

ETRUSCAN GOLD DENTAL APPLIANCES

- Deneffe V (1899) *La Prothèse dentaire dans l'Antiquité*. Paris: J.-B. Bailliere & fils.
- De Puma RD (1987) Etruscan gold jewelry techniques. *Field Museum of Natural History Bulletin* 58(9):7-15.
- Emptoz F (1987) *La Prothèse Dentaire dans la Civilisation Etrusque*. *Archéologie et Médecine: VII Rencontre Internationales d'Archéologie et d'Histoire* (Antibes 1986). Editions A.P.D.C.A.: Juan-les-Pins. pp. 545-560.
- Ginge B, Becker MJ, and Guldager P (1989) Of Roman extraction. *Archaeology* 42(4):34-37,74-75.
- Guerini V (1909) *A History of Dentistry*. Philadelphia: Lea & Febiger.
- Hoffmann-Axthelm W (1985) *Die Geschichte der Zahnheilkunde* (second edition). Berlin: Quintessenz Verlags-GmbH.
- Jackson R (1988) *Doctors and Diseases in the Roman Empire*. London: British Museum Publications.
- Johnstone MA (1932a) The Etruscan Collection in the Free Public Museums of Liverpool. *Annals of Archaeology and Anthropology, Liverpool* 19:121-137, pls. XCIII-XCIV.
- Johnstone MA (1932b) The Etruscan Collection in the Public Museum of Liverpool. *Studi Etruschi* 6:443-452.
- Lanciani R (1892) *Pagan and Christian Rome*. New York: Benjamin Blom [Reissued in 1967].
- Laviosa C, Capasso L, and Baggieri G (1993) Catalogo della Mostra. Pages 97-132 of, *Le Origini della Chirugia Italiana*. L. Capasso (ed.) Rome: Officine Grafiche Edigrafital, for the Ministero per i Beni Culturali e Ambientali.
- Lufkin AW (1948) *A History of Dentistry*. Second edition. Philadelphia: Lea & Febiger.
- Martial (M. Valerius Martialis) (1897) *The Epigrams of Martial*. London: G. Bell and Sons.
- Marvitz L (1982) *Tandlaegekunst. Etruskernes Verden: Livet og døden hos et oldtidsfolk i Italien*. [catalogue] Published by the Authors and The National Museum of Denmark. Copenhagen, p. 49.
- Masali L, and Peluso A (1985) L'odontoiatria nell'antico Egitto. Pages 51-66 of *Storia della odontoiatria*, G. Vogel and G. Gambacorta (eds). Milan: Ars Medica Antiqua.
- Pot T (1985) Two etruscan gold dental appliances, found in 19th century excavations at Satricum and Praeneste. *Mededelingen van het Nederlands Instituut te Rome* 47(N.S. 11):35-39.
- Poulsen F (1927) *Aus einer alten Etruskerstadt*. Copenhagen: Bianco Lunos Bogtrykkeri.
- Riis PJ (1941) *Tyrrhenika: An Archaeological Study of the Etruscan Sculpture in the Archaic and Classical Periods*. Copenhagen: Einar Munksgaard.
- Sudhoff K (1926) *Geschichte der Zahnheilkunde* (second edition). Leipzig: Johann Ambrosius Barth.
- Tabanelli MN (1963) *La Medicina nel Mondo degli Etruschi*. Firenze: L. S. Olschki.
- Waarsenburg D (1990) Auro dentes iuncti: An Inquiry into the Study of the Etruscan Dental Prosthesis. In M Gnade (ed.): *Stips Votiva*. Amsterdam: Allard Pierson Museum, University of Amsterdam, pp. 241-247.
- Waarsenburg D (1991) *De Schedel van Plinius Maior*. *Hermeneus* 63(1):39-43.
- Waarsenburg D (nd) *The 1896 Excavations at Satricum, Italy*. Manuscript.
- Woodforde J (1968) *The Strange Story of False Teeth*. London: Routledge and K. Paul.

