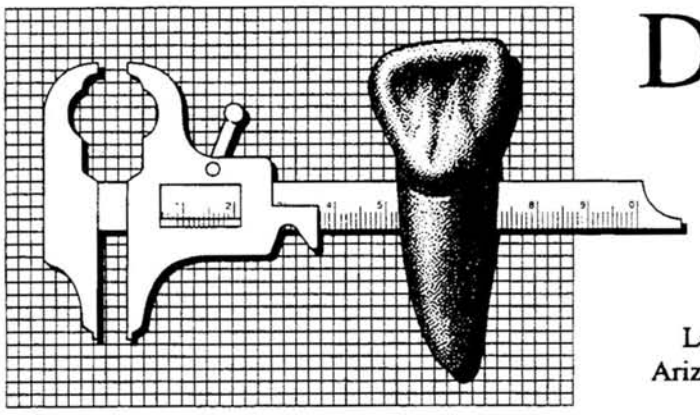

Dental Anthropology Newsletter

A PUBLICATION OF
THE DENTAL ANTHROPOLOGY ASSOCIATION

Laboratory of Dental Anthropology Department of Anthropology
Arizona State University Box 872402 Tempe, AZ 85287-2402, U.S.A

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Presidential Address

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The first newsletter of the new year provides an appropriate opportunity to reflect upon the events and issues of 1994 and to plan for significant future events in the field. One incident of 1994 in which I was personally involved may be of interest and provide an example for broadening the dissemination of research results in anthropology. In November, 1994, at the Wisconsin Conference on South Asia, J. Mark Kenoyer (University of Wisconsin, Department of Anthropology) organized a symposium on the topic, *Changing Perspectives on the Indus Valley Tradition*, in memory of the late George Dales (University of California at Berkeley, Department of South and Southeast Asian Studies). Professor Dales was not only a significant contributor to South and West Asian archaeology, but he was foresightful in incorporation of biological anthropologists (including a dental anthropologist) along with a diverse array of archaeological specialists in planning the excavation of Harappa cemetery R-37 in the late 1980's.[1]

One section of the two-day symposium was devoted to biological anthropology, and largely consisted of papers illustrating the diverse insights to be gained from the close association of dental anthropologists and archaeologists. Robert F. Pastor (Johns Hopkins University, Department of Anatomy and Cell Biology) presented a paper on dental microwear analysis of Harappan teeth, documenting differences in striae type and density between sexes and between Harappans as a group and earlier prehistoric occupants of the Indus and Ganges Valleys. Brian E. Hemphill (Vanderbilt University, Department of Anthropology) compared dental morphological and cranial discrete traits between the Harappans and several contemporaneous skeletal series from Central Asia to address the issue of whether cultural contacts evident in the archaeological record could have detectable biological parallels that may indicate gene flow. My contribution to the symposium dealt with applying a newly developed method of correcting dental caries rate for antemortem tooth loss of teeth to the Harappan dental evidence treating the sexes separately. Comparison with other earlier skeletal series from India and Pakistan show that females suffer from an increase in caries rate to a greater extent than males, as reliance upon agriculture rises and food processing technology increases in complexity.[2]

While these papers generated productive discussion and debate, the conference permitted scholars to identify concordances between the dental anthropological and archaeological results, and also to document discrepancies between different approaches that may lead to further research. The point of recounting these events is not only to recommend the close co-operation of dental anthropologists and archaeologists in the field and laboratory in the recovery and interpretation of data, but to emphasize the importance of bringing results of such collaboration to a wide audience.[3] Only then will the practical utility of the diverse insights gained from the study of ancient teeth become clear to non-specialists.

Looking to the future, I would like to devote one *Presidential Address* to issues and concerns of the Association's membership and to ways in which the Association might better serve its members. I encourage members to propose ideas and issues for future discussion and to suggest specific ways the newsletter can facilitate faculty and student research in dental anthropology. For example, would it be appropriate for the

Association to solicit information on institutional repositories of dental study models and skeletal materials, and international research facilities in dental anthropology, and then devote space to a listing of institutions and resources? Please send your opinions and comments to me (Department of Anthropology, University of Oregon, Eugene OR 97403-1218, U.S.A.; telephone: 503-346-5112; FAX: 503-346-0668); or to the newsletter editor, Sue Haeussler, at the university or e-mail address on the masthead of the newsletter.

Finally, having saved the best for last, I would like to close by reminding everyone that the Albert Dahlberg Memorial Symposium on Dental Anthropology and Evolution will convene at 8:00 AM, on Thursday, March 30th. I encourage you to attend this event as a tribute to one of dental anthropology's main founding fathers, as an opportunity to learn about exciting and current research developments in dental anthropology, and to meet a diverse and international group of dental anthropologists.[4] See you in Oakland!

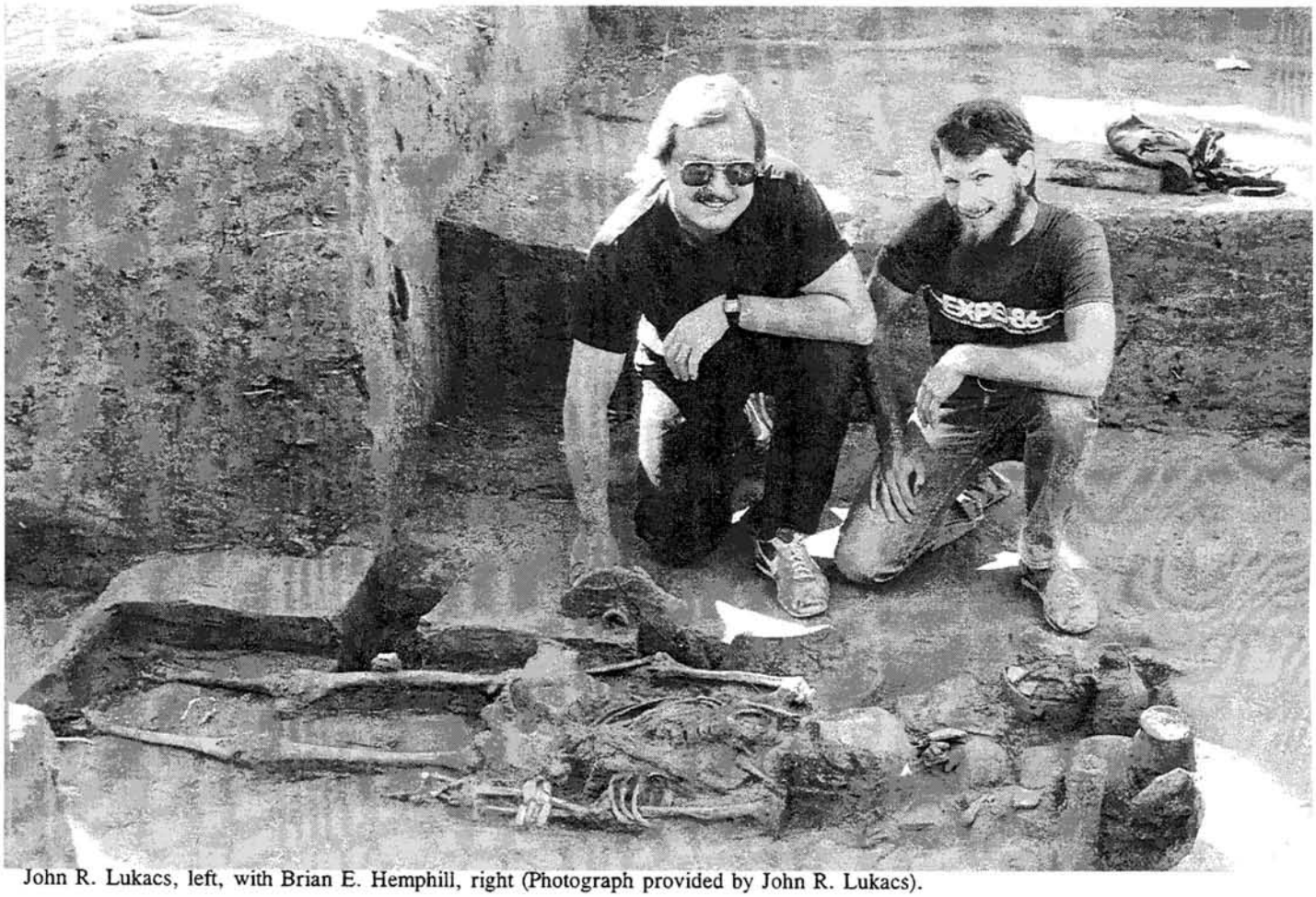
Endnotes

[1]Biological anthropologists involved in the excavation and field analysis of human skeletons at Harappa during the 1987 and 1988 winter field seasons include Brian E. Hemphill (Vanderbilt), Kenneth A.R. Kennedy (Cornell), John R. Lukacs (Oregon), and Nancy C. Lovell (Alberta). See Meadow (1991) Harappa Excavations 1986-1990: A Multidisciplinary Approach to Third Millennium Urbanism. (Monographs in World Archaeol., No. 3). Madison: Prehistory Press.

