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Periodontitis in Dry Skulls

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It has been widely thought that periodontitis is an ancient disease, affecting most members of all cultural groups (Schluger et al., 1977). This concept of periodontitis was supported by many early anthropological and epidemiological studies, but since the mid-eighties it has become evident that at the present time periodontitis is neither an all-embracing disease nor an important cause of tooth loss (Bouma et al., 1987; Bailit et al., 1987; Pilot et al., 1992). This paper considers some factors that have led to the controversy between those who believe that periodontitis is ubiquitous and damaging and those who think that it represents an unusual and minor problem.

PERIODONTAL DISEASE (PERIODONTITIS): DEFINITION

An early definition of periodontitis to adequately describe what might be measured in the dry skull and recorded as periodontitis was "...the surface of the alveolar crest appears porous at the interproximal septa and crenated along the facial and lingual limbi alveolares" (Ruffer, 1920). This definition requires modification as crenations (notching) of the margins appear to be a normal but not a universal feature of crestal bone. Notching appears to be relatively common in older subjects and may have some association with the physiological process of continuous tooth eruption.

The critically important feature of periodontitis is the exposure of cancellous bone, following the loss of the covering cortical plate of the alveolus, to give a porous appearance. Alveolar tissue damaged by periodontitis should also demonstrate the loss of the crestal knife-edged contour to result in a rounded alveolar margin. Alexandersen (1967) reviewed the criteria for the appropriate assessment of periodontitis in dry skulls and reinforced the opinions and observations of Ruffer. However, very few assessments of periodontitis in dry skulls since that time have adopted an objective assessment for the loss of alveolar bone. As a result, physiological and dental causes of alveolar bone loss have been confused with periodontitis.

PHYSIOLOGICAL CAUSES OF PERIODONTAL ATTACHMENT LOSS

In anthropological studies, periodontitis has usually been assessed by the examination of the relationship between the cemento-enamel junction (CEJ) of the tooth with the alveolar crest (AC) of the bone. It has been assumed that these anatomical markers represent fixed points in health throughout life. Increase in the distance between the two positions was deemed to represent loss of bone. However, some early workers were aware that the increasing CEJ-AC distance did not in itself represent disease. Leigh (1925) recorded alveoclasia only when the roots were exposed appreciably more than could be explained by a slow gradual recession of the alveolar crest with age and physiological eruption of the teeth. It is now clear that there is no evidence for recession of the alveolar bone with increasing age but there is a physiological continuous eruption of teeth.

MEASUREMENT OF PERIODONTITIS

Two indices have been proposed and used to measure periodontitis, based solely upon CEJ-AC distances: the Tooth-Cervical Height Index (TCH) (Davies et al., 1969) and the Root Index (Goldberg et al., 1976). The major confounding factor associated with these indices is the physiological process of continuous tooth eruption. Teeth move progressively in a mesial and occlusal direction throughout life in compensation for real or anticipated occlusal attrition (Murphy, 1959). These physiological movements affect all teeth in all people but are probably governed by the usual variables associated with lifestyle, culture, and genes. If this physiological variable becomes incorporated into an index of disease, it is inevitable that the incidence of disease will be found to be very high (ubiquitous). It is now reasonable to conclude that data for periodontitis based upon CEJ-AC measurements have inevitably measured both the physiological effects of continuous tooth eruption (approximately 0.1 mm per year) as well as any loss of crestal bone if present.

Many authors noted that there was severe attrition in many cultural groups and noted that there was a correlation between the severity of tooth wear and increased CEJ-AC distances. To determine whether tooth or bone movement was responsible for increasing CEJ-AC distance required a fixed reference point not associated with either marker.

The key breakthrough was made by Newman and Levers, (1979) who proposed that the inferior dental canal (IDC) of the mandible was a useful reference point from which the relative positions of the AC and the CEJ could be assessed. They found that the distance between the IDC and the alveolar crest was maintained or even slightly increased with advancing age indicating that there is no atrophy of crestal alveolar bone. The IDC-CEJ distance increased throughout life, indicating that relative to the IDC it was the tooth, not the bone that was unstable. Behrents (1985) found that teeth remain upright throughout life and several workers have observed that face height was maintained in the presence of severe wear by progressive continuous tooth eruption (Baarregaard, 1949; Murphy, 1959; Taylor, 1963; Barker, 1975). Many other workers have confirmed the physiological status of continuous tooth eruption (Clarke and Hirsch, 1991).

PATHOLOGICAL CAUSES OF ALVEOLAR BONE LOSS

Generalized periodontitis

An assessment of alveolar bone using an approach consistent with the concepts of Ruffer and Leigh in a diverse collection of skeletal materials, led to the conclusion that generalized horizontal periodontitis was unusual in dry skulls (Clarke et al., 1986). Furthermore, these findings confirm the evidence presented by a diverse group of researchers (Leigh, 1925; Pedersen, 1946; Phillipas, 1952; Greene et al., 1966; Newman and Levers, 1979; Costa, 1982; Whittaker et al., 1985; Clarke et al., 1986). This view of periodontitis is not universally accepted; recently it has been stated "...periodontal disease has remained a major oral health problem and has replaced caries as the leading cause of adult tooth loss" (Hildebolt and Molnar, 1991).

Although generalized horizontal periodontitis has been accepted as an ancient disease affecting most members of all cultural groups, there appears to be inadequate evidence to support such a conclusion. The opinions supporting a high incidence of generalized horizontal periodontitis in dry skulls are not founded upon a rational analysis of crestal bone.

Localized periodontitis

The localized form of periodontal disease has been variously referred to as alveoclasia, suppurative, retrograde and complex periodontitis. Extensive study of many skulls from diverse cultures reveals that localized periodontitis strongly correlates with perforation of the dental pulp by caries or severe attrition. It may be reasonably inferred that caries and severe occlusal wear resulting in perforation admit oral bacteria to the tooth pulp. Host defenses attempt to maintain the integrity of the tissue but the inflammatory consequences of the resulting conflict between parasite and host has the potential to impact upon the external supporting structures of the tooth. There is no reasonable doubt that the dental pulp does induce lesions in both the coronal and all other areas of the periodontium, but the critical question is whether inflammation of the gingiva has the capacity to induce similar lesions. It is most unusual for two different pathoses to have an identical physical effect.