Oral Condition of Three Yanomama Indian Tribes of South America

CLÉBER BIDEGAIN PERIERA, JOSEPH P. KATICH, and CHRISTY G. TURNER II

Av. Duque De Caxias, 1739 Conj. 903 Uruguaiaina RS 97500-905, Brazil (CBP) and Department of Anthropology Arizona State University, Box 872402, Tempe AZ 85287-2402, U.S.A. (CGT)

ABSTRACT The permanent dentition and supporting tissue of 140 Yanomama Indians ranging in age from three to more than 40 years was examined for malocclusion, caries, attrition, and periodontal disease. Their oral status is characterized by malocclusion (79%), anterior tooth crowding (55%), a low frequency of caries (14%), periodontal disease (83%), and a linear progression of occlusal attrition with age. The Yanomama are recognized as having been geographically, genetically, and linguistically isolated for a minimum of 500 years. This situation permits the use of their dental condition to assess the hypotheses that admixture and/or tooth use is chiefly responsible for the widespread malocclusion found in many modern Yanomama populations. Because the Yanomama have seemingly not been affected by foreign admixture, and because they possess marked tooth wear evidencing heavy mastication, neither admixture nor lack of masticatory function can be responsible for a high degree of malocclusion.

INTRODUCTION

The dentition and jaws of many contemporary populations are characterized by high incidence of static and dynamic malocclusion, ranging in frequency from 22.4% to 91.4% (Hrdlička, 1935; Mills, 1963; Horowitz, 1970). Although malocclusion is rarely found in early hominid and prehominid fossils (Pereira, 1972), it has been observed in the form of tooth crowding in some australopithecine material (Oppenheimer, 1967). Still, high frequencies of malocclusion are apparently a relatively recent development in some groups of *Homo sapiens*.

Precise causes for changes in the human masticatory system have not been established, but several hypotheses exist for the reduction in jaw and tooth size. Some of the notable hypotheses are: (1) a reduced need for heavy chewing (Benjamin, 1962; Dahlberg, 1963; Mahler, 1967); (2) the advent of tools as substitutes for teeth (Brace, 1964; Brace and Montague, 1965); and (3) possession of some adaptation that reflects selective pressures on a whole functional matrix which involves the teeth and jaws (Bailit and Friedlander, 1966). Another factor that may have contributed to increase in malocclusion, other than the three factors outlined above, is admixture resulting in large teeth in small jaws (Mills, 1963).

Therefore, the primary purpose of this paper is to examine the hypotheses concerning dental crowding in a living population which possesses two necessary conditions: (1) low to absent admixture and (2) a hunter-

YANOMAMA ORAL CONDITION

gatherer type of diet and method of food preparation. The Yanomama Indians living in the Federal Territory of Roraima, South America, were selected, even though they might be classed as tropical forest village farmers in Steward's (1959) sense. The Yanomama have maintained genetic integrity for roughly 500 years.

MATERIALS AND METHODS

Three of the Yanomama Indians were the subjects of this study: (1) Surucucu (n=48) who are mountain dwellers and subsist mainly on small birds and bananas, (2) Tototobi (n=48), and (3) Catrimani (n=52). The Tototobi and Catrimani live in river valleys where game animals are plentiful and meat is the staple food. Thus, the tribes can be divided into two nutritionally similar groups: the Surucucu (higher carbohydrate) and Tototobi and Catrimani (lower carbohydrate).

The dentition and jaws of the 148 Yanomama Indians (divided into the two generalized nutritional groups) were examined by one of us (C.B.P.) for malocclusion, caries, attrition, and periodontal disease. Occlusal attrition was scored with Pedersen's (1955) Index of Attrition. Malocclusion was scored with the Canadian Index (Rubierto, 1958) and caries and periodontal disease assessed with Ramfjord's (1967) Periodontal Disease Index. The groups were divided into four age groups: (1) adolescents: 13-18 years, (2) adults: 19-29 years, (3) mature: 30-49 years, and (4) older to senile adults: 50+ years. However, the data in Table 1 are listed only by sex and with the sexes pooled.

Table 1. Frequencies of oral conditions in Yanomama Indians.