[2]For a concise description of the caries factor see Lukacs (1992:143) Dental pathology and agricultural intensification in South Asia. Am. J. Phys. Anthropol. *87*:133-150. A more detailed discussion of caries correction factors and justification for the new method, see Lukacs (1995) The 'caries correction factor': a new method of calibrating dental caries rates for antemortem loss of teeth. International Journal of Osteoarchaeology (In Press).

[3]Proceedings of this symposium will be published by JM Kenoyer as Volume 4 of the Wisconsin Archaeological Reports.

[4]Papers for the Dahlberg symposium were given in the last newsletter.



John R. Lukacs, left, with Brian E. Hemphill, right (Photograph provided by John R. Lukacs).

Primate Dental Development: Ontogenetic Processes of Pattern Formation

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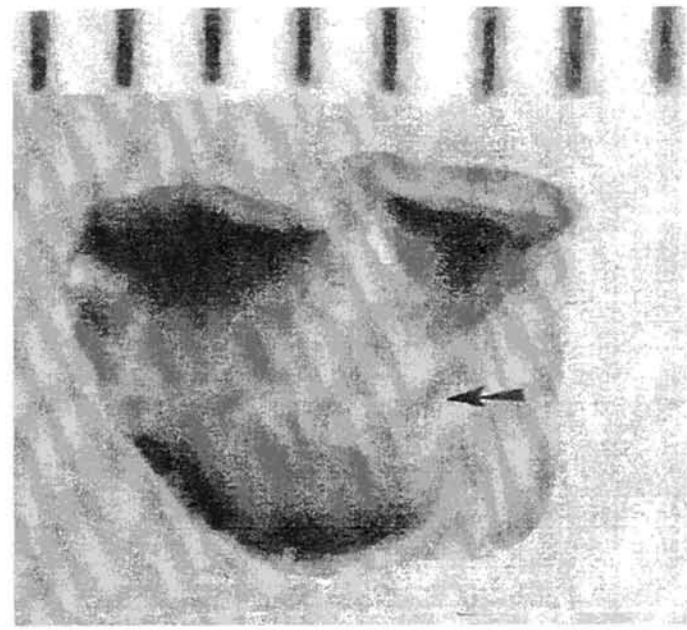
The development of tooth germs is a dynamic process. It involves proliferation of the cells of the dental papilla and the enamel organ, differentiation of the pre-odontoblasts and pre-ameloblasts into definitive odontoblasts and ameloblasts, and dentin and enamel apposition. The final size and shape of the tooth's crown results from the growth and differentiation of the inner enamel epithelium.

Variations in the pattern, timing, rate, and duration of theses events can cause considerable variation in the external morphology of the completed crown (Keene, 1982, 1991). Because morphological evolution can be thought of as "phyletic alteration of the developmental mechanisms of pattern formation" (Hanken, 1989:339), understanding how mechanisms of pattern formation produce the completed morphology is important for better understanding of evolutionary processes and may ultimately be of value in assessing phylogenetic relationships. Documenting the development of tooth germs in various primate taxa can aid in understanding how these events interact to produce the completed crown and can provide a foundation for understanding underlying evolutionary changes that have occurred in primate dentitions.

Direct examination of tooth germs dissected from members of three primate genera (*Pan, Macaca*, and *Alouatta*) was undertaken. Specimens used in this study were from the collections of D. R. Swindler and the late B. S. Kraus. The sample consisted of 171 individuals: *Macaca* (137 individuals), *Alouatta* (19 individuals) and *Pan* (15 individuals). The tooth germs were soaked in alizarin red S stain in order to distinguish the calcified areas of the crown from the uncalcified areas (the calcified areas absorb the stain and are red, while the uncalcified areas remain clear). The specimens were video taped in buccal, lingual, and occlusal views using a video camera fitted with a lens and billows to magnify specimens. Measurements were made using the Peak 2-D Motion Analysis software. The video images were digitized and measurements were made and scaled on the computer monitor. Detailed analyses of both quantitative and qualitative aspects (relative rates of growth and differential patterns of growth) of tooth germ development in *Pan, Macaca*,



Lingual

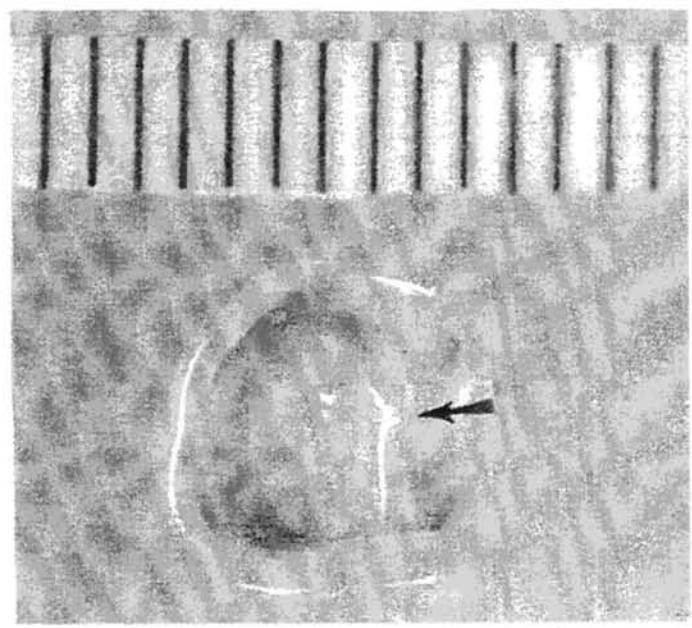


Fig. 1. Development of the *crista obliqua* on dm^3 of *Alouatta caraya* (top) and dm^2 of *Pan troglodytes*. Orientation: left is mesial; right is distal for both figures. Top is buccal for top figure; bottom is buccal for bottom figure.

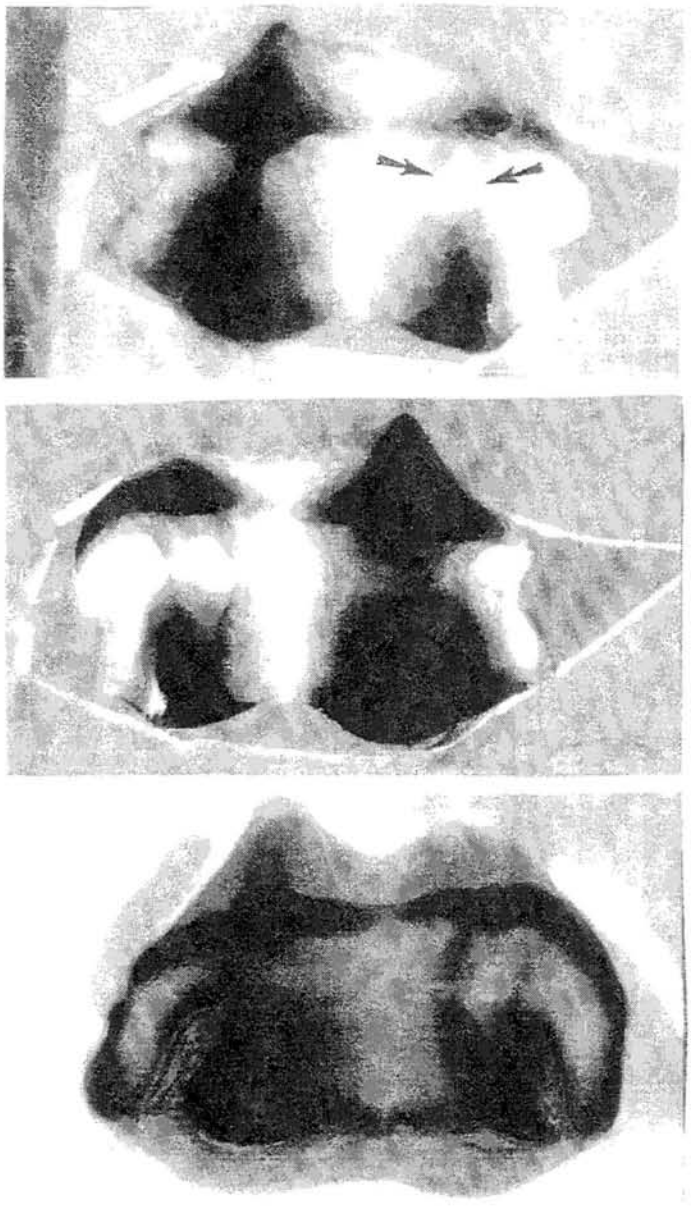


Fig. 2. Development of dm^2 of *Macaca mulatta*. Note lack of *crista obliqua* and development of two distal folds on the surface of the inner enamel epithelium. Orientation: mesial is on the left and distal on the right for the top and bottom specimens. Distal is on the left and mesial on the right for the middle specimen.

and *Alouatta* were made. These were compared with the findings of Butler (1967*a,b,c*, 1968, 1971, 1992) and Kraus and Jordan (1965) for the molars of *Homo sapiens*.

