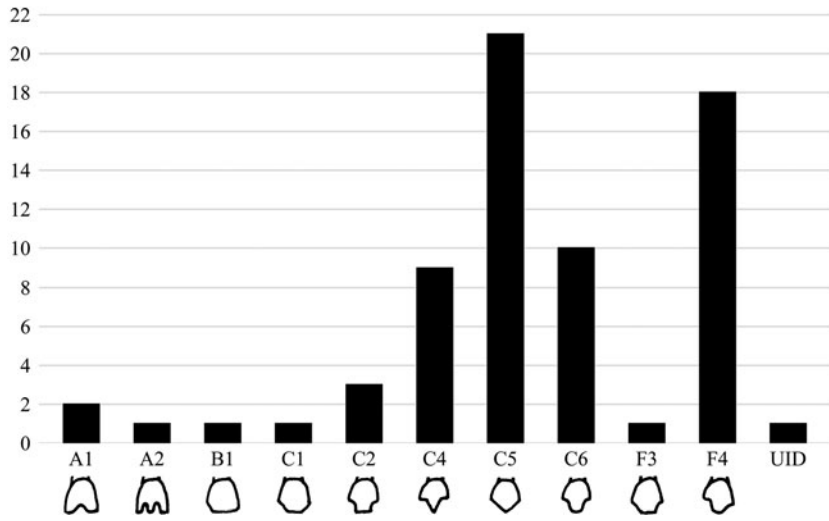

Figure 3. *Number of teeth exhibiting each type of dental modification.*

Table 2. *Frequency of dental modification by sex and arbitrary chronological intervals within the Postclassic occupation of Mayapan based on AMS dating. n = number of relatively complete individuals with modified teeth. N = number of individuals observable for modification. % = number of individuals with modified teeth divided by number of individuals observable for modification, calculated within each sex and period category.*

	Female			Male			Total		
Period	**n**	**N**	**%**	**n**	**N**	**%**	**n**	**N**	**%**
Early Interval (1200–1250 AD)	3	9	33.3	0	6	0.0	5	20	25.0
Middle Interval (1250–1400 AD)	2	9	22.2	0	8	0.0	2	21	9.5
Late Interval (1400–1450 AD)	1	4	25.0	0	3	0.0	1	7	14.3
Postclassic (specific interval unknown) (1150–1450 AD)	2	7	28.6	0	4	0.0	2	13	15.4
Total	*8*	*29*	*27.6*	*0*	*21*	*0.0*	*10*	*61*	*16.4*

for $\delta^{13}C$ and 8.6‰ for $\delta^{15}N$ (N = 5). These results are nearly identical to the mean values of females lacking filed teeth, –9.6‰ for $\delta^{13}C$ and a mean 8.9‰ for $\delta^{15}N$ (N = 17). The differences are not statistically significant (Mann-Whitney U Test, $p = 0.583$, $p = 0.664$, for $\delta^{13}C$ and $\delta^{15}N$, respectively).

Deliberately modified teeth were found in 15 distinct spatial contexts: 10 in individuals with relatively complete dentitions and 5 representing isolated teeth (Table 3; Fig. 4). These 15 contexts include structures located within or near to the monumental centre as well as in residential zones more distant from the epicentre. These contexts mostly include residential structures, except for individuals located within three elevated shrine structures (Q-71, Q-89, Q-149) and two mass graves (Q-79/79a, H-15). Added to this spatial comparison are single filed teeth from three different architectural contexts (J-50, J-131a and Q-71) published in an earlier study (Fry 1956). The frequency of individuals with modified teeth is slightly higher outside the main civic/ceremonial centre (19.4 per cent, 7/36 *versus* 12.0 per cent, 3/25) but the difference is not statistically significant (Fisher's Exact Test, $p = 0.505$).

There was little difference according to the social status of individuals with filed teeth (Table 3). Among the individuals of all sexes with relatively complete dentitions, 35 are commoners, 19 are elites and 7 are victims of sacrifice or war. 17.1 per cent of individuals from commoner dwellings had filed teeth (6/35) compared to 15.8 per cent for elites (3/19). These occurrences are not significantly different (Fisher's Exact Test, $p = 1.000$). For the subset of remains that could be identified

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Table 3. *Dental modification details by individual and context. YA, young adult; MA, middle adult; OA, old adult; A, indeterminate adult; EI, MI, LI, Early, Middle and Late temporal (Postclassic) intervals; HS, higher status; LS, lower status; V, victim of sacrifice or war.*

