

CROWN DIAMETERS OF DECIDUOUS TEETH IN JORDANIANS

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A BRIEF COMMENT ON AN INTENTIONALLY MODIFIED TOOTH FROM THE RIO TALGUA REGION, NORTHEASTERN HONDURAS

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ABSTRACT A single tooth from an ossuary cave in eastern Honduras was examined for the evidence of intentional modification. Using various microscopic methods, the authors did not observe linear striations associated with filing. However, characteristics consistent with normal masticatory processes were documented.

INTRODUCTION

Dental mutilation, also known as intentional dental modification, is an interesting cultural practice that has enjoyed a long and diverse history in many populations around the globe. Many explanations have been suggested for groups to artificially alter the morphology of their teeth. For instance, some researchers believe dental modifications are indicative of beautification (Rubin de la Borbolla, 1940; Romero, 1958; Fastlicht, 1976), ethnic markers, or tribal identification (van Reenen, 1978a,b, 1986; Handler, 1994), and social status (Fastlicht, 1948, 1976). For those interested, Milner and Larsen (1991) offer a detailed discussion of this practice.

Aside from these reasons for engaging in this interesting behavior, a fundamental question exists when considering intentional dental modification: What is the longevity of filing signature marks on modified teeth under masticatory function? Several authors have examined various methods for filing teeth (van Rippen, 1917; Havill, *et al.*, 1997). In a gross macroscopic example, van Rippen (1917) states that blades manufactured from obsidian were used to file or cut the incisal and mesial and/or distal margins of teeth in some prehistoric Mesoamerican populations. Havill and co-workers (1997) utilize scanning electron microscopy (SEM) to examine the signature marks left on intentionally modified teeth. Their study suggests that striations on the incisal borders of teeth are indicative of intentional filing.

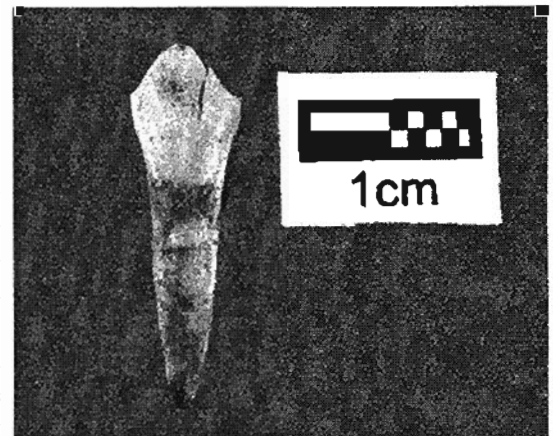


Fig. 1. Modified tooth from Cueva de las Arañas.

MATERIALS AND METHODS

In this study, we examined a modified mandibular incisor found in the vestibule of Cueva de las Arañas (Cave of the Spiders), an ossuary cave located in the Olancho Valley of northeastern Honduras near Catacamas. The cave is situated a few hundred meters from Cueva del Rio Talgua (Cave of the Glowing Skulls), an important ossuary cave discovered and investigated in 1994 and 1996 by Dr. James E. Brady of California State University-Los Angeles.

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Extensive investigations in the cave included survey and mapping, excavation of the cave entrance, documentation of the black and red cave paintings, and *in situ* analysis of the calcite-veneered human remains. No radiocarbon dates are available from the entrance of the cave where the modified tooth was recovered. Besides the modified tooth, excavations in the vestibule recovered additional human remains, numerous Classic period (300-900 AD) pottery sherds, worked shell, stone beads, hematite objects, obsidian blades, faunal remains, and a fragment of a corn cob.

We documented the modified tooth from a gross morphological perspective as well as by using microscopic methods. Several photomicrographs of the tooth surface and the incisal margin were produced with a Cambridge Stereoscan 360 Scanning Electron Microscope. The enamel surface was examined in an attempt to identify evidence of intentional modification (such as striations) or signatures of functional wear (such as pitting and linear scratches). Dr. Charles Brooks and Mr. Gregory Jones of the Department of Material Science and Engineering of the University of Tennessee Knoxville provided access to the SEM as well as several hours of technical assistance in sample preparation and image production.