The basic pattern of growth of the IEE (inner enamel epithelium) is influenced by the rates of proliferative growth. Cessation of mitotic activity in some cells and continued division of others is thought to produce the folds on the surface of the IEE.

The pattern of calcification is influenced by the pattern of these folds. Calcification is initiated in the tips of the cusps and the calcifying front advances along the ridges and crests before reaching the valleys and basins. The size of the completed crown is determined by the rate and duration of proliferative mitotic growth of the papilla and the inner enamel epithelium and, to a lesser extent, the rate and duration of appositional growth (*i.e.*, enamel secretion).

The shape of the completed crown results from differential growth within the various dimensions of the developing tooth germ. In comparing odontogenesis in members of the four primate genera, variation in all of these aspects of development are evident.

Topographical differences exist on the surface of the IEE. For example, a *crista obliqua* develops on the surface of the maxillary molars of *Pan, Homo*, and *Alouatta*, but not on the surface of the maxillary molars of *Macaca* (compare Figs. 1 and 2). Differences in both the timing and pattern of initiation of calcification are also evident. The order of initiation of calcification at the tips of the cusps is similar in all four genera, but variations in timing exist.

Calcification is underway in the tips of all of the major cusps of *Pan, Homo*, and *Macaca* prior to the coalescence of the calcifying fronts between the cusps. In *Alouatta*, some coalescence occurs prior to the initiation of calcification in the hypocone of the maxillary molars and the entoconid of the mandibular molars. Figs. 3 through 6 contain diagrammatic comparisons of the patterns of calcification.

Differences in the relative rates of growth within the molars of *Pan, Homo, Macaca*, and *Alouatta* are very complex. One notable difference is the greater rate of growth in the mesiodistal diameter (as measured by buccal length) relative to buccolingual diameter (as measured by mesial width) in the maxillary molars of *Macaca*. This results in molars that are longer and narrower than *Pan, Homo*, and, *Alouatta* molars. The rates of growth in the maximum mesiodistal and buccolingual diameters are essentially equal in the maxillary molars of *Pan, Homo*, and *Alouatta*. This results in molars that are about as long as they are wide. More subtle

differences in the relative rates of growth can also result in differences in morphology. For example, dm_2 and M_1 of *Homo* grow faster in length than the talonid grows in width, whereas growth in these dimensions do not differ significantly in dm_2 and M_1 of *Pan*. Comparisons of the changes in shape in these teeth reveal that the talonids of the dm_2 and M_1 of *Homo* become mesiodistally elongated as the molars develop. The talonids of the dm_2 and M_1 of *Pan* do not elongate mesiodistally to the same extent. As a result, the talonids of these molars are shorter and wider relative to the length of the tooth in *Pan* (Figs. 7, 8).

The pattern of initiation of calcification and the relative rates of growth can interact to influence the completed morphology considerably. For example, in dm^3 and M^1 of *Alouatta* the rate of growth in length (as measured by buccal length) does not differ significantly from that in distal width. This is also true for the dm^2 and M^1 of *Pan* and *Homo* but, because the hypocone develops and calcifies later in the development of these teeth in *Alouatta*, there is a greater increase in the size of the distal moiety of the tooth relative to the mesial moiety in *Alouatta*. The dm^2 and M^1 of *Pan* and *Homo* retain a much more rectangular shape.

Kraus (1964:206) has emphasized that "the aspect of the dentition that is critical in evolutionary interpretation is its *morphogenesis* rather than its final morphology." In fact, Kraus and Jordan (1965) hypothesized that the relative lengths of common ontogenetic patterns would be greater for the molars of more closely related taxa.

In comparing the development of the molars of *Alouatta, Macaca, Pan*, and *Homo* it is clear that the phylogenetic relationships cannot be inferred simply from comparisons of the length of common ontogeny. This is because dental development entails a complex interaction of factors to produce the completed crown and changes can (and apparently do) occur in any of these. Although the unfolding of the dental ontogenies does not provide a neat picture of phylogenetic relationships, dental morphogenesis can potentially provide information that is useful when making phylogenetic inferences.

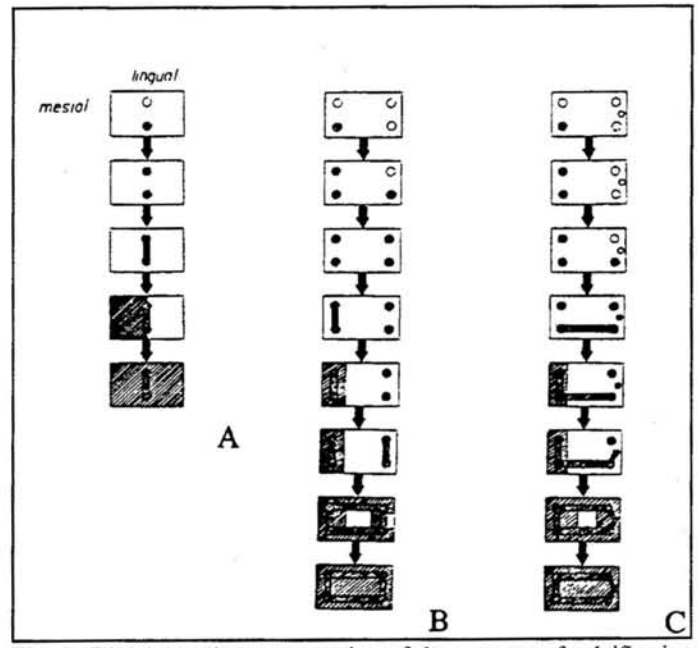


Fig. 3 .Diagrammatic representation of the patterns of calcification in: A dm_2 of *Alouatta*, B dm_1 of *Macaca*, and C dm_1 of *Pan* and *Homo*.

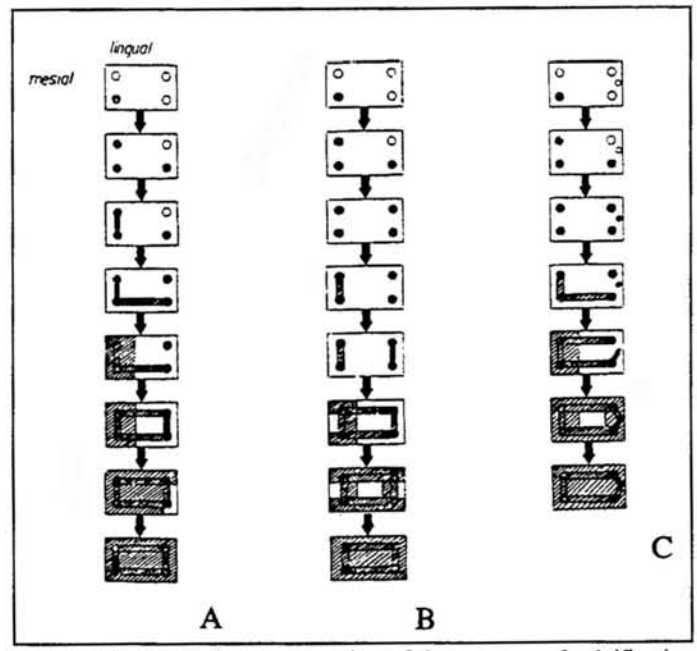


Fig. 4. Diagrammatic representation of the patterns of calcification in: A dm_3 of *Alouatta*, B dm_2 of *Macaca*, and C dm_2 of *Pan* and *Homo*.