Burial #	Structure	Complete	Age	Sex	Status	Period	Filed Teeth	Style
21	Q-79/ Q-79a	Yes	MA	F	V	MI	10	C
37	Q-89	Yes	A		HS	EI	2	C
39	Q-89	No	A		HS		3	C
59	Q-149	Yes	YA	F?	HS	MI	2	C
59	Q-149	No	MA		HS	MI	3	C
4	R-106	No	A		HS		1	C
12	Y-44	Yes	OA		LS	EI	7	C
13	Y-43b	Yes	MA	F	HS	EI	6	C
Itzmal Chen mass grave	H-15	No	A		V	MI	1	C
09-01	I-55a	Yes	YA	F	LS	EI	9	C
09-02	I-55a	Yes	MA	F	LS	EI	5	C
6	R-66 (E-43)	No	MA	F?	LS		4	C
9	R-148	Yes	OA	F	LS		3	A
11	R-183a	Yes	OA	F	HS	LI	5	C
12	R-112	Yes	OA	F	LS		7	C
Lot A-2	J-131a	No			HS		1	C
Lot A-13	J-50a	No			LS		1	C
Lot C-22	Q-71	No			HS		1	C

as female, 18 are commoners, 8 are elites and 3 are victims of sacrifice or war. A greater proportion of lower-status females (27.8 per cent, 5/18) had filed teeth compared to higher-status females (12.5 per cent, 1/8), although this difference is not statistically significant (Fisher's Exact Test, $p = 0.628$). Filed teeth, according to these findings, do not correlate with any particular category of status at Mayapan. One female with filed teeth was a casualty of war at Mayapan. She was recovered face down in a mass grave next to Hall Q-79 and Temple Q-80 and had an arrowhead embedded in the right scapula (Serafin *et al.* 2014). Strontium analysis indicates that she probably grew up in or near Mayapan (George *et al.* n.d.b, table 1). She may have been a victim of internal conflict at the city, referred to in mytho-historical documents as a 'purging of the nobility' in the late 1300s (Masson & Peraza Lope 2014c, table 8.1; Roys 1962, 45).

Discussion

Tooth filing at Mayapan was practised, in low frequencies, mostly or exclusively by women, through all temporal intervals of the city's Postclassic occupation, and equitably among commoners and elites. Individuals with dental modification included those who were born and raised in the Mayapan vicinity as well as migrants into the city. The diets of persons displaying this bodily adornment were not distinguishable from other residents.

These findings are important in terms of understanding the Mayapan sample in comparative context. The Mayapan patterns generally conform to Tiesler's (2001) conclusion that dental modification lost its association with high-status persons, particularly males, in the Postclassic compared to the Classic period. Inlays were no longer performed and tooth filing was undertaken by both commoners and elites at Mayapan, if relatively infrequently. Other investigations in Yucatan also reveal the tendency for more females than males to have filed teeth. For example, 52.2 per cent of females have modified teeth compared to 18.2 per cent of males in Tiesler's study of Postclassic cases reported from east coast (Caribbean Yucatan) sites.

While at Mayapan only females had filed teeth, the option was not a practice exclusive to either sex at contemporary sites across the peninsula. Potentially, the two individuals in our sample for which sex could not be determined may have been male. The