Early caries results in a relatively low level of bacterial penetration into the tissues, providing for a long conflict between the host and parasite in the coronal aspect of the tissue. These conditions may be apt to induce changes in the adjacent periodontal tissues at or adjacent to the crest. These defects can result in total loss of bone on the buccal and lingual aspects of the teeth and infra bony pockets within the proximal (mesial and distal) surfaces. The third region affected is within the root forks of multi-rooted teeth which may induce furcation defects. These alveolar changes have typically been described as periodontal but they are the first phase of dental disease affecting the periodontium.

Localized damage to the periodontium is not limited to teeth with caries or perforated crowns (Pedersen, 1938; Koritzer, 1968; Clarke, 1990). An intact external surface of a crown does not mean that the internal tissues are of necessity healthy. It is not possible to clinically demonstrate the subtle pathways available for bacteria to gain entry to the pulp in a sound crown, but pathways exist where there is insufficient cementum, or micro-cracks. Teeth with sound crowns are seen where a classical apical dental abscess has developed, demonstrating the potential of an apparently sound tooth to develop dental disease (phase 2 changes of dentally induced changes in the periodontium). There is no doubt that alveolar bone changes can be associated with pulpal disease in an intact tooth crown.

The compelling implications are that localized periodontitis is a disease of the periodontium of dental origin. In addition, there is no evidence that the presence of bacteria in the gingival crevice can induce localized periodontitis. The bacterial flora is not limited to diseased sites, and the bacteria suggested to have the potential to induce alveolar disease have not been able to do so when inoculated (Christersson et al., 1985). Bacteria are fastidious and colonize sites that provide the conditions for their support; they do not have the capacity to create sites that they require.

There is no anthropological evidence that localized periodontal damage occurs from the coronal gingival tissue; the morphological evidence points to a dental cause. The third phase of abscess development occurs when defects arising more deeply within the periodontium track along cancellous pathways of proximal tissue to merge with defects induced earlier in the process or independently forge their way to the alveolar crest (Clarke, 1992). In this way both early and late consequences of dental abscess formation impact upon the alveolar crest.

EVALUATION OF ALVEOLAR BONE CHANGES

When attempting to estimate the presence or absence of generalized periodontitis in dry skulls it would seem imperative that:

1. An attempt be made to establish whether there are physical changes in the crestal bone that are consistent with the erosion of the surface to leave a cancellous (porous) structure and modified contour.

2. A computation should be made for continuous tooth eruption based upon an eruptive rate of approximately 0.1 mm per year. Tooth eruption as a consequence of both increasing age and compensation for attrition should be expected. Increasing CEJ-AC distances do not alone constitute a disease. Continuous tooth eruption is more readily detected in the dry skull than in clinical observation but the process has been confirmed in the living (Ainamo and Talari, 1976).

3. It is now 70 years since Hirschfeld (1923) recognized the potential of the dry skull to provide evidence for the pathogenesis of periodontal disease. However, since that time, concepts have become entrenched in anthropological and clinical practice that cannot be substantiated from studies of the dry skull. Perhaps it is an opportune time to again focus attention on dry skulls to realize the potential that they hold in unravelling the web of conflicting opinions relating to the incidence and origins of alveolar bone loss.

CONCLUSIONS

Generalized periodontitis is of minimal presence and minimal consequence in anthropological materials; it is not responsible for tooth loss but requires differentiation from physiological attachment loss. Tooth morbidity and mortality occur as a result of localized bone loss of dental origin.

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Odontological Data for the Chernyakov Culture Population

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The Chernyakov culture is one of the most striking cultural history formations of the first half of the first millennium AD in southeastern Europe. During the period when it flourished (third to fourth centuries AD), the Chernyakov Culture was spread over a large part of Ukraine, Moldavia, some adjacent regions of Poland, Romania, and Russia.

Three local groups have been defined on the basis of characteristics of burial patterns, ceramics, and dwelling construction in the middle of sites of the Chernyakov Culture. These three groups are connected with definite regions: the northwestern Black Sea Region; the district between the Dniester, Pruth, and Danube Rivers; and the forest steppe zone of the Ukraine (Baran, 1981). In the opinion of the majority of contemporary investigators, Iran language-speaking Scythians and Sarmatians, Thracians (Getae), eastern Slavic Antes tribes, and Goths (an eastern German tribe, which moved from southeastern Scandinavia to southeastern Poland and Volyn' at the end of the second to third centuries AD) participated in the formation of the Chernyakov Culture (Baran, et al., 1990).

MATERIALS AND METHODS

The materials discussed in this paper are derived from cranial collections from nine Ukrainian Chernyakov cemeteries: Zhurovka, Chernyakov, Pereyaslav-Khmel'nitski' (Middle Podneprov'e), Boromlya, Uspenka, Sad (Levoberezh'e), Gavrilovka (Lower Podneprov'e), Kholmskoe, and Koblevo (northwest Black Sea region). The collections which I studied (160 skulls total) are curated in the Sector of Paleoanthropology of the Institute of Archaeology of the Ukrainian Academy of Sciences in Kiev and in the Scientific Research Institute and Museum of Anthropology of Moscow State University in Moscow. For comparison, I used Gravere's (1987) data for a pooled series from Budesht and Malaesht Cemeteries in Moldavia. The location of these cemeteries is shown in Figure 1.

My research program included the following morphological dental features: diastema between the upper central incisors; crowding of the lateral incisors; form of the lingual surface of the upper incisors[1]; reduction of the lateral incisors; form of the upper molars[2]; Carabelli's cusp on the first upper molars; form of the lower molars[3]; distal trigonid crest, deflecting wrinkle of the metaconid, and inner middle extra cusp[4] on the first lower molars; and enamel extensions on the upper and lower molars. I also studied the odontoglyphic traits of position of the second furrow of the metaconid on the first lower molar and type of structure of the first furrow of the paracone on the first upper molar[5]. Classification of the morphological dental features was done using the system set up by A.A. Zubov (1968, 1973)[6].