Understanding the developmental mechanisms that determine the size and shape of the completed crown can assist in assessing whether characters are more likely to be similar due to common descent or to

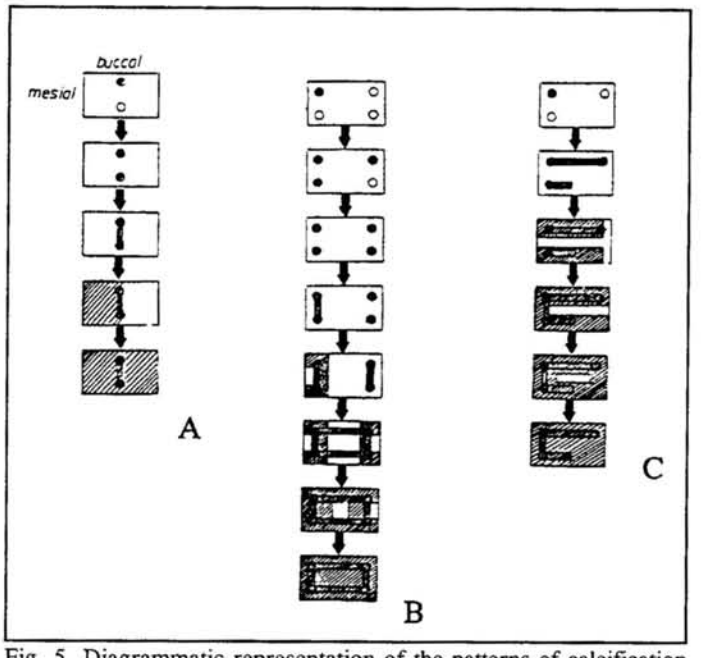


Fig. 5. Diagrammatic representation of the patterns of calcification in: A dm^2 of *Alouatta*, B dm^1 of *Macaca*, and C dm^1 of *Pan* and *Homo*

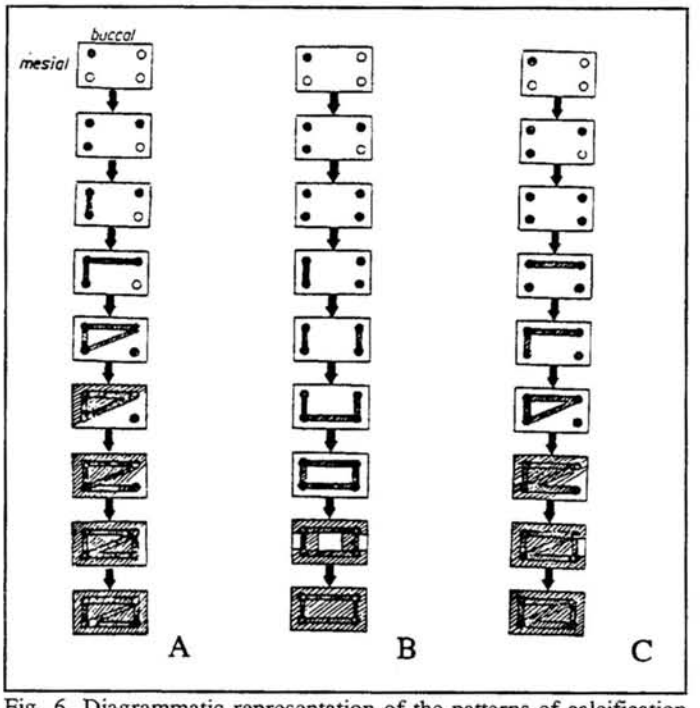


Fig. 6. Diagrammatic representation of the patterns of calcification in: A dm^3 of *Alouatta*, B dm^2 of *Macaca*, and C dm^2 of *Pan* and *Homo*.

homoplasy. This is because understanding how a given morphology is formed during ontogeny, and how variable the developmental processes are, can help in assessing how mutable the morphology may be (i.e., whether the character could easily change in different lines of descent).

Moreover, if the ancestral condition is reasonably well established (either from the fossil record or out-group analysis), an understanding of how differences in shape and size are achieved developmentally can aid in determining the polarity of change. Thus, although dental morphogenesis alone may not be sufficient to infer phylogenetic relationships, it can provide insights that, when coupled with paleontological data and data from out-group analyses, can be used to make such inferences.

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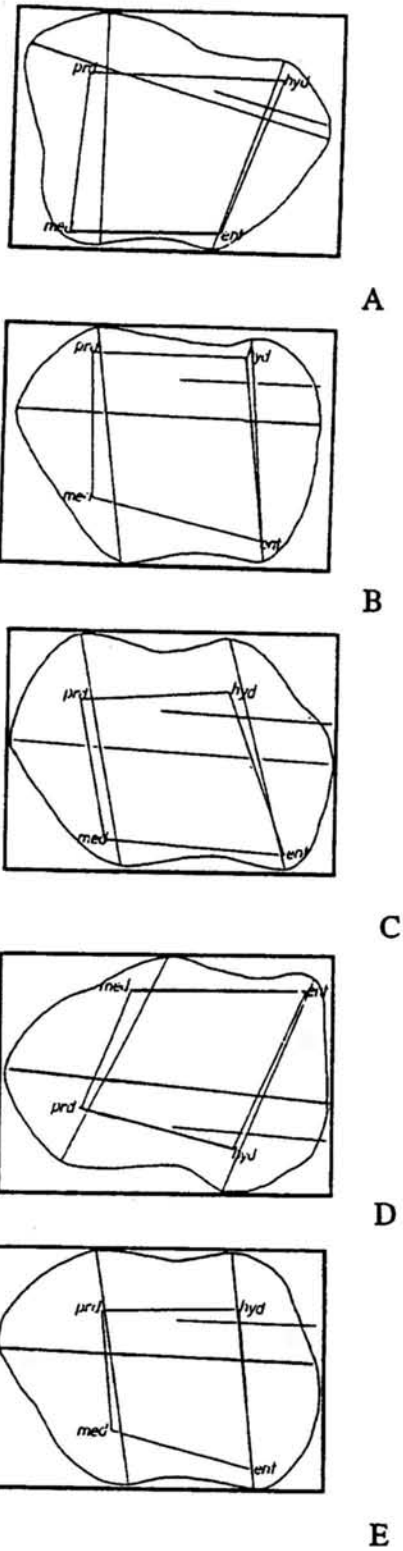

Fig. 8. Changes in the shape of the mandibular second molars of *Pan troglodytes*. A 3 cusps calcifying; B 4 cusps calcifying; C mesial and buccal cusps coalesced; D mesial, buccal, and lingual cusps coalesced; E entire occlusal surface calcifying.

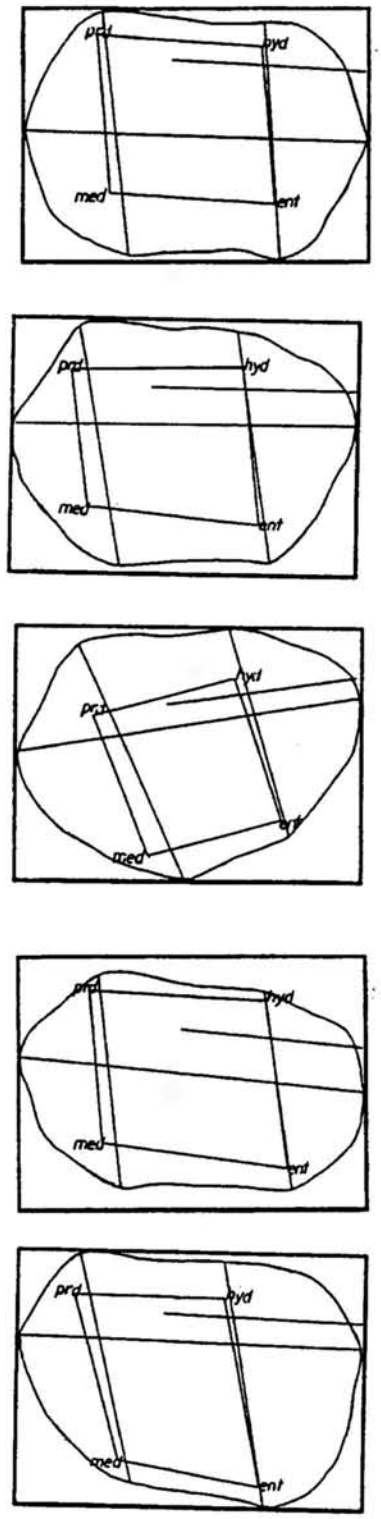

Fig. 9. Changes in the shape of the mandibular second deciduous molar of *Homo sapiens*. A 18 weeks gestation; B 25 weeks gestation; C 28 weeks gestation; D 32 weeks gestation; E 36 weeks gestation.

The Triform Variant: I. Definition, Classification and Population Distribution

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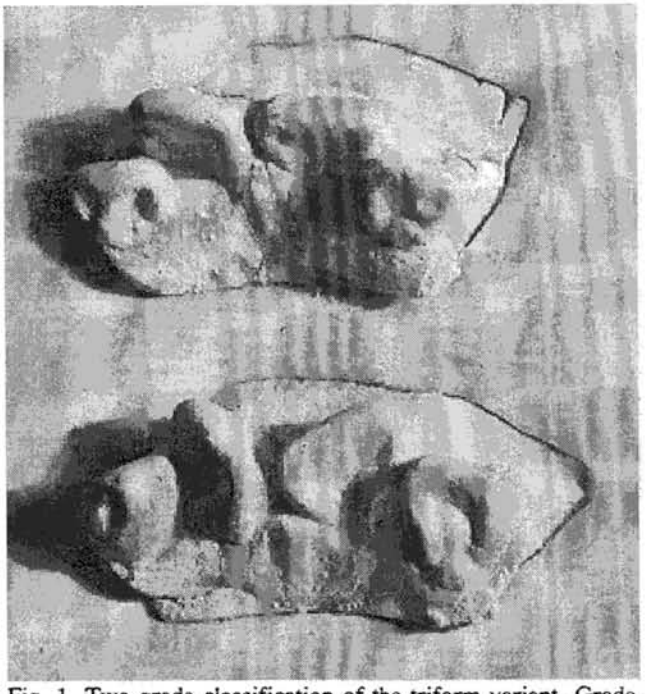

Fig. 1. Two-grade classification of the triform variant. Grade 1 on the right UI2 on the top; grade 2 on the right UI2 on bottom (Photo by S. Bailey-Schmidt).