All specimens examined were sputter coated with gold by a Hummer I Technics sputter coater within a nitrogen plasma field. Specimen surfaces were scanned at 20Kv with varying probe currents in an effort to maximize image quality. Finally, black and white Polaroid images of select features and surfaces were taken.

In order to examine the potential microscopic modifications within the architecture of the tooth, three 1.2mm sections were cut from the embedded crown fragment using the techniques outlined by Marks and co-workers (1996). Dr. Murray Marks of the Department of Anthropology at the University of Tennessee Knoxville provided access to the Mineralized Tissue Laboratory where the tooth was imbedded and thin sections were cut.

The labial portion of the crown separated from the root as the tooth dried during decompression in the SEM chamber. Therefore, examination of the entire enamel and dentine structure was possible without embedding the complete tooth or the lingual half of the modified crown. The thin sections were examined by transmitted light microscopy (TLM) and closely scrutinized for the presence of dead tracts. We specifically focused on the mesial plateau section because it was adjacent to the most heavily modified portion of the crown and would have been directly impacted by filing.

RESULTS AND DISCUSSION

The tooth is a mandibular left lateral incisor that exhibits characteristics consistent with intentional filing of the incisal, mesial, and distal margins (Fig. 1). The type of modification corresponds to Romero's (1958) C-6 category. As a result of the modification, a band of dentine is exposed across the incisal margin of the tooth. In addition, a small area of fractured enamel is evident at the labial apex of the crown. This defect suggests that the tooth functioned normally after modification.

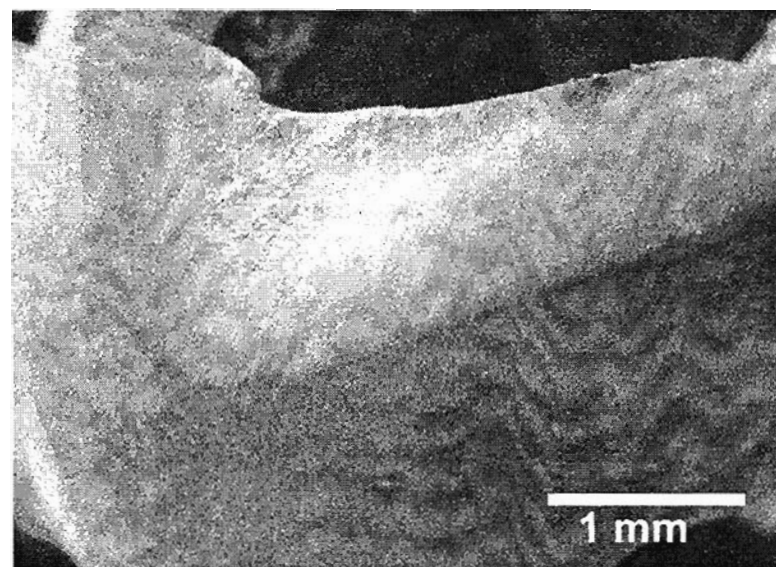


Fig. 2. SEM photomicrograph of the mesiolabial occlusal surface.

Along the labial and incisal surfaces of the tooth, no filing marks similar to the type reported by Havill and co-workers (1997) were present (Figs. 2, 3, and 4). However, most surface features evident were consistent with normal attritional processes (see Teaford, 1991; Teaford and Lytle, 1996). Scratches and pits were observed on the mesial and distal plateaus. Several scratches were also present along the incisal margin. Attritional processes appear to have obliterated filing marks. The tooth does show evidence of trauma at the labial incisal margin where a small area of enamel has fractured (Fig. 2). Although not visible in these figures, a distally oriented wear facet is present on the lingual aspect of the incisal margin, possibly suggesting that the upper incisors were also modified.

Using gross macroscopic and SEM methods of investigation, we did not find evidence of filing as defined by Havill and co-workers (1997). Based on

this, we assume that the tooth was modified and normal masticatory processes resumed after filing. Attritional wear is evident on all surfaces of this tooth. No dead tracts were observed in any section of the crown including the heavily modified mesial plateau (Marks, Personal Communication, 1998).