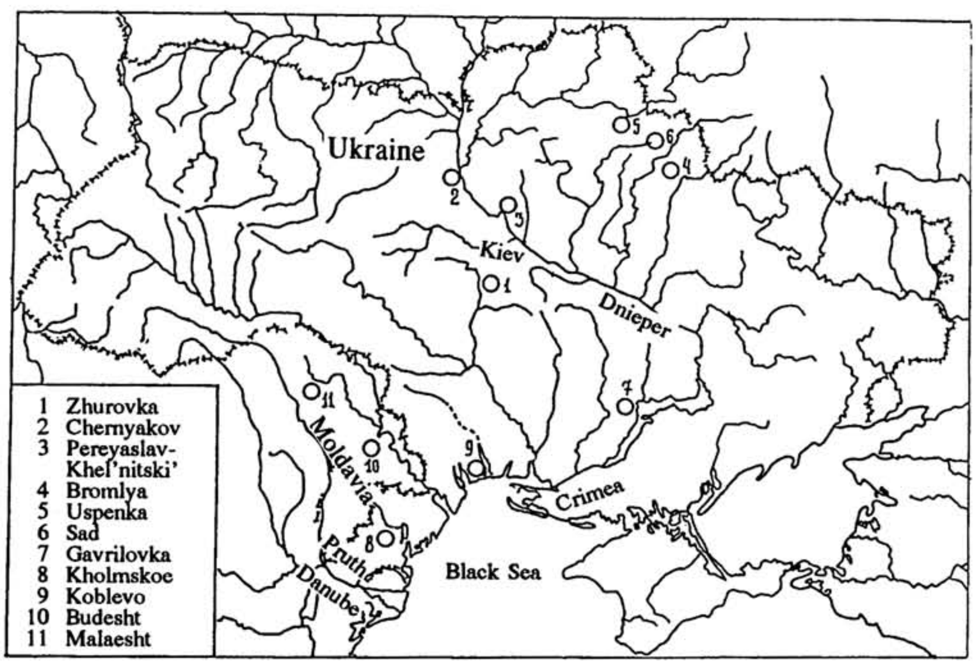

Fig. 1. Map of Ukraine and Moldavia with locations of cemeteries discussed in the text.

RESULTS AND DISCUSSION

Analysis of the main odontological traits in these series indicated that their frequencies fit within the range characteristic for the European race. In addition, definite geographical regularities occur in the distribution of frequencies, thereby supporting the definition of three regional complexes in the area of the Chernyakov Culture. These complexes are Podneprov'e, Levoberezh'e, and Danube-Dniester.

The first complex, the Podneprov'e, occurs in the Zhurovka, Chernyakov, and Pereyaslav-Khmel'nits series. On a European scale, this complex is characterized by an average amount of reduction of the lower first molar, moderate percentages of traits which originate in the East (shovel-shaped upper central incisors, distal trigonid crest, deflecting wrinkle, etc.), moderate frequencies of Carabelli's cusp, and a moderately low frequency of variant 2(II)med[7]. A similar combination of features has been described as the Central European odontological type[8] (Zubov, 1979). According to my data, one of the modifications of the Central European type is characteristic for tribes of the Scythian Era (1,000 BC) of Middle Podneprov'e. This provides reason to think that the odontological type of the Podneprov'e Complex was formed on a local Scythian base.

The second complex, the Levoberezh'e, occurs in the Boromlya, Uspenka, and Sad series, which are close to one another. The Levoberezh'e Complex is characterized by a moderately high frequency of reduction of the lower first molar, very high percentage of Carabelli's cusp, fairly high frequency of some eastern traits[9], and a very low percentage of variant 2(II)med. This combination of traits is characteristic for the western branch of the southern gracile type[10], which existed in the Ukraine during the Eneolithic in the course of the Eneolithic-Bronze Age. According to my data, during first millennium BC to the beginning of the first millennium AD, features of the Levoberezh'e Complex were widespread among some Scythian and especially Sarmatian tribes of the Ukraine (Segeda, 1991; Segeda and Litvinova, 1991). Thus, results of this study indicate that the odontological type of the Chernyakov people of Levoberezh'e was formed through the interaction of two components: Scythian and Sarmatian.

The third odontological complex, the Danube-Dniester, is found in the Kholmskoe, Budesht-Malaesht, and the Koblevo series, which is near them. Characteristic traits are a high percentage of reduction of the upper molars, absence of eastern features, and a high percent of Carabelli's cusp and variant 2(II) med. Presently, there are no data in the literature, in which we can find a similar combination of features. Possibly, a Getae (Thracian) component is situated at its base.

The Gavrilovka series, however, is characterized by a very distinctive combination of traits, which does not possibly belong to any of the defined complexes.

In the physical anthropological literature of the last decade, the question of the role of the Goths in the formation of the Chernyakov Culture has come up repeatedly (Konduktorova, 1972; Alekseeva, 1973). However, the lack of a source study basis has hindered the solution of this problem. With the help of a Polish colleague, a worker in the Department of Polish Archaeology of M. Kyuri-Skladov Lublin University, I had the opportunity to become familiar with a craniological collection from Maslomench Group burials (70 skulls). According to Kokowski (1987), Goths probably took part in formation of the Maslomench Group and local tribes assimilated them.

Analysis of the odontological features of the pooled series of skulls from Maslomench cemeteries showed that the frequencies were characteristic of the northern gracile type[11], which occurs in the population of Scandinavia, the southeastern Baltic region, and some other regions (Zubov, 1979; Gravere, 1987). In the combination of major features, the Maslomench group is quite distinguished from members of all three regional complexes of Chernyakov peoples mentioned above. This indicates that a Goth (eastern German) morphological component did not play a substantial role in the formation of the physical make-up of the Chernyakov Culture population. Moreover, individual traits of the northern gracile type show up in skulls from the cemetery near the village of Gavrilovka, which agrees with the results of craniological investigations (Konduktorova, 1972).