Condition	Surucucu n=48			Tototobi n=48		
	♂	♀	♂+♀	♂	♀	♂+♀
Crowding	52.5	59.3	56.2	68.4	31.0	45.8
Overjet ¹	19.0	37.0	29.1	5.2	24.1	16.6
Overbite ¹	33.3	37.0	35.4	5.2	13.7	10.4
Crossbite ¹	33.3	33.3	33.3	21.0	6.8	12.5
Edge-Edge ¹	4.7	14.8	10.4	15.8	3.4	8.3
Mandibular shift ¹	0.0	0.0	0.0	5.2	3.4	4.1
Diastema	0.0	7.4	4.2	0.0	27.6	12.5
Supernumerary teeth	0.0	3.4	2.0	0.0	3.4	2.0
Periodontal disease	61.9	82.7	77.0	94.4	93.1	93.6
Caries ²	4.7	3.4	4.2	10.5	10.3	10.4

Condition	Catrimani n=52			All tribes n=148		
	♂	♀	♂+♀	♂	♀	♂+♀
Crowding	70.0	20.0	55.7	64.9	39.4	52.7
Overjet ¹	13.5	26.6	17.3	12.9	29.5	20.9
Overbite ¹	5.4	13.3	7.6	22.0	22.5	17.6
Crossbite ¹	29.7	13.3	25.0	28.5	18.3	23.6
Edge-Edge ¹	18.9	20.0	19.2	14.3	11.3	12.8
Mandibular shift ¹	5.4	0.0	3.8	3.9	1.4	2.7
Diastema	2.7	0.0	1.9	1.3	11.8	7.4
Supernumerary teeth	2.7	0.0	1.9	1.3	2.8	2.0
Periodontal disease	81.0	80.0	80.7	78.9	88.7	83.7
Caries ²	24.3	26.6	25.0	15.6	11.3	13.5

¹Conditions accounting for the 77.6% malocclusion in Yanomama.

²Frequencies are for individuals with one or more caries.

RESULTS

Malocclusion shows no significant sexual dimorphism in either the Surucucu ($\chi^2=1.77$, $p>0.05$), or the Tototobi and Catrimani ($\chi^2=2.60$, $p>0.05$). The two groups (mountain, valley) also have no significant difference in their frequencies of malocclusion ($\chi^2=0.164$, $p>0.05$). Frequencies of traits denoting malocclusion (overjet, overbite, crossbite, edge-to-edge bite, and mandibular shift) are shown in Table 1.

The incidence of caries for all of the 148 Yanomama Indians is 13.5%, which is considerably lower than had been expected (Table 1). The lowest frequency of caries in the two nutritional groups was 4.2% in the Surucucu (higher carbohydrate diet). The Catrimani and Tototobi had 25.0% and 10.4% caries, respectively. The frequency of periodontal disease is relatively uniform in the Yanomama. The Surucucu have the lowest frequency of all (77.0%). The Catrimani have 80.7%, and the Tototobi have 93.6% respectively (Table 1). The degree of attrition in the Yanomama shows an almost direct relation to age.

DISCUSSION AND CONCLUSIONS

Neither malocclusion nor severe occlusal attrition seems to seriously impair the masticatory efficiency in the Yanomama Indians. Physiological occlusal abrasion over time eliminates the tooth cusps without impairing the masticatory efficiency in any obvious way. Attrition increases with age, considerably reducing the total crown height. Physiological occlusal abrasion and vigorous mastication are seemingly beneficial to periodontal health. In addition, the amount and degree of malocclusion are not sexually dimorphic.

YANOMAMA ORAL CONDITION

Admixture cannot be the primary factor in the high frequency of malocclusion, since the Yanomama have been geographically isolated for at least 500 years. Thus, neither reduced chewing nor admixture explain the high frequency of malocclusion. Since tooth crowding seems to account for so much of the malocclusion, future studies are needed. These studies should concentrate on understanding the processes that determine positioning, tooth and jaw size, and the adaptive value of ideal occlusion, if any.