In 1921 Hrdlička remarked that the cingulum of maxillary incisors can be so marked that occasionally it will reach the cutting edge of the tooth. Other anthropologists have referred to a tooth that resembles an "aberrant \\barrel-shaped incisor" (Dahlberg, 1949), or that has a "bicuspid appearance" (Goaz and Miller, 1964). Clinicians, too, are familiar with this aberrant form, as it is sometimes associated with *dens invaginatus* - an invagination of the tooth tissue (both dentin and enamel) towards the pulp (Oehlers, 1957; Lee et al., 1988).

The term "triform" was first used by Scott (1973) to describe this unusual variant that affects the maxillary lateral incisors. It is characterized by prominent mesial and distal marginal ridges combined with a projecting cingulum that is attached to the incisal edge by a transverse ridge (Fig. 1). According to periodic references to the variant in the literature (Nelson, 1938; Goldstein, 1948; Dahlberg, 1949; Goaz and Miller, 1964; Larson, 1978), the triform variant occurs in pre- and post-contact Native American groups. The geographic distribution and relative frequency of this variant have not been systematically examined until now.

MATERIALS AND METHODS

The materials used in this study are derived from crania and casts from the following 16 populations: San Francisco Chinese (Asian); South African Indian (Asiatic Indians); South African and American White (Europeans); Solomon Islanders (Melanesian); Easter Islanders (Polynesian); Bantu and Bushman (Africans); and Arikara, Zuni, Pima, Papago, Hopi, Navajo, Yaqui, Eskimo, and Mohr site (Native Americans). More than one Native American sample was included in order to examine the triform variant's distribution within North America.

The Arikara and Zuni material are curated in the National Museum of Natural History, Washington D.C. The Mohr site archaeological material and Solomon Island casts are curated in Temple University, Philadelphia, PA. All other samples are hard stone casts (Fig. 2) curated in the Arizona State University Dental Anthropology Laboratory, Tempe, AZ.

A two-grade classification was devised by the author for this study (Fig. 1). Both grades are regarded as presence and can be described as follows:

Grade 1: characterized by a marked mesial or distal marginal ridge that is attached to a medium-size cusp which reaches one-quarter to one-half of the way to the incisal edge;

Grade 2: characterized by marked symmetrical marginal ridges (shoveling), with a large cusp that is attached to the incisal edge by a transverse ridge.

RESULTS AND DISCUSSION

The results of the population analysis are presented in Table 1. Native Americans clearly show the highest frequency for this variant. In fact, with the exception of one Bushman, the variant did not occur outside of North America. Perhaps the most salient feature of this table is the frequency observed in the Pima and Papago groups (10% and 7.5% respectively). While almost all other Native American groups exhibited the variant, its presence was less than in these two groups.

The fact that the variant occurs in early post-contact groups (Arikara and Zuni) as well as in living populations (Navajo, Hopi, Papago, and Pima), indicates that it not the result of a recent mutation, but was likely brought to North America by Paleo-Indian groups. The finding by Lee et al. (1988) of the triform's

bilateral presence in a Chinese girl, indicates that the variant occurs in Asians.

The concentration of the triform's occurrence in the Pima and Papago is intriguing. The Pima are a biologically unusual population in more than just their dentition. Lampl and Blumberg (1979) have found that the Pima have an unusually high frequency of albumin Mexico - three to four times that of other Uto-Aztecan groups. In addition, Wallace and Torroni (1992:406) have recently found that "an extraordinary 41% of the Pima and Papago harbor the rare Asian (mtDNA) variant *HincII morph 6.*" It is possible that these peculiarities are indicative of a genetic drift event that could be relatively recent.

The triform variant is still an enigma that requires additional study regarding its genetic nature and its relationship to other dental traits. Preliminary studies have shown that triform incidence runs in family lines (Bailey-Schmidt, in progress). It is also probable that this variant is part of the continuum for the *tuberculum dentale* complex. Part II of this study will address these issues. In the meantime, I am interested in other readers' thoughts and observations regarding this variant.

Fig. 2 Hard stone cast of a Papago Indian exhibiting the triform variant on both lateral incisors. Left UI2 has grade 1; right UI2 has grade 2 (Photo by S. Bailey-Schmidt).

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ACKNOWLEDGMENTS

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TABLE 1. Population variation of the triform variant.

		Absence	Triform	
Group	N	0	1	2
Americas				
Arikara	96	97.9	0.0	2.1
Hopi	101	96.0	0.0	2.0
Mohr	29	100.0	0.0	0.0
Navajo	105	99.1	0.0	0.9
Papago	107	90.6	2.8	4.7
Pima	100	86.0	3.0	7.0
Yaqui	116	100.0	0.0	0.0
Zuni	99	99.0	1.0	0.0
Eskimo	98	100.0	0.0	0.0
Polynesia				
Easter Island	101	100.0	0.0	0.0
Melanesia				
Solomon Islands	103	100.0	0.0	0.0
Asia				
Chinese	67	100.0	0.0	0.0
Asiatic Indians				
South African Indian	100	100.0	0.0	0.0
European				
S. African White	107	100.0	0.0	0.0
American White	97	100.0	0.0	0.0
Africa				
Bushmen	103	96.1	1.0	0.0
Bantu	107	100.0	0.0	0.0

The Matty Canyon Population: Dental Observations of Late Archaic Individuals from Southern Arizona

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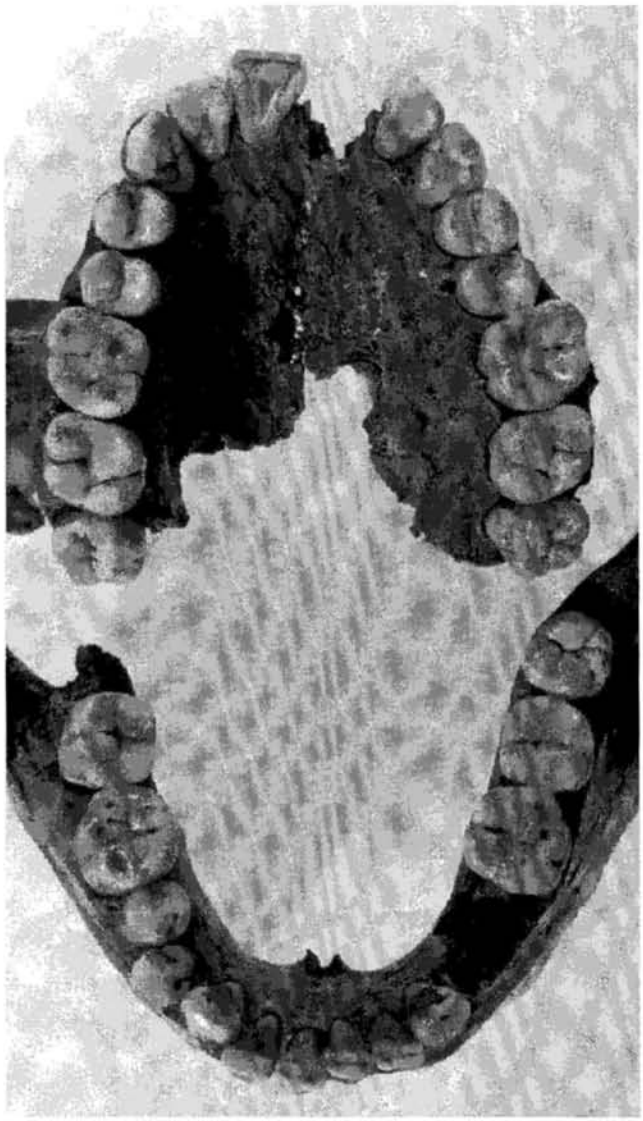
ABSTRACT Skeletal and dental material from the largest known burial population from the Late Archaic Period of southern Arizona was analyzed (Minturn and Lincoln-Babb, n.d.). Minturn performed the skeletal analyses, including the standard observations for age, sex, and pathologies. The dental analyses support a mixed economy subsistence of hunting - gathering and agriculture. This conclusion is based on observations for caries, enamel chipping, abscessing, and enamel hypoplasia.

THE MATTY CANYON SITES

The Donaldson Site and Los Ojitos are floodplain sites (Eddy and Cooley 1983, Huckell 1988) located in Matty Canyon, southeast of Tucson, Arizona. These pre-ceramic sites have been dated at 2800 to 2400 BP (Huckell, personal communication). Both sites produced multiple pit structures for habitation and storage. Evidence of maize and abundant remains of various wild faunal and floral resources were identified. These features are standard for many Late Archaic floodplain sites in the Tucson Basin (Roth 1992; Mabry and Clark 1994).