The question about the participation of Slavic tribes in the formation of the Chernyakov culture is quite interesting. The comparative analysis shows considerable similarity between the Chernyakov and Ancient Russian population of Middle Podneprov'e, and presents evidence in favor of their genetic relationship. This means that Slavs either assimilated part of the Chernyakov peoples and acquired their traits, or were part of the conglomerate of tribes who formed the Chernyakov Culture. The last seems more likely, since the Central

European odontological type, characteristic for the Chernyakov and Ancient Russian population of Podneprov'e, the historical heart of the Ukraine, was broadly dispersed among the ancient and contemporary Eastern Slavic groups (Zubov, 1979; Gravere, 1987).

As a whole, the odontological data substantially broaden the conception of the physical anthropological composition and genetic sources of the population of the Chernyakov Culture.

TRANSLATOR'S NOTES

A.M. HAEUSSLER

[1]Form of the lingual surface of the upper incisors is shoveling.

[2]Form of the upper molars refers to relative size of the hypocone.

[3]Form of the lower molars means cusp number and groove pattern.

[4]Inner middle extra cusp is cusp 7 or tuberculum intermedium.

[5]Zubov (1977) contains a discussion of odontoglyphics in English.

[6]For definitions of Zubov's trait rankings and their correspondences with the ASU and Dahlberg system in English see Table 1 in Haeussler and Turner (1992)

[7]2(II)med is notation for an odontoglyphic trait on the metaconid (med) of lower molars. 2(II) indicates that furrow 2 (a second order furrow that occurs closer to the fovea centrale than furrow 1) goes into furrow II (a first order furrow that separates the protoconid from the metaconid).

[8]Central European odontological type has a low frequency of upper central incisor shoveling, weak lateral incisor reduction, low percentages of lower molar six cusps, deflecting wrinkle, and distal trigonid crest, and high 2(II)med (Zubov, 1979).

[9]Eastern traits are high frequencies of upper central incisor shoveling, and lower molar six cusps, deflecting wrinkle, and distal trigonid crest (Zubov, 1979).

[10]Southern gracile type has gracile upper incisors, low percent of Carabelli's trait, some increase of cusp 7, and low percent 2(II)med (Zubov, 1979).

[11]Northern gracile type has a slight amount of upper lateral incisor reduction, high percent of Carabelli's trait, and "increased gracility", moderately high deflecting wrinkle, low distal trigonid crest, and high 2(II)med on the lower molars (Zubov, 1979)

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Nutritional Supplements and Recovery from Tooth Extractions

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Vitamins, minerals, and other nutritional supplements have been successfully administered for many years in the treatment of a variety of illnesses and injuries. Nutrients have historically not been prescribed, however, for dental diseases or to assist in the recovery from oral surgery (Ismail et al., 1983). By way of example, supplemental vitamin C has not been tested for dental therapeutics despite the longstanding recognition of the role of ascorbic acid in the formation and maintenance of dental structures (Fullmer et al., 1961) and the frequently observed occurrence of gingivitis as a symptom of vitamin C deficiency such as scurvy (e.g. Chope and Breslow, 1956).

The research project reported here investigated the potential benefits of the application of ascorbic acid in promoting healing in a large sample (N = 696) of consecutive tooth extraction patients analyzed at a dental clinic in Miami, Florida. The subjects are broadly distributed in different age groups (range = 11 to 77 years), and both genders are well-represented (males = 48.9% and females = 51.1%). Each individual was provided a printed list of standardized instructions for post-surgical dental care and dietary modification which is routinely given to all clinic extraction patients, and each was asked to return exactly one week later for a follow-up examination. Surprisingly, all patients reported the ability to ingest ample amounts of solid foods beyond the "soft" diet recommendations during the week of recovery.

TABLE 1. Healing progress and incidence of alveolagia (dry socket) according to supplemental Vitamin C status.

Postoperative Medication	Incidence Slow Healing	Incidence Rapid Healing	Dry Socket
Vitamin C (N=358)	13.1%	86.9%	1.1%
Placebo No Vitamin C N = 255	36.5%	63.5%	7.1%
Total N = 613	22.8%	77.2%	3.6%

The study was conducted in three different phases, each with a separate sample and distinctive experimental design. First was a "single-blind" comparison of 277 patients prescribed vitamin C 1,000 mg/day (500 mg 2 times/day) for a week following the procedure against 175 control patients who received no post-operative vitamin C (Halberstein and Abrahmsohn, 1988). In the second phase 81 patients treated with a larger dosage of vitamin C (1,500 mg/day; 500 mg 3 times/day) were likewise evaluated for healing progress one week after their extractions along with 80 placebo patients in a "double-blind" follow-up (Abrahmsohn, Halberstein et al., 1993).

In both of the above mentioned series of trials, the sub-samples receiving supplementary vitamin C exhibited significantly more rapid healing according to several criteria: (1) presence or absence of edema and purulent material, (2) degree of granulation bed formation, (3) pain expression (according to the Melzack scale) and need for extra analgesic, and 4) post-surgical complications. Table 1 summarizes the cumulative results of the first two samples.

The incidence of alveolalgia ("dry socket"), an extremely painful form of faulty extraction recovery, was scored as an objective measure of post-operative complications. As illustrated by the X-ray in Figure 1, dry socket characteristically involves bony osteitis and "ghost imaging" of the socket a full week following the extraction. Alveolalgia was nearly seven times more frequent in the non-vitamin C control groups (7.1% to 1.1%); its overall incidence among tooth extraction patients is about 5% (Archer, 1975, p. 1628).

While vitamin C administration was strongly correlated with rapid healing progress according to chi-square and matched (paired) sample t test values ($p = 0.0002$-0.0009), gender, age, occupation, medical history, and other demographic and clinical characteristics were not statistically associated with healing rates. No negative side effects of high-dose vitamin C usage (e.g. excess gastric acidity) were reported.

