

A Visit to the Laboratory of Osteology and Paleoanthropology, Institute of Anthropology, University of Florence

A.M. HAEUSSLER

Following the 9th International Congress on Dental Morphology last September, I spent a morning visiting with Jacopo Moggi-Cecchi, organizing secretary of the meetings. The place was the Institute of Anthropology of the University of Florence.

Along with being the homeland of the Renaissance, Florence is the birthplace of Italian anthropology. There, in 1869, Paolo Mantegazza founded the National Museum of Anthropology and Ethnography. Two years later, Mantegazza formed the Società Italiana di Antropologia e l'Etnologia and began publication of the journal *Archivio per l'Antropologia e l'Etnologia*. Forty years later in 1901, the Anthropometrical Laboratory, named after Mantegazza, became the center of research and scientific expeditions led by Florentine anthropologists.

Today, the Laboratory of Osteology and Paleoanthropology of the Institute of Anthropology, directed by B. Chiarelli, continues the work with projects dealing with cyto-genetics, human biology, human osteology, and paleoanthropology. According to Moggi-Cecchi, dental anthropology cuts across all of the current research.

The institute is presently engaged in three major studies: The Population Biology of the Ancient Etruscans, Analysis of Indicators of Skeletal and Dental Stress in Human Populations of the Past, and Analysis of Cranial and Cerebral Asymmetries for the Study of the Origin of Speech (through computerized tomography). Dental Anthropology is especially important for the Etruscan study. Specific studies focus on dental morphometric characterization of the Etruscans, dental wear as a source of information on diet, and cultural practices involving teeth. Moreover, Etruscans usually burned the bodies of the dead, and teeth are often the only biological materials found in non-cremated remains.

Studies of dental and skeletal stress indicators also deal with past populations. Research involves ontogenetic development, trauma, disease, and conditions of nutritional history, habitat, life style, and environmental factors. Studies involving the dentition are aimed at evaluating episodic stress through investigation of enamel hypoplasia and Harris lines, and estimation of specific stresses through analysis of dental pathology, trauma, infection, and arthropathy. Institute researchers hope that the results of these studies will assist in reconstructions of paleobiology, life way, disease resistance and susceptibility, and adaptation to specific environmental conditions. The institute also plans to use information from the stress studies in the Etruscan research. Specific goals are to infer Etruscan state of health, especially the age of onset of dental enamel defects, and to determine age of weaning and possible association with social status.

The main collection available for study consists of about 50 Etruscan skulls. The institute also curates skeletal materials for 40 to 60 Neolithic to Bronze age and 2,000 recent Italians, 40 recent southern Africans and 22 Fuegians. Individuals interested in learning more about the collections and the ongoing work of the institute can contact B. Chiarelli or Jacopo Moggi-Cecchi at Istituto di Antropologia, Università di Firenze, via del Proconsolo 12, I-50122 Florence (Italy), Telephone and FAX 39-55-2398065.

Book Reviews

Structure, Function and Evolution of Teeth. Edited by Patricia Smith and Eitan Tchernov. London and Tel Aviv: Freund Publishing House Ltd. 1992. xvii + 570 pp. ISBN 965-222-270-4. \$100.00, \$70.00 to DAA members see insert (paper).

The 8th International Symposium on Dental Morphology convened in Jerusalem in May, 1989, and "explored the developmental, evolutionary, and functional aspects of dentition from fish to humans" (Introduction, xi). This volume is a compendium of symposium papers, which were especially rewritten for the book. Of the 33 papers, 18 deal directly with human or early hominid dentitions. Of the 56 participants, 11 are presently members of anthropology or anatomy and anthropology departments (Alexandersen, Ben-David, Bromage, Dahlberg, Hershkovitz, Kaczmarek, Marcsik, Rami Reddy, Ring, Scott, and Tóth) and 23 others are well known in the dental anthropological literature (Alvesalo, Beynon, Bromage, T. Brown, Butler, Dean, Hylander, Jäger, Kosa, Kocsis, Mayhall, Radlanski, Ravosa, C. Reid, D. Reid, Richards, T. Sakai, P. Smith, Townsend, Varrela, van Reenen, Yamada, and Zilberman).

The papers probably reflect fairly accurately the diversity in current dental anthropological research: some are imaginative and well-conceived and others show lack of concern for basic methodological problems. Some papers state their basic assumptions explicitly; others, not at all.

The reviewer was especially impressed by the techniques employed by van Reenen et al., Reid et al. (fixed arm planimeter), and Mayhall and Alvesalo (moiré imaging) to determine the areas of individual cusps, cusps summed, and cusp volumes. The techniques are relatively cumbersome when compared with simple width and

length measurement products for estimating crown areas, but have the potential to provide much useful information for population and phyletic studies.