An example of the quality of preservation and general dental health of the Matty Canyon population (Burial 8, Los Ojitos, female 18-20 years). (Photo by K.D. Turner).

Eight primary burials and one multiple secondary burial with four individuals were excavated from the two sites. The primary burials were in simple pits without associated grave goods. According to Minturn, the nine burial features contained 19 individuals, seven of which were represented by only a few elements. Of the 19 individuals, 12 could be analyzed for dental pathologies.

DENTAL PATHOLOGIES

The assessment of dental pathologies in a burial population can provide useful information about the diet and general health of those people (Turner and Cadien, 1969; Turner, 1979; Schmucker, 1985; and Goodman and Rose, 1991). Observations for caries, enamel hypoplasia, abscessing, and enamel chipping, commonly employed in such studies, were carried out on the Matty Canyon samples.

Caries is a multifactorial disease that can manifest itself as a necrotic pit in the enamel or dentine. Consumption of sticky, processed carbohydrate foods contributes to the development of caries. A high frequency of caries may indicate a carbohydrate-rich diet. A number of high carbohydrate content foods were present in the prehistoric Southwest. These include maize, agave, yucca, mesquite, and acorns (Schmucker, 1985; Sobolik, 1994). The potential these foods have to contribute to caries formation depends on the processing technique. Age and host resistance factors, such as non-immunological characteristics of the saliva, may contribute to an individuals's caries susceptibility (Mendel, 1979).

Analysis of the five primary inhumations (all females) from Los Ojitos with intact and relatively unworn dentitions revealed 14 carious teeth out of 142 (9.9%). The carious lesions were small and mainly located interproximally. Antemortem and postmortem missing teeth prevented a proper assessment of the Donaldson sample.

The caries frequency fits into Turner's (1979) range (0.44 to 10.3%) indicative of a mixed economy and the range (2.3 to 26.9%) indicative of agricultural groups. One individual had seven caries. The amount of caries in the remaining four individuals ranged from zero to four (4.9%). The total caries frequency in the population places the Los Ojitos group in the mixed and agricultural range. However, when the outlier is omitted from the calculations, the sample belongs in the mixed economy and hunter-gatherer subsistence groups.

Prehistoric hunters and gatherers from California had a similar percentage of individuals affected with carious lesions (Walker and Erlandson, 1986). This was attributed to a high carbohydrate diet of indigenous tubers and roots.

Enamel hypoplasia is a macroscopic defect of the enamel that is usually due to some systemic interference (Pindborg, 1970). The cause of enamel hypoplasia has been attributed to episodic types of nutritional, pathogenic, environmental, and cultural stresses (Turner, 1979; Goodman et al., 1980; Walker, 1981; Goodman et al., 1984; Van Gerven and Beck, 1988; Ogilvie et al., 1989; Moggi-Cecchi et al., 1994). The pathology is more prevalent among prehistoric agricultural populations than hunters and gatherers (Goodman et al., 1980; Schmucker, 1985).

Out of the twelve individuals examined for enamel hypoplasia (hypoplastic pits, grooves on one or more teeth), only one evidenced this pathology. This finding suggests that the majority of the population did not experience pathology-inducing stress in their developmental years.

Enamel chipping has many causes. Chipping can result from using teeth as tools, as holding and gripping devices, and in food preparation. Enamel chipping is more prevalent in meat eating populations than in groups with an intensive agriculture subsistence (Turner and Cadien, 1969).

In this study, 13 tooth crowns from seven individuals show enamel chipping. The premolar and first molar tooth region contains most of the chipping. This location suggests use of premolars and molars for processing foods. The substantial amount of faunal remains recovered from both sites (B.B. Huckell, personal communication, 1994) indicates that bone breakage may have caused a significant amount of the chipping. Additional factors could be breaking seeds or nut hull fragments.

Abscessing, defined as at least one abscess per dentition, occurred in seven out of the twelve individuals examined for this pathology. The majority of the abscesses were small and did not involve significant degeneration of the alveolar bone. Most of the abscessing was associated with pulp chamber exposure from excessive attrition. Caries were infrequently observed in relation to the abscesses.

DENTAL WEAR ANALYSIS

Huckell and Huckell (1988) utilized the wear plane angle method (Smith, 1984) to examine these samples. They placed the Los Ojitos sample within the range for agriculturists. Molar wear of individuals omitted from the 1988 study also exhibited varying degrees of an oblique wear plane. Wear is generally more extreme on the posterior than anterior dentition. Although findings support the notion that the Matty Canyon population relied to some degree on agriculture, food consistency and processing techniques also may be influential factors contributing to an oblique wear pattern (P.L. Walker, personal communication, 1995).

SUMMARY AND CONCLUSIONS

High frequencies of enamel hypoplasia and caries are common for prehistoric agricultural groups of the Southwest (Berry, 1985; Schmucker, 1985; Turner, 1979). Only one individual out of 12 demonstrated physiological stress during the developmental years resulting in hypoplasia. The caries frequency is 9.9%, which is considered high for hunters and gatherers. A number of high carbohydrate foods besides maize were accessible for the Matty Canyon peoples. The amount of enamel chipping suggests substantial protein intake and the utilization of wild resources. Considering these observations and Huckell and Huckell's (1988) wear

analysis, I propose that a mixed economy of hunting and gathering with some agriculture provided subsistence for the Late Archaic individuals of Matty Canyon in southern Arizona.

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Milan Dokládal and a Tour of Brno in the Czech Republic

CHARLES MERBS
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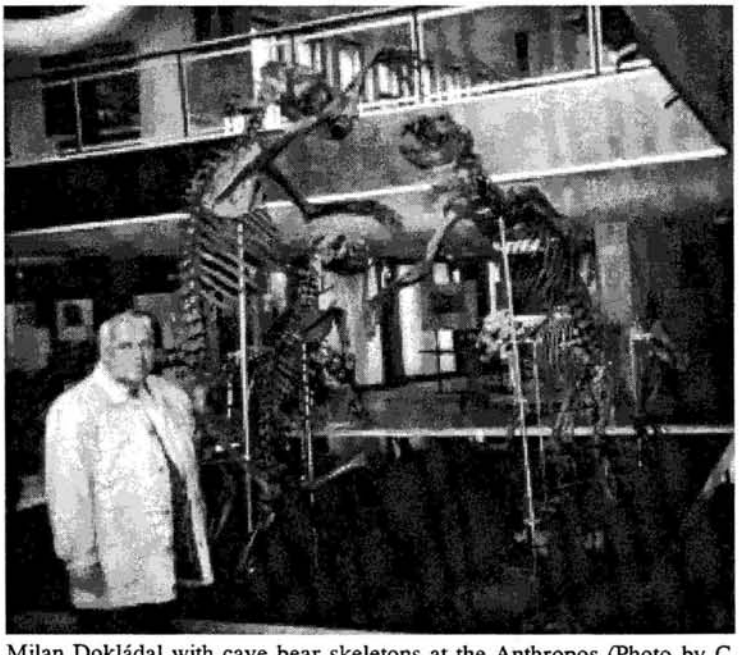
On the occasion of his 65th birthday in September of 1994, a *personalia* for Professor Milan Dokládal, M.D., Ph.D., Head of the Department of Medical Anthropology at Masaryk University in Brno, Czech Republic, was published in *Scripta Medica* (66:263-295, 1994). According to this article, in 1950 Professor Dokládal, then a medical student, developed the interest in physical anthropology that has lasted a lifetime. The article goes on to describe his professional career—his specialities (osteology, dental anthropology, and growth in children), the courses he taught, the administrative positions he held, the research he carried out, and the items he published. He "has always attracted young co-workers" to his field, a continuing activity that will assure a bright future for physical anthropology in the Czech Republic. Among the honors he received over the years is the Aleš Hrdlička Medal from the Czechoslovak Anthropological Association in Prague, and among his many professional memberships is the "Dental Anthropology Association (Tempe, Arizona)."

I first met Milan in 1973, when he participated in a symposium I chaired at the International Congress of Anthropology held in Chicago. During the following 20 years, his ability to travel was strictly curtailed by the communist government of Czechoslovakia. Not until September of 1994, were we were able to renew our friendship at the European Meeting of the Paleopathology Association in Göttingen, Germany. When I returned to Germany in October for a meeting in Berlin, I took the opportunity to visit Prague. Hearing about my presence in the Czech Republic, Milan informed me that he had a day, October 12, free of teaching and invited me to visit Brno as his guest. With great enthusiasm I accepted.

We began the visit to Brno with a tour of the Anthropos, an entire museum dedicated to human origins, where I photographed him amidst mounted cave bear skeletons. From the Anthropos, we went to the Mendelianum, the monastery where Gregor Mendel lived, conducted his famous genetic experiments, and eventually became Abbot. Today the Mendelianum serves as a museum dedicated to Mendel and his work and to the science of genetics in general. We also visited the building of an old school at No. 22 Jánská Street, where in 1865 Mendel read his now famous paper on peas.