In the third phase of the research the possible role of dietary vitamin C and other nutrients in extraction recovery was monitored. An extensive and detailed analysis was conducted on patients' post-operative intake of dietary nutriments and their possible correlation with healing progress. Neither supplementary vitamin C nor placebos were provided to this additional sample of 83 extraction patients, 28 of whom (33.7%) were subsequently classified as slow healing, while the remainder exhibited rapid healing according to our previous criteria. Protein, calorie, vitamin (A, B6, B12, C), and mineral (magnesium, calcium, iron, zinc, copper, and manganese) ingestion was determined and quantified from patient diaries documenting all food and drink

Fig. 1. a case of alveolalgia ("dry socket"). X-rays of a molar prior to extraction (A), and its socket one week following the extraction (B) exhibiting "ghost imaging" and bony osteitis (arrow).

TABLE 2. Nutrient constituents of patient's post-operative diets (7 days); N = 28 (Slow Healing) and 55 (Rapid Healing)

Nutrient	Patient Category	Mean	Standard Deviation
Vitamin A	Slow Healing	8,506.3	7,432.3
(IU)	Rapid Healing	12,308.1	10,551.5
Vitamin B6	Slow Healing	3.3	2.5
(mg)	Rapid Healing	4.1	3.5
Vitamin B12	Slow Healing	9.0	5.4
(μg)	Rapid Healing	11.7	12.2
Vitamin C	Slow Healing	395.9	317.5
(mg)	Rapid Healing	554.2	382.6
Magnesium	Slow Healing	569.0	336.5
(mg)	Rapid Healing	632.1	361.6
Calcium	Slow Healing	2,219.6	1,264.8
(mg)	Rapid Healing	2,936.9	1,787.2
Iron	Slow Healing	31.3	12.8
(mg)	Rapid Healing	34.4	15.9
Zinc	Slow Healing	18.2	11.7
(mg)	Rapid Healing	20.5	14.1
Copper	Slow Healing	2.4	2.2
(mg)	Rapid Healing	2.6	3.0
Manganese	Slow Healing	3.5	2.9
(mg)	Rapid Healing	4.7	3.7
Kilocalories	Slow Healing	5,230.3	2,316.2
	Rapid Healing	5,972.4	2,576.9
Protein (gm)	Slow Healing	205.2	94.7
	Rapid Healing	253.0	102.32

consumed during the week following the surgery. Particular items and their specific quantities (e.g. tuna fish sandwich on whole wheat bread, bowl of tomato soup, serving of applesauce, etc.) were converted to nutrient constituents (gm of protein; number of calories expressed in kcal; and vitamins and minerals in mg, μg, or International Units) by utilizing the 15th edition of Bowes and Church's *Food Values of Portions Commonly Used* (Pennington and Church, 1985).

Results of the independent dietary analysis are presented in Table 2. Subjects classified in the rapid healing category were subsequently discovered to exhibit higher average nutrient intake values across the board. Analysis of variance and *t* tests indicate that statistically significant differences characterized the variations between slow and rapid healing patients with respect to vitamin A, vitamin C, and calcium ($p < 0.05$). Weaker statistical associations were found between healing rates and intake levels of vitamin B12 and protein ($p < 0.20$). Standard deviation figures suggest wide variation among individual patients within the sub-samples with regard to post-operative ingestion of two of the investigated nutrients (vitamin A and calcium) and total calories. An intermediate range of variation may be noted in intake of vitamin C, magnesium, and protein, as well as a greater uniformity in the consumption of the remaining nutrients.

DISCUSSION

The present findings strongly suggest that certain nutrients are beneficial for hastening the recovery from tooth extractions. Results from all three samples indicate that dietary and supplemental ascorbic acid intake is correlated with more rapid clinical healing and reduced likelihood of complication, particularly alveolalgia. This discovery is especially significant in light of the fact that the patients' demographic and clinical characteristics (e.g. age, gender, marital status, occupation, disease and medical care history) were not statistically important contributing factors to the observed variations in healing rates.

Recent research indicates that vitamin C might speed dental healing through several biodynamic mechanisms: stimulation of the immune system and antibacterial activity of antibodies and enzymes, strengthening of blood clots, and facilitation of scar (connective) tissue formation during wound repair (Halberstein and Abrahmsohn, 1988). Particularly important is the realization that ascorbic acid serves as a catalyst in the body's synthesis of collagen, a non-dietary protein which is the principal constituent of scar tissue and tooth socket granulation beds (Pinnel, 1984; Pinnel et al, 1987; Rubin, 1984).

According to the present study vitamin A, calcium, and vitamin B12 might also assist an extraction recovery, and further research is warranted to test this hypothesis. The possible role of post-surgical dietary protein intake also deserves reevaluation and double-blind experimentation. Since this investigation revealed extensive variation in post-operative consumption of certain nutrients with relative uniformity of others, it would be worthwhile to reexamine this phenomenon in additional samples of oral surgery patients.

In conclusion, dietary and supplementary nutrients appear to be important factors influencing the course of dental healing. Consequently, dentists and oral surgeons could maximize positive results of their procedures by prescribing vitamins C, A, and B12 and possibly calcium supplements. Dental patients might also profit by the recommendation to ingest as much nutritious food as possible during the recovery period.

ACKNOWLEDGEMENTS

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A Prehistoric Peruvian Oral Pathology Suggesting Coca Chewing

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Figures 1 and 2 illustrate the left and right sides of a prehistoric Peruvian male mandible from the physical anthropology collections of the Smithsonian Institution's National Museum of Natural History, Washington, D.C. The mandible was one of many collected by Aleš Hrdlička in the summer of 1910 from the desert coastal zone of the Chicama Valley, about 20 miles north of Trujillo, Peru. Hrdlička enlisted the aid of the local residents to help him collect 3,400 crania and loose mandibles that were lying on the ground surface in some 30 desert cemeteries in the Chicama Valley and at Pachecamac. According to Clifford Evans (pers. com.) the Chicama Valley was occupied mainly during the Chimu and Mochica periods (A.D. 600 to 1,450). Most of the Chicama skulls probably belong to the latter period.