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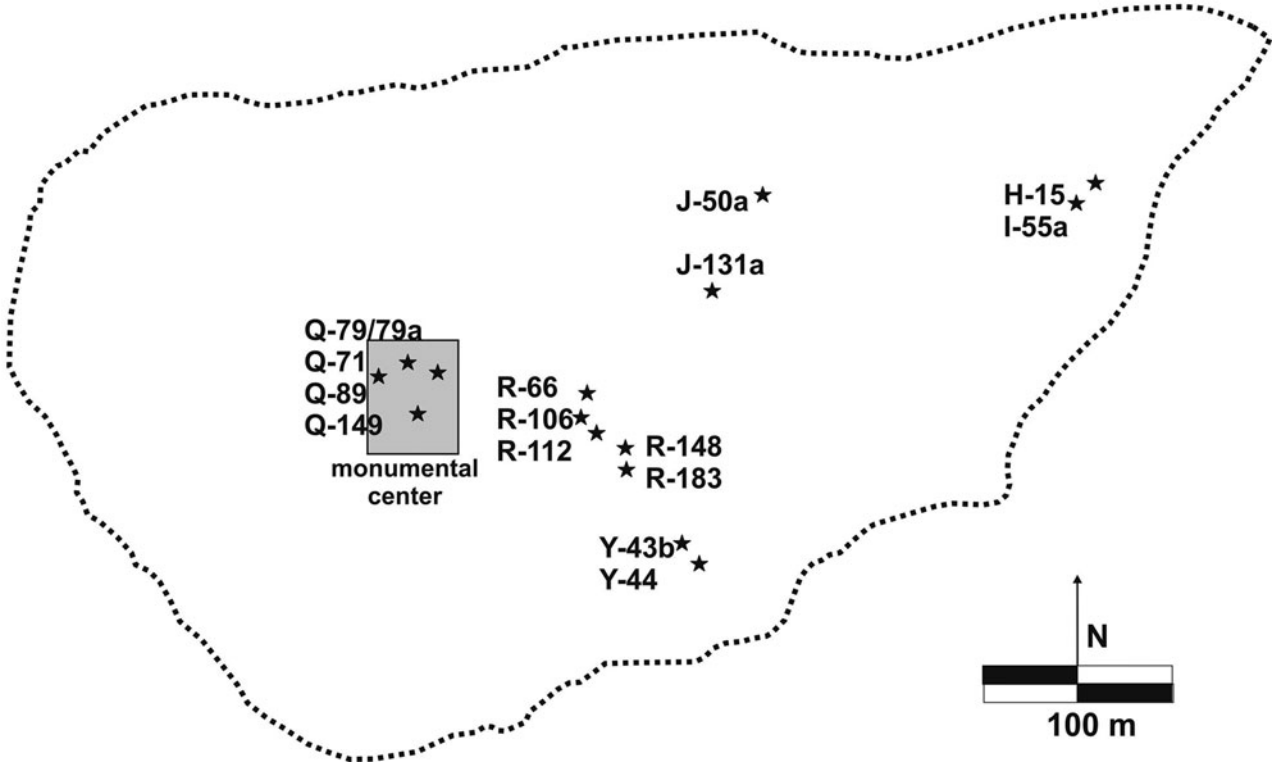

Figure 4. *Map of Mayapan showing locations of burials with filed teeth.*

presence of male effigy censers with filed teeth at Mayapan also underscores the likelihood that certain males adorned themselves in this way. Analysis of dental modification according to sex should also consider the possibility of blended or alternative gender identities, or cross-dressing especially for male ritual specialists, as is known in the art of the Maya area (Ashmore 2002; Geller 2006; Joyce 1998, 164; Looper 2002; Stockett 2005, 570; Stone 1988, 75–6). Dressing and other presentation in gender-ambiguous or dual-gender ways may have served to embody personhood for members of society as a whole (or uniting cosmological or reproductive principles). Joyce argues (2000, 78–81) that transcending binary gender identities in ritual practice was clearly intentional. It is possible that the males represented by effigy censers, concentrated at an architectural group likely to have been the nexus of Kukulcan priests at Mayapan (Peraza Lope & Masson 2014a, 54), reflect men-women of special status of the sort described by Looper (2002). Given that these entities do not bear the diagnostic markings of known Maya gods in the codices, they may have represented patron gods unique to the Kukulcan priesthood. An alternative and perhaps complementary interpretation may be that their filed teeth reflect the sacred breath or wind aspect closely linked to Kukulcan and his aspect as the wind god Ehecatl, so common across Mesoamerica (Taube 1992, 59).

In general, dental and cranial modification become more regionally homogenous in Postclassic Mesoamerica, with serrated teeth and tabular erect cranial modification predominating, and Mayapan conforms to this pattern (Tiesler 2014, 22, 240). However, the relative prevalence of tooth filing traditions at Postclassic Maya sites is remarkably divergent at the community level. Mayapan differs from Tiesler's comparative sample of east coast sites in its lower frequency of tooth filing (Tiesler 2001; 40.9 per cent, 18/44, Fisher's Exact Test, $p = 0.007$). The popularity of the C pattern among females is reflected at Mayapan as well as at settlements on the northeast coast (Tiesler 2001). The eastern sites of Laguna de On and Caye Coco conform to the Mayapan pattern for (pointed) tooth filing style and sex association, although tooth filing was much more common at these sites. A higher proportion of female skeletons from these two sites exhibit pointed tooth filing (66.7 per cent, 8/12) compared to males (10.0 per cent, 1/10) (Rosenswig *et al.* 2020, appendix 1). Yet at the site of Santa Rita, an important regional capital with which Laguna de On and Caye Coco

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were affiliated, no individuals had filed teeth (Chase 1997, 24). In addition, more males exhibit dental decoration and more diverse forms of modification occur at Postclassic sites further to the south in Belize such as Lamanai and Chau Hiix (Havill *et al.* 1997; Williams & White 2006). These findings suggest, on the one hand, that tooth filing was more popular at settlements in the Belize region compared to Mayapan, but also that this practice was not standardized between communities with respect to sexual identity or prevalence.