Before visiting Milan's office in the anatomy building at Masaryk University, we had lunch at the Pegas, a brewpub with its own superb dark beer and excellent food. The anatomy building contains a museum with the skeletons of a giant and a microcephalic among its exhibits. In probably the only immediately functional laboratory (the building is undergoing massive reconstruction), I saw some of the skeletal remains that Milan is presently studying and met two of his very enthusiastic co-workers, Ladislava Horáčová and Lenka Benešová.



Milan Dokládal with cave bear skeletons at the Anthropos (Photo by C. Merbs).

Next, we visited a church, where the dead famous citizens of Brno, as well as the monks, became mummified. We capped off the day with a tour of the Moravian Museum, one of the most beautiful museums that I have ever visited. The archaeology exhibits, in particular, were as grand and informative (especially when you can read Czech) as I have seen anywhere.

Thank you for a fantastic and unforgettable day in your beloved Brno, Milan. I strongly recommend that every dental anthropologist traveling through central Europe take time to visit this important center of physical anthropology, archaeology, and genetics.

DENTAL ANTHROPOLOGY. By John R. Lukacs. Pictures of Record, Inc. 119 Kettle Creek Road, Weston, CT 06883, U.S.A. 1993. 90 slides, 29 pages explanatory text in binder. $150.00.

Research and Travel. What anthropologist denies the opportunity to do either? What student can resist the lure? The slide sets produced by Pictures of Record allow the viewer a taste of the field, whether it is on Easter Island or a physical anthropology laboratory in India. These and other specialized topical slide collections are designed for both instructional and archival purposes. The slides are the products of professionals in archeology, anthropology, and art history.

The slide set, *Dental Anthropology*, produced by John R. Lukacs, was informally shown to a class of ASU dental anthropology students and members of the Dental Anthropology Association. The following review is a synthesis of comments and opinions from that viewing.

Lukacs has organized this slide set from his vast research in south Asia. Most of the slides are photographs of material from sites in India and Pakistan, supplemented by some Canary Island dental examples. The slides are accompanied by a 29-page guide containing explanations and background of the sites from which the material was excavated, and a numbered inventory of the slides with a paragraph of provenience data, physical description, as well as additional information and comments for each.

This packet is a "must read" for anyone viewing and especially for a person presenting the slides. It is also a fascinating summary of some of Lukacs' and others' research in this field. The explanatory text is followed by a bibliography appropriate to the short discussions. Many of our test viewers commented on the usefulness of the packet descriptions. However, they felt that without a good sense of dental anthropology (or if slides are not in order), one could get confused about which slide was on screen. The solution offered to this problem was a discreet number somewhere on the slide image, allowing the viewer (and presenter) to easily match slide to text commentary.

The 90 slides are divided into six sections. These are: Location Maps and Archaeological Context, with a map and examples of the burials and other archeological details; Pathological Lesions; Morphological Traits; Wear Patterns; Anomalies and Occlusal Variation; and Data Interpretation: Graphics. Considering that most, if not all of the slides of the actual dental material were taken in the field, the test audience felt that the quality of the slides is surprisingly good.

The viewers had some minor critical remarks on the focus or composition of a few slides, but the overall commentary was "very good" to "excellent." However, one mystery slide, #22, raised a few questions. The text discusses the dental fluorosis that this maxillary dentition exhibits, but contains no explanation for the very weird shape of the palate. It is extremely narrow, and the audience could only guess that the shape is a result of either severe ground deformation or reconstruction attempt. This slide is very striking; an explanation would have been helpful.

The final slides are graphic representations of various data sets and comparisons, all specifically relevant to the India and Pakistan material. While such data could be more easily absorbed in printed context (why we read journals?), they did provide an example of visual presentation which is potentially useful for students and other workers who may not have attended many high-tech conferences. Certainly, the test audience saw merit in viewing some of the various ways in which information can be presented. The data themselves would best accompany a more detailed discussion of the archeology, anthropological goals, and specific research topics, perhaps not easily handled by the casual presenter.

Lukacs' slide collection, despite a few slides that lack the quality of the rest, is an excellent sample of dental anthropology of prehistoric India and Pakistan, as well as the Canary Islands. This collection is accompanied by a very useful and informative inventory and commentary on the slides. The topics are not just relevant to regional examples of dental variation, but would supplement a larger collection, on a world-wide basis. This slide set could certainly be useful for instructors who have not yet amassed their own collection of teaching slides. For those who are interested in south Asia, but have not had Lukacs' experience, *Dental Anthropology* provides an opportunity to examine first hand these examples of south Asian dentitions.

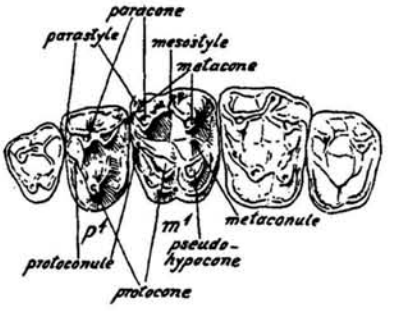
KORRI DEE TURNER
Arizona State University, Tempe, Arizona

On the Cope-Osborn Theory of Trituberculy

There once was a cusp, Protocone
Whose position as first was quite his own.
Osborn and Cope
Named him first on the slope.
But where's Hypo, and Meta, and Paracone?

The order of rising, by gum
Can be charted and ordered by some.
But science like this
Must contend with a twist.
So it's try, try again, trituberculum.

Kathy Swindler



Adapted from William King Gregory who adapted it from Henry Fairfield Osborn.

Dental Anthropology Association Section

Member News

Passing. Professor Dr. Odontology **P.O. Pedersen** died on August 26, 1994.

Transition. On April 1, 1995, **J.F. Van Reenen** will retire to 18 Lambecht Street, Denver Park, George 6530, South Africa.

Andrea Cucina sent the following note while visiting Florida Atlantic University last November. "Our program in dental anthropology, developed in the Laboratory of Anthropology of the Dipartimento di biologia Animale e dell'uomo, sez. Antropologia, is coordinated by Professor A. Coppa together with Dr. Domenico Mancinelli. Dr. Rita Vargiu and Dr. Andrea Cucina deal with the analysis of metric and non-metric traits, oral pathologies, enamel hypoplasias, and dental wear of central and southern Italian populations. We have some 50 necropolises spanning the Neolithic to the Middle Ages."

Looking Ahead: the 1995 annual business meeting

LINDA WINKLER, Arrangements and Nominations Chairperson
University of Pittsburgh, Titusville

The 1995 Dental Anthropology Association business meeting will be held during the American Association of Physical Anthropology Annual meetings in Oakland. It is scheduled for Thursday evening, March 29, from 7-8:00 pm. The location is Simmons Ballroom #1 in the Parc Oakland Hotel, the AAPA convention hotel. A cash bar will be available prior to the start of the meeting in order to provide subsistence for the deliberations.

The Dental Anthropology Association meeting will include the election of two officers: a Secretary-Treasurer and an Executive Board Member in charge of nominations and arrangements for the annual meeting. Shara Bailey-Schmidt and Debbie Guatelli-Steinberg have been nominated for secretary-treasurer. Brian Hemphill has been nominated for Executive Board member. A brief biographical sketch of each of the candidates is located below. Additional nominations may be sent to Linda Winkler at the University of Pittsburgh, Titusville campus, Titusville PA, 16354 (email: LAWUPT@VMS.CIS.PITT.EDU).

The Physical Anthropology Meetings will include two Dental Anthropology Association sponsored sessions. John Lukacs (University of Oregon) and G. Richard Scott (University of Alaska) have organized a symposium entitled the "Albert Dahlberg Memorial Symposium on Dental Morphology and Evolution." Brian Hemphill is chairing a poster session which has been organized from submitted abstracts for posters.

Additional symposia and poster sessions will interest members of the Dental Anthropology Association. They are 1.) "Prehistoric Human Skeletal Biology in Island Ecosystems: Current Status of Bioarchaeological Research in the Marianas Archipelago," a symposium with podium and poster presentations organized and chaired by D.H. Hanson (Forsyth Dental Center) and B.M. Butler (Southern Illinois University); 2.) "Evolution, History and Biological Anthropology. A Symposium in Honor of C. Loring Brace," organized and chaired by Kevin D. Hunt (Indiana University) and Lucia Allen Yaroch (University of Michigan); 3.) "Paleopathology and Dental Anthropology II: Contributed Papers," chaired by D. Weaver (Wake Forest University). The dates, times, paper topics, and authors are listed following the biographical sketches of the nominees for Dental Anthropology Association officers.

Candidates for DAA Officers

Secretary-Treasurer

Shara Bailey-Schmidt (B.A. Temple University) is finishing her M.A. thesis (defense, spring 1995) at Arizona State University. The thesis investigates the population distribution of the *tuberculum dentale* complex and anomalies of the anterior dentition. Bailey-Schmidt's research centers on dental microdifferentiation in living and ancient Native Americans and the anthropological value of minor dental traits. She has been an editor of the *Dental Anthropology Newsletter* for the past two years.