I found this unusual bone erosion pathology, as illustrated, on the buccal surfaces of lower premolar and molar alveolar borders in a number of the Chicama adults, as well as in the same region in their maxillae. It did not occur in children, subadults, or in the anterior tooth region of any adult. Because mandibles in the collection (all numbered the same, 265352) were in storage trays unassociated with the crania, I counted the pathological condition only in the mandibles. It was present in 56 out of 250 Chicama adults. Sex could not be reliably determined, although both males and females seem to have been about equally represented in the 56 affected mandibles. There were 171 mandibles that lacked the buccal side alveolar bone destruction (i.e., the unaffected

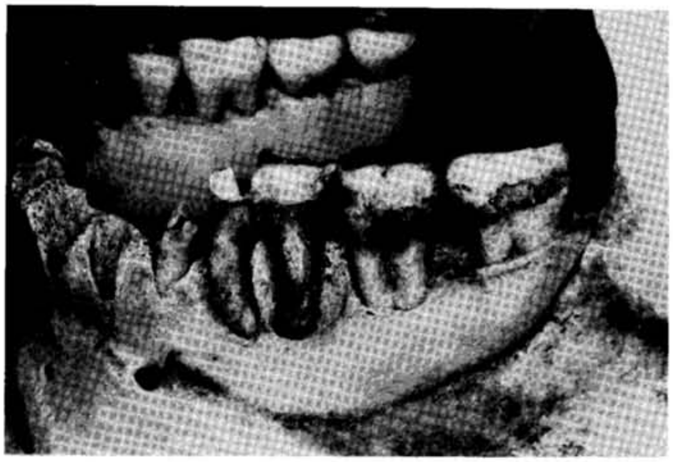

Fig. 1. Left side of Chicama Valley male mandible showing buccal surface alveolar bone erosion in the first and second molar region. The lingual side does not have this erosion pathology (CGT neg. no. 7/7-3-80).

Fig. 2. Right side of same individual in Fig. 1 showing similar amount of buccal surface erosion (CGT neg. no. 9/7-3-80).

had both buccal and lingual sides with the same amount of bone), and 23 were edentulous. Thus, *cheek teeth region buccal surface alveolar bone erosion* (CRSABE) in the Chicama Valley adult population was about 20 percent.

CRSABE is distinctly unlike the necrotic, pitted, and inflamed condition associated with periodontal disease, which usually progresses along both the lingual and buccal alveolar bone surfaces. The tooth roots of the affected individuals did not appear to be physically altered, at least not to the visual extent as the alveolar bone.

The chewing of coca leaves as a stimulant is well known for Peruvian and other Andean Indians (Cabieses, 1985). According to Lanning (1974), coca had been traded to Peruvian Pacific coast settlements from the Andean *montaña* by 1,700 or 1,800 BC. Prehistoric Peruvian anthropomorphic ceramic vessels have been found on which human faces are portrayed with a bulging cheek region indicating a quid held in one or both sides of the mouth. In addition to the ethnographic and archaeological evidence for historic and prehistoric coca chewing by *coqueros*, human skeletal remains may also provide evidence for the ancient practice.

Because this exceptional oral pathology (exceptional in the sense of its appearance and its high within-group frequency) occurs where coca has been used for thousands of years, it can be suggested that the alveolar bone damage resulted from the habitual chewing of quids made up of coca leaves and lime, the traditional preparation. The bone erosion seemingly resulted from the physio-chemical effect of the lime and alkaloids in the coca leaf quid, which is held in the *coquero's* mouth for hours at a time. I have not seen this pathology in other South American skeletal remains, such as the Sambaquí of the Atlantic coast of Brazil, where coca chewing was not practiced. I would be interested in learning if other members of the Dental Anthropology Association know of relatively high frequencies of CRSABE in other skeletal collections, either where there is ethnographic evidence for the habitual chewing of coca, betel nut, tobacco, and other alkaloid-containing plants, or alternatively, were there is no evidence for such practices.

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Oral Tori in the Ticuna Indians, Colombia

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This note describes the low frequency of mandibular and palatine tori among the Ticuna Indians, Colombia, South America. Tori are bony exostoses occurring along the palatal midline and on the lingual border of the mandible adjacent to the premolars. Tori may result from masticatory stress (and they are age-dependent, being most common and most developed in adults), but marked population differences imply a ponderable heritable component to trait expression. Palatine and mandibular tori are positively associated in their occurrence and exhibit familial predispositions.

Moorrees et al. (1952) noted that a minimum of three independent loci are needed to explain familial variations. Assuming a polygenic threshold model, I have used the pedigrees published by Suzuki and Sakai (1960) to estimate the heritability of liability ($h^2 \pm$standard error) for mandibular torus at 0.81 ± 0.11 and palatine torus at 0.97 ± 0.10. These estimates used parent-offspring relationships (sexes pooled) and the method of Falconer (1965). These high h^2 values suggest that tori should be useful indicators of biologic affinity. Halffman et al. (1992) caution that expression of the genetic potential is alterable by the individual's degree of masticatory stress.

Material consisted of dental examinations and study models of 55 full-blooded Ticuna adults from the village of Arara, 30 km northwest of Leticia, Colombia. Trait identification followed the classification scheme of Hrdlicka (1940). Palatine torus was absent (0/55), and just one subject, a male, possessed a mandibular torus. This instance was a very slight, flattened torus that occurred bilaterally. This one case of mandibular torus yielded a frequency of 3.7% for males alone and 1.8% for sexes pooled (Table 1).