The lack of dead tracts within the dentine below the modified areas suggests that attrition quickly erased the signatures of artificial alteration. However, we found no reference specifically outlining the time required for the development of dead tracts. Therefore, we are unable to provide an estimate of time since modification.

A bias in the archaeological record may occur because natural tooth wear in older individuals might destroy evidence of intentional modification on teeth (Milner and Larsen, 1991). That is, through the natural process of tooth wear consistent with a gritty diet (see Teaford and Lytle, 1997), individuals who possess dental modifications as young adults may actually wear the modification away. Had the individual from Cueva de las Arañas lived longer, the altered crown would have been gradually reduced. Thus, as time passes the teeth may not reveal intentional modification, even though those teeth may have been modified.

SUMMARY

In this study we examined a lateral mandibular incisor from Honduras to see if evidence of filing on the distal and mesial borders of the incisal surface is present. Based on our investigation, the pits and striations evident under SEM are consistent with marks made by normal masticatory function. Any signature filing "marks" have either worn away or were not present initially after the filing episode. The longevity of filing signature marks is potentially short due to high attrition in most maize-dependent Mesoamerican populations.

ACKNOWLEDGMENTS

We would like to thank the Honduran Government and the Instituto Hondureño de Antropología e Historia in Tegucigalpa for allowing research on the dental remains from the Rio Talgua mortuary caves. In addition, Dr. James Brady deserves credit for directing the Proyecto Arqueológico Talgua.

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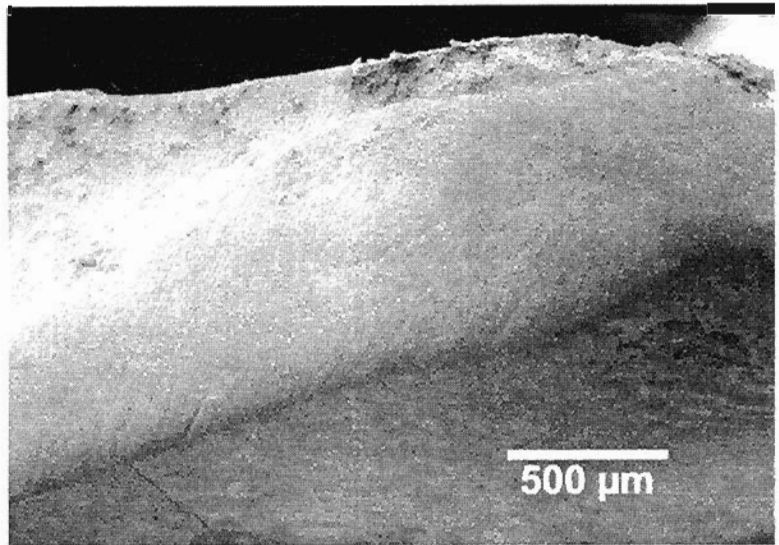


Fig. 3. SEM photomicrograph of the labial-incisal margin with a small enamel fracture at the apex.

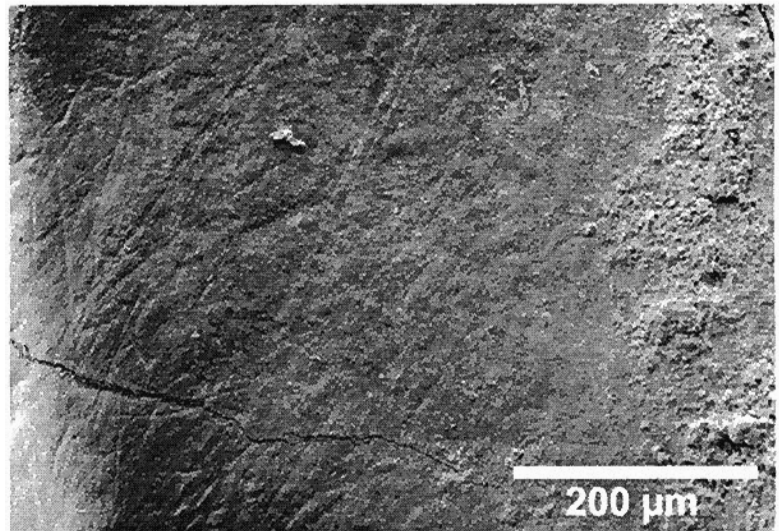


Fig. 4. SEM photomicrograph of the mesial plateau with scratches.