LITERATURE CITED

- Bailit NN, and Friedlander JS (1966) Tooth size reduction: a hominid trend. *Am. Anthropol.* 68:665-672.
- Benjamin FB (1962) Personal communication.
- Brace CL (1964) The fate of the "Classic" Neanderthals: a consideration of hominid catastrophism. *Curr. Anthropol.* 5:3-43.
- Brace CL, and Ashley Montague MF (1965) *Man's Evolution: an Introduction to Physical Anthropology.* New York: Macmillan Co.
- Dahlberg AA (1963) Analysis of American Indian dentition. In DR Brothwell (ed.): *Dental Anthropology.* New York: Pergamon Press, pp. 149-177.
- Hrdlička A (1935) Normal variation of the teeth and jaws and orthodonty. *Int J Orthodont* 21:1009.
- Mahler PE (1971) Further evidence for the reduction of post-Pleistocene hominid dentition. *Am J Phys Anthropol* 35(2):268.
- Mills JRE (1963) Occlusion and malocclusion of the teeth of primates. In DR Brothwell (ed.): *Dental Anthropology.* New York: Pergamon Press, pp. 29-51.
- Oppenheimer AM (1967) Tooth size reduction: a hominid trend. *Am Anthropol* 69(5):514-515.
- Pedersen PO (1955) The degree of attrition of the deciduous teeth and first permanent molars of primitive and urbanized Greenland natives. *Brit Dent J* 99:35-43.
- Pereira CB (1972) Periodontal Disease, Occlusion, Attrition and Other Dental Characteristics in Primitive Brazilian Men. *Campus Avancado Boa Vista/Roraima. Universidade Federal de Santa Maria.*
- Ramfjord SP (1967) The periodontal disease index. *J Periodont* 38:602-610.
- Ruberto D (1958) The evaluation of community dental health. A system for recording statistical analysis. *Dental Statistics and Dental Research Section, Division of Medical Statistics. Department of Health for Ontario, Canada.*
- Steward JH, and Faron LC (1959) *Native Peoples of South America.* New York: McGraw-Hill

BOOK REVIEWS

FORENSIC ANALYSIS OF THE SKULL. Edited by Mehmet Yaşar İşcan and Richard P. Helmer. New York: Wiley-Liss. 1993. ISBN 0-471-56078-2. 258 pp. \$64.95.

The primary concern of this book is individual identification based on reconstruction of faces (in three or two dimensions) onto skulls and comparisons (superimposition) of skulls with facial photographs taken during life. Of the editors, İşcan is currently Professor and Chairman of the Department of Anthropology at Florida Atlantic University in Boca Raton, while Helmer is Professor in the Department of Experimental Forensic Medicine at the Institut für Rechtsmedizin in Bonn, Germany. Both editors have considerable experience in the field of forensic anthropology. The contents of the book come primarily from a workshop, "Advances in Skull Identification via Video Superimposition," held on August 3-5, 1988, in Kiel, Germany.

A broad range of subjects is covered, beginning with a historical overview that includes early efforts to identify the skulls, based on portraits or death masks, of Johann Sebastian Bach, Josef Haydn, and Immanuel Kant. Also included are contributions relating to basic analysis of the skull and to implementation of the latest technology in the field. Anyone interested in forensic identification will find much of interest and perhaps some techniques that they can employ in their own work.

Dental anthropologists, however, will be disappointed by the small role played by the dentition in this book. Dental development and tooth wear are important age determinants, as noted in Novotný's chapter on "Morphologic and Osteometric Assessment of Age, Sex, and Race From the Skull," and the incisors, we are told by Fedosyutkin and Nainys in "The Relationship of Skull Morphology to Facial Features", represent a useful landmark for reconstructing the philtrum. In general, however, the teeth are just there, clearly visible on photographs of skulls, but largely ignored, and nearly always hidden behind lips in facial reconstructions.

This book serves as a reminder that although forensic anthropologists and forensic dentists may both work on the same part of the skull with personal identification as a common goal and sometimes even meet in joint session at forensic meetings, they rarely actually work together. Forensic dentistry has long been a major contributor to personal identification through comparison of dental radiographs taken during life with those taken after death, unique dental pathology, visual identification of teeth exposed in photographs based on correspondence of shape, wear, spacing, etc., and bite-mark impressions left at the scene of a crime. Beyond use of the dentition to determine age at death, however, the role of dental anthropology in personal identification is less obvious. Although numerous dental traits have been used to measure biological distance