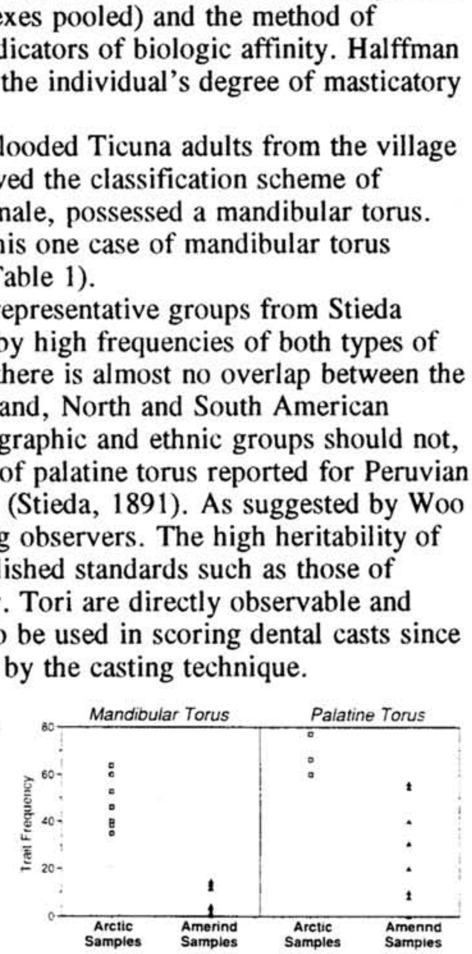
Figure 1 plots a collation of samples provided by Bernaba (1977) plus representative groups from Stieda (1891), Godlee (1909), and Woo (1950). Arctic peoples are characterized by high frequencies of both types of tori, while American Indians have appreciably lower frequencies. Indeed, there is almost no overlap between the Eskimo and Aleut samples ("Arctic") and the Amerindians. On the other hand, North and South American Indians appear to have similar trait distributions. Local variations with geographic and ethnic groups should not, however, be overlooked. A notable example concerns the disparate values of palatine torus reported for Peruvian skeletal series: 0.2% (Russell, 1900), 30.5% (Hrdlička, 1940), and 56.3% (Stieda, 1891). As suggested by Woo (1950), much of this variation probably is due to scoring differences among observers. The high heritability of liability estimates noted above points to the need for close attention to published standards such as those of Martin (1973) to maximize these traits' biologic and anthropological utility. Tori are directly observable and easily graded on skeletal material and the living alike, though care needs to be used in scoring dental casts since the site of the mandibular torus can be inferior to the basal limits captured by the casting technique.

TABLE 1. Incidence of tori in Ticuna Indians[1]

	Palatine Torus	Mandibular Torus
Males	0/27	1/27 (3.7%)
Females	0/28	0/28 (0.0%)
Total	0/55	1/55 (1.8%)

[1]individual counts

Fig. 1. Distributions of frequencies of palatine and mandibular tori in New World samples.



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Dental Morphology from Two Mayan Ethnic Groups in Chiapas, Mexico

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In 1991 we conducted field research with the National Museum of Mexico among the Tojolabal Indians of the Maya community of Las Margaritas in the Chiapas Highlands, southeast Mexico. We also studied 82 Tzeltal Maya individuals, whose dental morphology we report here.

According to our plan, we studied eight morphological dental traits: shoveling, ridging, and tuberculum dentale (cingulum) in upper incisors; Carabelli's trait and hypocone in upper molars; and groove pattern, cusp number, and protostylid in lower molars (Table 1).

TABLE 1. Frequencies of dental traits in 82 Tzeltal Mayans (individual counts, sexes pooled).

Trait	Rank	%
Shoveling[1] UI1	N[2]	0.7
	U	65.1
	A	34.1
	O	0.0
Ridging[1]	0	7.5
	1	11.3
	2	13.7
	3	0.0
	4	0.0
Tuberculum dentale[1] UI1		15.4
Carabelli's trait[3] UM1		26.1
Hypocone[3] UM2		56.0
Protostylid[3] LM1		28.2
Protostylid[3] LM2		14.1
Groove pattern[3] LM2	Y	8.7
	+	43.6
	X	47.6
Cusp number[3] LM1	4	0.8
	5	63.4
	6	35.8
Cusp number[3] LM2	4	48.0
	5	32.8
	6	19.2

[1]Classification of Pompa (1991)
[2]Absence
[3]ASU System (Turner et al., 1991)

RESULTS AND DISCUSSION

Shoveling, as has been observed in other Amerindian populations, has an expression close to 100%. The frequency of Carabelli's trait was 55% on UM1, but very few tubercles were found. Therefore, we obtained a very low weighted frequency (26.1%), using the method of Turner (1985). The unweighted frequency of hypocone on UM2 is close to 85%.

The frequency of Y-groove on LM1 is 83%. However groove pattern on LM2 varies in the Maya Indians. The frequency of Y-groove is 8.7%, whereas + and X pattern are about equal (Table 1). Regarding cusp number, 6-cusped mandibular molars occurred in average frequencies (35.8% on LM1 and 19.2% on LM2. On LM2 over half of the individuals had more than four cusps. Protostylid was expressed as expected, with greater expression on LM1 than LM2. The unweighted frequency was over 50%, but as with Carabelli's, trait few tubercles were found. Cusp 7 was very rare (2% on LM1 and 0% on M_2).

The frequencies of the features we observed agree with the Amerindian dental characteristics (Scott, 1973; Pompa, 1984, 1990) as well as with the Sinodonty dental complex (Turner and Bird, 1981). The data we obtained show the low rate of admixture that these New World ethnic groups have undergone.

Our goal for the near future is to extend this study on dental morphology by analyzing a larger sample of both modern and colonial individuals in the area.

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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 Instituto 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.

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Craniofacial Variation in Pacific Populations. Papers Presented at a Symposium. Honolulu, Hawaii, May 30, 1991. Edited by Tasman Brown and Stephen Molnar, Adelaide: Anthropology and Genetics Laboratory, Department of Dentistry, The University of Adelaide. 1992. 150 pp. ISBN 0-86396-141-X. $29.95 Australian $29.95, $19.18 special to DAA members, see insert (paper).

As is evident in the subtitle, *Craniofacial Variation in Pacific Populations* is a collection of papers derived from a symposium in Honolulu, Hawaii, in May 1991 (see Brace, *Dental Anthropology Newsletter 6(1)*:3). The conference was a sequel to a 1988 panel, "The Face and Dentition of Australian Populations", which Tasman Brown and Stephen Molnar organized for the 57th annual meeting of the American Association of Physical Anthropologists in Kansas City. Therefore, the present book is also a sequel: to the July, 1990, edition of *The American Journal of Physical Anthropology 82(3)*, which contains the papers from the 1988 symposium.