Unlike tooth filing, tabular erect cranial modification was widely practised (88.1 per cent, 37/42) at Mayapan (Serafin *et al.* 2012) and in hinterland populations (Briggs 2002; Rosenswig *et al.* 2020). Why was cranial modification commonly adopted as a regional marker of social identity, while tooth filing was not? No clear explanations are apparent for the reasons for choosing to file teeth, but doing so appears to have been an individual (or family) rather than community-scale choice. The higher frequencies of dental modification at hinterland sites suggest that the city welcomed migrants from these allied territories, but even in these distant towns, many people had unmodified teeth. In other words, there are no clear 'source' towns for populations of persons with filed teeth. Given patrilocal residence patterns, women with filed teeth would have died and been buried at locations where they spent their adult married lives, but they may have undertaken the modifications before marriage. The lack of concentrations of skeletal remains with filed teeth further constrains the prospects for residential-scale analysis of this practice. Based on the present data, we infer that tooth filing was an elective form of ornamentation that was open to individuals, and that doing so did not cause social stigmatization, nor did it mark noble birth.

The relative scarcity of dental modification at Mayapan is also statistically different compared to earlier Maya sites. For example, the proportion of individuals with modified teeth at Mayapan (16.4 per cent; 10/61) is significantly lower than values reported for the northern Yucatan coastal Classic era site of Xcambo (Tiesler 2005; 31.3 per cent, 31/99; Fisher's Exact Test, $p = 0.041$).

Modified teeth were similarly rare at two other, earlier urban settings in Classic period Mesoamerica, the political capitals of Monte Alban and Teotihuacan (Cid Beziez & Torres Sanders 1999; Martínez Lopez *et al.* 1996; Rodríguez & Serrano 1975). While tooth filing correlates with higher social status at Monte Alban, this does not appear to be true for Teotihuacan. Teotihuacan, the larger of the two cities, is particularly identified as a multi-ethnic melting pot tolerant of diverse, household-scale expressions of social identity. Studies of burial practices and skeletal isotope analysis highlight the social diversity of this city's residents (e.g. Manzanilla 2015).

Mortuary practices at Mayapan similarly reflect an environment in which families freely diverged from one burial event to the next in terms of treatment and furniture of the deceased at individual residential groups (Hutchinson 2021; Smith 1962). Occasionally, household artefact assemblages point to ethnically distinct families who possessed concentrations of more unique types of pottery (Peraza Lope & Masson 2014b, 144). Yet for most contexts, facets of the material culture of daily life such as ordinary, common artefacts and forms of residential architecture reflect an adoption of relatively uniform norms (Masson *et al.* 2014, 194), as does the popularity of tabular erect cranial modification. Like mortuary practices, tooth filing was a more individual choice. Correlating with neither social rank nor place of birth (local, non-local), women with filed teeth at Mayapan were accepted into urban society. Decisions to file teeth at Mayapan may have been influenced by a desire to emulate popular and fluctuating styles, perhaps related to principles of fashion as applied to archaeology (e.g. Lesure 2015, 113). However, the superficial homogeneity of different variants of the 'C' pattern of tooth filing, the principal form observed at Mayapan and numerous other contemporaneous sites, masks subtle variations that merit closer consideration. Some, like Romero's C5 and C8 styles, resemble the simple triangular depiction of filed teeth visible on some of the city's (male) Chen Mul Modeled effigy censers. Others, such as F4, C6 and C4, exhibit varying degrees of elaboration and asymmetry of the mesial and distal corners. All of these subtle variations were probably referents to the same underlying symbolism, perhaps wind or breath. The females who bore these variations on the 'C' theme were adopting a prevailing regional style, and the possibility exists that they were ritual specialists. Modest variations may be related to the desire to personalize this theme, or other factors such as perception or skill of craftspersons or family members performing the filing.

When conflicts brought violence to the city, these women, along with others who did not modify their dentition, were susceptible to extermination and hasty burial in the city's mass graves. Female victims in Mayapan's mass graves included individuals born locally as well as migrants. An important mechanism by which women arrived at Mayapan would have been the practice of enslaving war captives. This status merits further consideration for

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individuals with non-local bone chemistry signatures, although documentary sources indicate that some slaves were also acquired from neighboring northern Yucatan polities (Roys 1962, 47). Female slaves frequently performed domestic services, and some were concubines (Roys 1972, 27). Slave trade was also, unfortunately, a key component of economic exchanges between Mayapan (and other northern sites) and Gulf Coast merchants connected to central Mexico (Roys 1972, 34–5; Scholes & Roys 1938). Cross-culturally, slaves are often displaced to locations far from their support networks so that they have diminished prospects for flight and refuge (Graeber 2011, 140, 145; Inomata 2001b). It is worth considering that at least some females with filed teeth, and some lacking this trait, arrived at the city against their will.