Van Reenen et al. compared maxillary molar crown areas of hybrid San (Kwengo) with robust australopithecines from East and South Africa, gracile forms from South Africa, and *Homo habilis* from East Africa. This interesting analytical approach showed that for the maxillary first molar, all fossil forms have the same rank order of relative cusp areas (protocone, paracone, metacone, hypocone), but the modern forms have the reverse rank order of paracone and hypocone. In another study, the same authors (Reid, et al.) found that Carabelli's trait "is associated with an increase in size of all four cusps and not only the protocone" (p. 462). The fixed arm planimeter data obtained by these workers can show percentage relationships of cuspal and total occlusal areas and is far superior to estimates based on simple length and width measurements. Although there are few surprises resulting from the analysis, the power is clear.

Mayhall and Alvesalo studied sexual dimorphism in the size of maxillary first molars of Finns of Hailuoto, using measurements of cusp height, basal area, and volume made using the moiré technique. Results show that "there is little sexual dimorphism in the area and volume of the hypocone but there is in the volume and area of the trigon cusps" (p.434). The authors do not discuss measurement error nor possible antimere differences.

In another study of sexual dimorphism, Yamada and Sakai examined Cook Islander dentition. They concluded that sexual dimorphism of tooth size is somewhat greater in samples from the Southern Group of islands than those from the Northern Group, but similar to that found in other population groups. The authors do not discuss repeatability (although they do provide standard deviations).

Townsend et al.'s twin study of Carabelli's trait and permanent tooth crown size is a progress report. The authors report that "there was a general trend for concordance in trait expression to be the greatest between MZ twin pairs, followed by DZ pairs, followed by singletons" (p. 506). With only three grades of expression scored, antimere asymmetry was nevertheless about 25 percent. Heritability estimates for tooth size varied from about 60% to 90%. The authors conclude that "an exciting new era in dental genetics" looms as refinements in data acquisition techniques and analytic methods develop.

Varrela's paper presents data on root morphology of Finnish 45,X females, their first degree female relatives, and normal females. The author interprets the results (two-rooted mandibular premolars are found about 30% more frequently in 45,X females than in the relative or control samples) to indicate that "the development of two-rooted mandibular premolars might thus be caused by the absence of an X chromosome (or Y chromosome) gene(s) necessary to the development of a single-rooted form" (p. 525).

In a well-conceived paper, Scott and Alexandersen discuss dental morphological variation in Medieval Greenlandic, Icelandic, and Norwegian skeletons. Iceland and Greenland were colonized by Norse during the warm Medieval Climatic Optimum. However, the Greenland colony, which was established just before A.D. 1,000, succumbed to the increasing stress brought on by the Little Ice Age. The authors studied five samples: Early Eastern Settlement (Greenland), Middle to Late Eastern Settlement (Greenland), Western Settlement (Greenland), Icelanders, and Trondheim Norse. The authors carefully state the assumptions which underlie their genetic interpretations. They conclude that the Greenland colony was sufficiently large (3,000-6,000) to preclude founder effect and genetic drift, and found little evidence for Norse-Inuit (Eskimo) admixture. The authors also discuss the concept of a "European dental pattern" and suggest that there may be "both east-west and north-south clines in crown and root morphology reflecting, respectively, Asian genetic influence in eastern Europe and greater tooth size reduction and morphological simplification in southern Europe and the Near East" (p. 486).

Two additional papers deal with dental morphology. Tóth gives data on shovel-shaped incisors in over 2,000 Hungarian males who represent nine ethno-geographic groups. Tóth concludes that the Mongoloid component in Hungarian males is small. Kaczmarek provides morphological data on Polish youths and compares them with Slavs and Balts from Eastern Europe. Results show that Poles cluster with Russians, Latvians, and Lithuanians; Ukrainians with Estonians; and Byelorussians stand apart. Nearly 25% of the references used in the paper are not given in the bibliography.

Marcsik et al. observed changes in dental transparency with advancing age in eighth through tenth century Hungarians. The authors suggest that dentine transparency may be useful in age determination if bones are fragmentary or insufficient.

Reddy discusses evolutionary trends in hominid tooth size and identifies the earliest dental reduction in the molars rather than the canines. Reddy hypothesizes that "maximum tooth reduction (reduction in crown areas, not volumes) occurred in those populations whose agricultural practices were the most intensive and complex" (p. 541). However, no data are presented on degree of agricultural intensiveness, complexity, or change for the samples for which data are given. Reddy also suggests that manufacture of different types and sizes of pots contributed to a "high degree of dental reduction in Neolithic and later populations" (p. 546), and concludes that the differences between samples of different "cultural levels" are not statistically significant.

