
Introduction to a World View of Bioculturally Modified Teeth

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Humans have long employed deliberate modification of the body to convey information about themselves, the societies in which they live, and their relationship to others. Intentional body modification can take many forms. Some cultural practices, such as foot binding in China, have a limited geographic range. Others, including piercing, tattooing, scarification, and artificial cranial deformation, have a much broader distribution in time and space. Arguably few have left physical evidence of a more wide-ranging distribution, both geographically and temporally, than intentional dental modification, the practice of purposefully modifying the appearance of human teeth, typically through removal, staining, inlays, filing, or notching. In one form or another, humans have modified their teeth since the late Pleistocene, and they continue to do so today in some parts of the Americas, Africa, and Asia. In virtually every region on the planet, people have practiced intentional dental modification at some point in time.

Many forms of intentional body modification are limited to soft tissue, leaving little trace in human remains from archaeological sites, aside from contexts that provide remarkable preservation of soft tissue due to desiccation or freezing. This preservation bias limits our ability to identify and use modifications of soft tissue to understand past peoples and cultures. For example, Oetzi, the frozen “iceman” that was found high in the Italian Alps, has 61 simple tattoos in 19 clusters on the wrist, back, ribcage, and lower legs (Samadelli et al. 2015). Dating to circa 5,300 years ago, Oetzi is the earliest direct evidence of tattooing, although the practice is likely to be much more ancient (Deter-Wolf et al. 2016). Conversely, intentional dental modification is perhaps unique, in that it is the sole form of corporal

modification that affects that most durable of tissues in the human body, tooth enamel. Fortunately for us, this means that a record of its occurrence is more likely to be preserved, even in regions with poor bone preservation, as is often typical in tropical regions of the Americas, Africa, and Asia.

Intentional Dental Modification

Intentional dental modification is sometimes referred to as dental transfigurement (Turner 2000) or dental mutilation, although this latter term is increasingly rare in anthropological literature because of its pejorative connotations. The practice is remarkably diverse, due in part to the long-standing and widespread nature of the modification but also as a result of myriad underlying reasons. Such modification may be parsed into whether it is conducted for therapeutic or nontherapeutic purposes (Alt and Pichler 1998). Stojanowski et al. (2016) recently referred to nontherapeutic changes as culturally mediated dental modification. Evidence of therapeutic modification would include actions designed to treat or prevent dental conditions or to ameliorate their symptoms. Examples of drilled teeth, some with evidence of caries or periapical abscesses, are examples of this therapeutic modification (e.g., Bennike and Fredebo 1986; White et al. 1997; Turner 2004; Seidel et al. 2005; Ortiz et al. 2016). The practice appears to date back to at least the Neolithic (Coppa et al. 2006), and even earlier similar efforts have been recently reported (Oxilia et al. 2015). Other forms of therapeutic intentional modification include possible dental prosthetics and implants (e.g., Crubézy et al. 1998; Becker 1999a; Schneider 2000; Seguin et al. 2014), although some cases of these are contested (Becker 1999b). Tooth removal can also be for therapeutic purposes, as seen in ablation that is done because of folk conceptions of disease (Erlandsson and Bäckman 1999; Norman et al. 2015) or to allow feeding in the case of lockjaw (e.g., Van Rippen 1918a; Singer 1953).

In most cases, nontherapeutic intentional dental modification involves alterations to the number, shape, surface, or color of teeth. It is this agency that distinguishes intentional from unintentional modification. This latter category includes the incidental chipping, grooving, notching, and discoloration that can result from both masticatory and nonmasticatory factors. These distinctions, as seen in the chapters that follow, are not always easy to make.

Ablation

A reduction in the number of teeth through the intentional removal of one or more sound teeth is known as ablation, avulsion, or evulsion. We use the term ablation in this volume because of its primary connotation as an intentional action, whereas avulsion refers to either accidental or intentional removal. Anterior permanent teeth in the upper and/or lower jaws are most commonly involved to visibly change the outward appearance of the dentition. In most regions, deciduous teeth are targeted less frequently, although they may be removed because of folk conceptions of disease in Africa. Ablation is readily distinguished from postmortem tooth loss because of the absence of patent tooth sockets from alveolar remodeling. However, identification of ablation should also involve consideration of regional patterns of dental agenesis, impaction, and/or antemortem tooth loss due to caries, trauma, alveolar resorption, and aging. Symmetric and repetitive patterning of tooth loss in the absence of dental pathology are frequently cited as important factors (e.g., Hrdlička 1940; Merbs 1968; Cook 1981; Pietrusewsky and Douglas 1993), although not necessarily diagnostic (Stojanowski et al. 2016). Indeed, nineteenth-century ethnohistoric accounts of removal of one, two, or three teeth in Hawaii after the death of a chief or another royal family member support the often-variable nature of the practice in some societies (Ellis 1979; Townsend 1999). Nonetheless, if no evidence of dental pathology is present, symmetry and repetitive patterning in antemortem tooth loss of the anterior dentition are likely among the more conclusive indicators of ablation, particularly in the absence of ethnographic documentation for the practice.