Conclusions

City life, in the past as well as today, presents opportunities for amalgamations of hometown identities through processes of acculturation, assimilation, hybridity and the allure of urban cachet. The governors of pre-modern states such as Mayapan may have effectively promoted a narrative of cultural unity at the city, across the confederated polity and among hinterland allies. Such efforts are rarely complete in their transformations of individual or family-scale outlooks. Citizens and subject peoples may conform in some aspects of lifestyle and presentation and diverge in others, and urban leaders are rarely able to control every such choice; it is unlikely that they were motivated to do so. Tooth filing, like mortuary practices at Mayapan, represented one such tolerated arena of individual choice. This form of personal ornamentation contrasted with other aspects of appearance, such as cranial modification, that reflected a person's belonging to a prevalent regional majority of Postclassic Yucatan peoples.

As Stockett argues (2005, 573), it is more productive to focus on the study of social identity as a process that 'mediated the tension between large-scale, social-defined and small-scale, individually enacted understandings of sex and gender', rather than focusing more generally on women and binary concepts of sexual identity that have their roots in Spanish Colonial characterizations of Maya societal norms. This study at Mayapan answers Stockett's call by comparing complex patterns of corporeal presentations of identity at the regional and local scale. Normative practices were mediated by individual choice in the pluralistic urban setting of the capital city of Mayapan.

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Stanley Serafin
School of Medical Sciences
Earth and Sustainability Science Research Centre
University of New South Wales
Sydney, NSW 2052
Australia
Email: s.serafin@unsw.edu.au

Marilyn A. Masson
Department of Anthropology
University at Albany-SUNY
Arts & Sciences Room 237
1400 Washington Ave
Albany, NY 12222
USA
Email: mmasson@albany.edu

Carlos Peraza Lope
Centro INAH Yucatán
Km 6.5 Carretera Mérida-Progreso
Col. Gonzalo Guerrero
Merida, Yucatan CP 97310
Mexico
Email: cperaza_yuc@hotmail.com

Douglas J. Kennett
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
USA
Email: kennett@anth.ucsb.edu

Richard J. George
Department of Anthropology
University of California
Santa Barbara, CA 93106-3210
USA
Email: richardgeorge@ucsb.edu

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Author biographies

Stanley Serafin is a Senior Lecturer in the School of Medical Sciences at the University of New South Wales, Australia. His research focuses on the analysis of human skeletal remains in the Maya culture area, including Yucatan, Tabasco, and Chiapas, focusing particularly on issues of dental anthropology, taphonomy, and trauma.

Marilyn Masson is a Professor of Anthropology at University at Albany-SUNY. She co-directs the Economic Foundations of Mayapan research project in Yucatan, Mexico. Her research focuses on premodern political economies, ancient urban life, household archaeology and the Postclassic Maya period. She is the author/editor of three books: *In the Realm of Nachan Kan: Postclassic Maya archaeology at Laguna de On, Belize* (UP Colorado, 2000), *Ancient Maya Political Economies* (AtlaMira, 2002, with D. Freidel) and *Kukulcan's Realm: Urban life at ancient Mayapan* (UP Colorado, 2014, with C. Peraza Lope).

Carlos Peraza Lope is an archaeologist and project director with the Instituto Nacional de Antropología e Historia, Centro INAH Yucatán, Mexico. He co-directs the Economic Foundations of Mayapan research project in Yucatan, Mexico. He is the author of *Kukulcan's Realm: Urban life at ancient Mayapan* (UP Colorado, 2014, with M. Masson).

Douglas Kennett is a Professor of Anthropology at the University of California, Santa Barbara. His current interests include the study of human sociopolitical dynamics under changing environmental conditions, human impacts on ancient environments, and behavioral response to abrupt climate change in the past.

Richard George is a Postdoctoral Researcher in the Department of Anthropology at the University of California, Santa Barbara. He is interested in prehistoric population genetics and human behavioral ecology. Specifically, he studies how population dynamics change in response to social and environmental events. Currently he is combining isotopic and genomic analyses to understand regional diversity within the population structure across Mesoamerica.