Zilberman and Smith make four measurements of tooth components (enamel height, dentine height, pulp height, and pulp width) from sagittal radiographs of first and second permanent molars of modern and prehistoric hominid teeth. Data are not given for non-australopithecine maxillary molars. Nevertheless, australopithecine mandibular and maxillary homologous teeth measurements are lumped together, since no significant differences were found (p. 353). There should be data (Table 1) on 20 *A. robustus* first and 17 second molars, and 17 *A. africanus* first and 13 second molars. Table 2 shows enamel height for 26 *A. robustus* molars and 29 *A. africanus* molars. The authors apparently lump together not only maxillary and mandibular homologous teeth, but also non-homologous teeth, apparently rejecting enamel height measurements on 11 *A. robustus* and one *A. africanus* specimen(s). On the other hand, they present data for 25 Neanderthal teeth in Table 2, whereas only 21 are available according to Table 1. The arithmetic problem continues as the authors write, "In general, molar enamel height decreased from the Australopithecinae to *Homo sapiens sapiens*" (p. 355). According to Table 2 the enamel heights are, 1.92, 2.55, 1.38, 1.56, and 1.82 for *A. africanus*, *A. robustus*, Ante-Neanderthals, Neanderthals, and *H. s. sapiens*, respectively.

Hershkovitz et al. discuss ontogenetic changes in the dental arches of South Sinai Bedouin boys, which they observed through 46 measurements made on plaster casts to an accuracy of 0.02 mm. The authors do not discuss the repeatability of these measurements. However, in a related paper on the same sample (Ben-David, et al., p. 365: Table 1), a footnote reads that fluctuating asymmetry values are not included "because of low measurement accuracy". This paper does not give measurement data. Instead, it gives graphically what appear to be different cross-sectional measurement means at one-year age intervals. Even though data are not given by tribe, the authors conclude that arch dimensions differences between the Gebeliya tribe and the other Bedouin tribes are probably due to endogamy and its Egyptian and European elements (p. 408).

The companion paper on the same sample by Ben-David et al. deals with dental asymmetry, crown size variability, and age and sequence of tooth eruption. Although the summary states that the paper is preliminary and hence presents "basically raw data" (p. 386), metric data for the various tribes and age groups are combined. The Bedouin crown diameters are compared with those of both inbred and panmictic groups and no significant differences are found (p. 368). Eruption data are also combined for the tribes. Percent of eruption of maxillary and mandibular teeth is given by age group. Mandibular permanent right second molars have erupted in 2.6% of boys aged 8 years and in 47.8% of boys aged 11. On the other hand, 11.5% of 9 year-old boys still did not have their maxillary central incisors. The number of boys at each age interval in each tribe would be interesting to know, but neither paper gives that data for the Bedouin boys.

Beynon contributes to the dialogue concerning circadian (daily) and circaseptan (weekly) rhythms of enamel deposition. The study is aimed at quantifying relationships between surface perikymata and surface striae in anterior teeth of modern humans, estimating the timing of the weekly cycle, and looking for existence and length of circaseptan cycles in Plio-Pliocene hominids (*P. boisei*, *P. robustus*, and *A. africanus*). The outcome of Beynon's study is that modern humans have a circaseptan rhythm of seven to nine days, which is slower than that of early hominids, suggesting that "early hominids had a comparatively short overall period of development, and did not have an extended childhood growth period" (p. 308). Even though broken fossil teeth are used in this research, the authors of this and the following study face a not uncommon dilemma: a theoretically useful technique (in this case, sectioning of teeth) may be destructive to skeletal materials, while achieving the aim of the research.

Dean et al. have a companion paper in which they use a dual method approach (two microscopical procedures: scanning electron microscopy and transmitted light microscopy) to study root extension and crown formation rate of a young skeleton from Christ Church, Spitalfields, London. Although data on the one individual "say little" about dental development in the nearly 1,000 individuals recovered at Spitalfields, or elsewhere, the well documented observations and logically presented discussion are an interesting contribution to the subject of dental microanatomy.

A note by A.A. Dahlberg on enamel pathways in growth and two papers on primate orbital regions, one by W.L. Hylander and M.J. Ravosa and the other by T.G. Bromage, complete the papers on dental anthropological topics.

The symposium volume is dedicated to the memory of Shirley Glasstone Hughes, who passed away in 1990, and a tribute to her is offered by Percy M. Butler. The editors, Patricia Smith and Eitan Tchernov, are to be congratulated on producing a volume that will attract the attention of the dental anthropological community.

Donald H. Morris
 Department of Anthropology, Arizona State University
 Tempe, Arizona