Ten out of the 13 papers and five out of the 11 abstracts in *Craniofacial Variation in Pacific Populations* directly relate to the dentition. Of these, two papers deal with population studies, both reporting on moiré imaging results. In the first, Yamada and workers show that Cook Islanders have palates that are deeper and wider than those of Japanese and Chinese. In the second, Kanazawa and associates identify two clusters of Polynesian and Mongoloid populations (1. Japanese and Taiwanese and 2. Cook Islanders and Ainu) based on maxillary first molar occlusal surface tubercles, their term for morphological crown traits.

Three studies use a single trait or principle of dental anthropology to demonstrate geographical or temporal variation. In the first, P. Brown argues that dental and craniofacial metrics along with ecological evidence indicate that, allometrically, tooth size has increased in Australia since the late Pleistocene. In the second, Molnar and Molnar point out through palatal and dental metrics that dental arch morphology and occlusion are important factors in tooth wear patterns. In the third, Townsend and colleagues review possible causal factors related to mirror imaging of twin dentitions.

Case studies make up the materials for two papers. An instance of first molar agenesis and data for additional anomalies in dental patients are reported by Diamenti and co-workers. Intense craniofacial remodeling and unusual tooth wear associated with unilateral mandibular growth inhibition in a late prehistoric skeleton is reported and well photographed by Pretty and associates.

The authors of two papers deal with interproximal wear. In the first, Kaidonis and colleagues conclude that one mechanism responsible for the heavy interproximal wear in Australian aboriginals is vertical or near vertical tooth movement accompanied by simultaneous tipping. In the second, Richards suggests a slower rate of interproximal wear than that previously reported for Australian Aboriginals, because mesiodistal diameters negatively correlate with occlusal wear and age.

The three papers that do not directly relate to teeth are of interest because they deal with the bones of the face and skull vault. Mizoguchi suggests that brachycephalization among modern Japanese is due to increase in brain size, development of the masticatory apparatus, and posture. Mizoguchi helpfully provided a table with descriptive statistics for cranial and postcranial metrics for the modern Japanese male sample, and an offset section of text documenting the published sources of comparative data. Swindler reports on factors (short facial height, broad zygomatic diameters) responsible for the Melanesian craniofacial complex, especially among the Lakalai of New Britain, Melanesia. Here, individuals looking for craniofacial metric data will appreciate the table of descriptive statistics that accompanies the article. The third non-dental article reports mirror image facial asymmetry in monozygotic twins. The last six pages of the book contain seven abstracts by Brace et al., Katayama, Turner, Prokopec and Pretty, Smith and Rosen, Houghton and Kean, Kean and Houghton, Neville et al., Neville et al., Taylor et al., and K. Brown et al.

Craniofacial Variation in Pacific Populations is a valuable contribution to the library of the dental anthropologist for four reasons. First, the papers complement those published in the *Journal of American Physical Anthropology 82(3)*. No article is repeated and some, such as those by Molnar and Molnar, and Clarke, follow up on their 1990 articles with additional information. Second, the articles in both books contribute substantially to our growing body of information on the physical anthropology of the Pacific. Third, the book is available to unaffiliated anthropologists; in other words, you need not be a member a professional society and subscribe to a journal in order to own it. Fourth, the book is affordable. Finally, the editors are to be congratulated, because of the short time between the symposium in May 1991 and the publication of the papers just one year later.

A.M. Haeussler

Letters

Dear Dr. Molnar,

I am the Chairman of the Dade County Research Center in Miami, Florida. I am currently the chairman of the implant section and have been co-chairman for the past twenty-six years, We are directly associated with the University of Miami School of Medicine and have been performing in the field of implantology for the past twenty-eight years in this area.

I would like to ask you or your membership whether there is any information either in publications or any form of research regarding implantology as it was done many hundreds of years ago. It would be greatly appreciated if that information could possibly be forwarded to me so that I may extend this and write this up as a possible research project for the Dade County Research Center and in conjunction with the University of Miami. I would like very much to find out if there is any historical significance in the field of implantology dating back to the pre-1930 era where implants are fairly well known to have been done not only in the United States but worldwide. It would be my goal to inform the educators in the field of implantology and perhaps the general population of attempts that were made in the field of implantology in the 1930-1940 era. I would like whatever information that I can obtain through the Anthropology Association to be placed on record with the possibility of publishing an informative article to the general dental population.

Thank you very much for your time. I appreciate it and am looking forward to hearing from you.

Charles S. Mandell, D.D.S.
Stirling Grove Dental Office, 3220 Stirling Road, Hollywood, Florida 33021, U.S.A.

Editorial Board:

Before all, I wish to congratulate the Editorial Board staff for the splendid work on the *Dental Anthropology Newsletter*. Besides opportune news of association interest, I see this new publication as a great opportunity for publication of articles which do not always fulfill the exacting requisites of other journals of anthropology. It is a loss that these smaller articles that deserve to be edited and at least recorded, are not published in the English language. I say this because I have three works about occlusion and dental wear in the Yanomamas Indians, Lenguas Indians, and Pre-Columbian skulls which are of less profound and scientific value for more rigorous publications. These works could be published in order to be known in the universal literature.

I think that the *Dental Anthropology Newsletter* is performing a great and fundamentally important work. In a short time I myself will dare to send some of my work for your appreciation. Separately, I am sending two books of mine, as well as other publications, to be incorporated into the Association Library, even though some of them were written in the Portuguese language.

Health, love, and work,

Dr. Cléber Bidegaine Periera, C.D.
Delegate of the Orthodontic Latin American Association (ALADO)
Vice-President of the Computer Use Brazilian Dentistry Association (ABUCO)
Av. Duque de Caxias, 1739 - Conj. 903 - Uruguaiana RS - 97500-905

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