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Book Review

HUMAN DENTAL DEVELOPMENT, MORPHOLOGY AND PATHOLOGY: A TRIBUTE TO ALBERT A. DAHLBERG. Edited by John R. Lukacs. Eugene: University of Oregon Anthropological Papers 54. 447 pp. ISBN 0-87114-060-8 (paper) 1998

"For I would have thee to know, Sancho, that a mouth without grinders is like a mill without a millstone, and every tooth in a man's head is more valuable than a diamond." Thus said Don Quixote to his faithful squire while recovering from a fall off his mount, Rozinante, during his assault upon the innocent sheep which he mistook for an army of enchanted Moors (Miguel de Cervantes, 1605, *The History and Adventures of the Renowned Don Quixote* Part 1, Book 3, Chapter 4). Cervantes could not have imagined that four centuries after the publication of his satire of medieval chivalry a generation would arise which shared his hero's enthusiasm for the dentition, but because teeth are also important as sources of scientific data for documenting the biological diversity, evolution and phylogenetic affinities of ancient and modern human populations. In this august company of twentieth century dental anthropologists Albert A. Dahlberg (1908-1993) pioneered research for over seven decades, a career celebrated in a *Festschrift* published by the editors of *Ossa* in 1979 (25 contributors) and in the *Dental Anthropology Newsletter* in 1992 (31 contributors).

To these tributes John R. Lukacs, Professor of Anthropology at the University of Oregon, has edited a volume of 20 chapters by 35 authors of whom the majority presented papers at the Albert A. Dahlberg Memorial Symposium on Dental Anthropology and Evolution held at the annual meeting of the American Association of Physical Anthropologists in Oakland, California, in 1995, an event co-sponsored by the Dental Anthropology Association.

The volume is organized into five parts: 1. Dental Development and Genetics (3 chapters); 2. Morphological Variations (8 chapters); 3. Odontometric Variation and Dental Asymmetry (5 chapters); 4. Dental Pathology and Wear (3 chapters); and 5. History of Dental Anthropology (1 chapter). Preceding these chapters is a Dedication by G. Richard Scott. Reference citations appear at the end of each chapter. The volume concludes with an author - subject Index. It is amply illustrated with black and white photographs, line drawings and tables. The editor, a distinguished dental anthropologist with a quarter century of research in dental anthropology, has written a Preface. He is to be complimented for his careful attention to proofing and formatting this collection of papers, and for his organization of the 1995 Symposium while President of the Dental Anthropology Association. The name of Hennie T. Groeneveld as co-author with Julius A. Kieser of Chapter 14 is omitted from the Table of Contents where Kieser's first name is given not as "Julius" but as "Jules" at the heading of the chapter with Groeneveld.

The contributors discuss current issues of dental anthropology using samples from geographically widespread populations of Bronze Age Bactria (Chapter 5: Brian E. Hemphill, Alexander F. Christiansen, and S.I. Mustafakulov), Mesolithic Ukraine (Chapter 6: A.M. Haeussler), post-Paleolithic Nubia (Chapter 8: Joel Irish), Archaic Florida (Chapter 18: Andrea Cucina and M. Yasar Iscan), and prehistoric St. Thomas in the United States Virgin Islands (Chapter 19: Clark Spencer Larsen, Mark F. Teaford, and Mary K. Sandford). Among studies of historic populations are those from Maharashtra, India (Chapter 7: John R. Lukacs, Brian E. Hemphill, and S.R. Walimbe), native populations of the Northwest Coast (Chapter 11: Guy L. Tasa), South America (Chapter 17: Phillip