Filing or Notching

Among the most frequent forms of intentional dental modification is alteration of the crown margin or labial surface. Generally, tooth filing, or notching, incising, or grooving, as it is variably known, also affects the anterior teeth, although the premolars can be involved on occasion. Upper teeth are more likely to be affected than the lower, since the lower teeth are covered due to maxillary overjet and overbite. Some intentional modifications are simple: a single notch in the occlusal surface, the filing of anterior teeth to a point, or the removal of the mesial corners of upper central incisors, for example. In other cases, modification is considerably more complex, involving hatch marks across the labial surface or elaborate modification of the crown margins (Fig 1.1). For the latter, conclusive identification may



Figure 1.1. Elaborate tooth filing in Mayan remains from Uaxactun (Guatemala). PMAE#39-108-20/N3562.0. Copyright 2017 President and Fellows of Harvard College. Photograph by Scott E. Burnett.

be straightforward. However, some relatively simple modifications may be difficult to distinguish from idiosyncratic or task-related tooth abrasion and, to a lesser extent, chipping (chapter 16).

Inlays

Foreign materials embedded into the labial surface as decorations are known as inlays or incrustations. They have a less widespread distribution than the types of dental modification previously discussed and are primarily found in Mesoamerica, South America, and parts of South and Southeast Asia. Again, the anterior upper teeth are more likely affected, with only rare cases of premolar involvement. Generally, a circular cavity is prepared with a bow-drill or similar technology, and the material of choice is inserted with or without adhesive. Cases from South and Southeast Asia typically involved gold or brass. In Mesoamerica, the inlays are often made of jadeite, turquoise, pyrite, hematite, or obsidian, although in one case bone was used (Romero Molina 1986). Gold is frequently found in inlays from South America (although not in the recent example from Peru described below). In some cases from Ecuador, alternative overlays are used

instead of a circular inlay: a gold plaque is inserted into a trough cut into the labial surface or wrapped around the tooth (Saville 1913).

Tooth Dyeing

Tooth dyeing involves impregnating the enamel with substances to change the color. While this practice is also known as tooth staining or discoloration, the latter terms may be more suitable for unintentional changes due to their primary connotation as an accidental process. The use of plant-based pastes to dye the teeth red or black is known in a wide range of cultures in South, Southeast, and East Asia and Oceania (e.g., Zumbroich 2011), although accounts also exist from the Americas (van Rippen 1918b; Zumbroich and Stross 2013) and Madagascar (Zumbroich 2012).

Teeth naturally change color through life, developing yellow, brown, gray, or reddish hues with age, depending on dental hygiene, environmental factors (hyperfluorosis, exposure to metals), diet (coffee, tea, betel nuts), and other lifestyle choices (smoking) (Manuel et al. 2010). As a result, intentional dyeing can be difficult to differentiate from natural staining, particularly in the absence of ethnographic evidence. Furthermore, teeth may change color after death as they absorb elements in the archaeological matrix they are buried in. Teeth may be stained bluish or black from the uptake of iron or manganese (Mansilla et al. 2003; Brown et al. 2014) or green from artifacts that contain bronze or copper, such as coins in the mouth (Hopkinson et al. 2008). These examples may account, in part, for the scant attention intentional dyeing has received in the literature until recently.

Research on Intentional Dental Modification

While dental modification has long been noted by biological anthropologists and archaeologists, much early research on intentionally modified teeth tended to focus on case reports or regionally based classification schemes (de la Borbolla 1940; Romero Molina 1970). Generating reliable frequencies can be difficult (Milner and Larsen 1991; Stojanowski et al. 2016) because of ante- and postmortem tooth loss, dental pathology, and enamel chipping, among other factors. These factors, along with the low to moderate rate they are encountered in most societies, may partly be responsible for the lack of more systematic efforts. While later researchers focused on ideas of status, more recent research provides a broader spectrum of viewpoints and hypotheses concerning the practice.