Debbie Guatelli-Steinberg (M.A., University of California, Davis; B.A., Stanford University; Teaching Credential, Oregon; Teaching Credential, Life Science, UCLA) is a doctoral student at the University of Oregon. Her M.A. theses was titled "Inbreeding Avoidance Related Dispersal in Primates." She plans to conduct dissertation research on linear enamel hypoplasia in non-human primates, investigating intrinsic and extrinsic factors influencing the patterning of its occurrence.

Executive Board Member

Brian Hemphill (Ph.D., University of Oregon) is Assistant Professor of Anthropology at Vanderbilt University. His primary area of interest concerns patterns of biological interaction and population history of the peoples of the Indian subcontinent. To pursue this interest, Hemphill has undertaken two lines of research: 1.) a diachronic investigation of odontometric and dental morphological variation among the living peoples of India, and 2.) a diachronic investigation of biological interactions among the prehistoric peoples. Hemphill has done research on Mesolithic peoples of the Gangetic Valley; Neolithic, Bronze Age, and Iron Age populations of the Indus Valley; and Bronze Age populations from the Central Asian Bactrian Oasis. Besides his south Asian research interests, Hemphill is examining the interaction between gross tooth size and morphological features and the relationship between the degree of inbreeding and bilateral asymmetry of odontometric and morphological parameters.

SYMPOSIA CONTAINING PRESENTATIONS OF INTEREST TO DAA MEMBERS

DENTAL ANTHROPOLOGY I: ALBERT A. DAHLBERG MEMORIAL SYMPOSIUM ON DENTAL MORPHOLOGY AND EVOLUTION

Thursday Morning, March 30, 1995

8:00 AM Introduction. G.R. Scott (University of Alaska, Fairbanks) and Mrs. Thelma Dahlberg.

8:15 A century of dental anthropology in South Australia. T. Brown (The University of Adelaide, South Australia).

8:30 Crown morphology and the processes of dental enamel formation. S.W. Hillson (University College, London, UK).

8:45 Crown pattern changes during enamel apposition. P. Smith, S. Spitz, and J. Becker (Hebrew University), M. Gomorri (Hadassah Hospital, Jerusalem, Israel).

9:00 Enamel and dentine thickness in 48,XXXX females' permanent teeth. L. Alvesalo (University of Oulu, Finland) and E. Tammisalo (University of Turku, Finland).

9:15 Dental Anthropology of 47,XYY males: molar cusp area, volume, shape, and linear measurements. J.T. Mayhall (University of Toronto, Canada), L. Alvesalo (University of Oulu, Finland), and G. Townsend (University of Adelaide, Australia).

9:30 Size and co-variation among deciduous teeth. Y. Mizoguchi (National Science Museum, Tokyo Japan).

9:45 Dental asymmetry in the deciduous dentition of South Australian children. G. Townsend and V. Farmer (The University of Adelaide, Australia).

10:15 Ontogenetic Intraspecific pattern of tooth size associations in humans. E.F. Harris (University of Tennessee, Memphis, TN)

10:30 Systematic angular and linear measurement side bias in five samples of human dentitions. D.H. Morris (Arizona State University, Tempe, AZ).

10:45 Origins and relationships of people buried in large Ukrainian Mesolithic Era cemeteries: the evidence from dental morphology. A.M. Haeussler (Arizona State University, Tempe, AZ).

11:00 High frequency archaic dental traits in modern sub-Saharan African populations. J.D. Irish (Arizona State University, Tempe, AZ).

11:15 Whose teeth are these? Carabelli's trait. C.G. Turner II and D.E. Hawkey (Arizona State University, Tempe, AZ)

11:30 Assessment of enamel hypoplasia in a high-status burial site. A. Cucina (Universitá Cattolica, Italy) and M.Y. İşcan (Florida Atlantic University. Boca Raton, FL).

11:45 Variation in the dental health of South American Indian horticulturalists. P.L. Walker, L. Sugiyama, and R. Chacon (University of California, Santa Barbara, CA).

12:00 Discussion, Comments, and Closing. J.R. Lukacs (University of Oregon, OR) and Mrs. Thelma Dahlberg.

DENTAL ANTHROPOLOGY II: POSTERS

Thursday Morning, March 30, 1995

8:30-10:00 AM Authors of Even-Numbered Posters Available

10:30-12:30 AM Authors of Odd-Numbered Posters Available

1. Deciduous Dental Microwear in Live, Wild-caught *Alouatta palliata*. A. Pokempner, M.F. Teaford, R.F. Pastor, V.E. Noble, C.L. Burnell (Johns Hopkins University, Baltimore, MD), K.E. Gander (Duke University, Durham, NC).
2. The Use of Two-Dimensional Fournier Analysis in Dental Microwear Studies. S.M. Bloor, S.W. Hillson (University College, London, UK).

3. Dental Microwear in Caucasian, American *Homo sapiens*: Preliminary Results. V.E. Noble, M.F. Teaford (Johns Hopkins University, Baltimore, MD).
4. Tooth Size, Caries, Mortality, and Natural Selection in the 6th-3rd c. B.C. Greek Colony of Metaponto, South Italy. R.G. Henneberg (University of the Witwatersrand, South Africa).
5. Different Patterns of Enamel Hypoplasia between Prehistoric Navajo Reservoir and Grasshopper Pueblo populations. B.E. Ensor (Archaeological Consulting Services, Ltd., Tempe, AZ), J.D. Irish (Arizona State University, Tempe, AZ).
6. Linear Alveolar Bone Loss Reproducibility in Longitudinal Studies. C.F. Hildebold, T.K. Pilgram, N. Yokoyama-Crothers, J.L. Helbig, J. Hauser, S. Cohen, M. Vannier (Washington University, St. Louis, MO), M.K. Shrout (Medical College of Georgia, Augusta, GA), W. Loesche, J. Giordano (University of Michigan, Ann Arbor, MI).
7. Sexual Dimorphism in the Deciduous Dentition and Dental Arch of Modern Native American Indians. L.J. Hall (Arizona State University, Tempe, AZ).
8. Development of a Dental Emergence Aging Standard Applicable to the Zambian Population: a Comparison of the Accuracy of Three Methods. R.M. Gillett (Indiana University, Bloomington, IN).
9. Development of the Permanent Dentition in the Libben Population. S.E. Simpson (Case Western Reserve University and Cleveland Museum of Natural History, Cleveland OH).
10. Skeletal Growth Deficits and Dental Development in the Barton on Humber Skeletal Population. R. Wiggins, J. Rogers (University of Bristol, UK).
11. Three-rooted Mandibular Molars and Their Incidence in Southern Northwest Coast Populations: Implications for Southwestern Oregon Prehistory and the Peopling of the New World. G.L. Tasa (University of Oregon, Eugene, OR).
12. Population Distribution of the *tuberculum dentale* Complex and Anomalies of the Anterior Maxillary Teeth. S.E. Bailey-Schmidt (Arizona State University, Tempe, AZ).
13. Development of the *crista obliqua*. N.J. Swails, D.R. Swindler (University of Washington, Seattle, WA).

EVOLUTION, HISTORY AND BIOLOGICAL ANTHROPOLOGY
A SYMPOSIUM IN HONOR OF C. LORING BRACE

Thursday Afternoon, March 30, 1995

1:00 PM A Multidimensional Approach to Human Evolution C. Loring Brace in Retrospect. K.D. Hunt (Indiana University, Bloomington, IN) and F. Spencer (Queens College, CUNY, NY).

1:15 Developmental Age of the KNM-WT 15000 *Homo erectus* in Broad Perspective. B.H. Smith, K.L. Brandt (University of Michigan, Ann Arbor, MI) and R.L. Tomkins (University of Illinois, Urbana, IL).

1:30 An Atypical Neandertal: Cranial Shape in the "Old Man" from La Chapelle. L.A. Yaroch (University of Michigan, Ann Arbor, MI).

1:45 Was Lucy Single? D. Falk (SUNY, Albany, NY).

2:00 Early Hominid Ecology: Stable Bone Isotope Ratios as Probes. M.J. Schoeninger (University of Wisconsin, Madison, WI).

2:15 Biomechanical Changes in Long Bone Diaphyses with the Intensification of Agriculture in the Lower Illinois Valley. P.S. Bridges (Queens College, SUNY, NY).

2:30 Paleoanthropological Discoveries at the Taza Locality, Jijel Algeria. Part I: The Human Skull. R.J. Meier and M. Sahnouni (Indiana University, Bloomington, IN).

2:45 Human Tooth Wear Studies: The Revival of Experimental Research. S. Molnar (Washington University, St. Louis, MO), J. Kaidonis and L. Richards (University of Adelaide, South Australia).

3:15 Correlates of Browridge Thickness in Two Species of *Macaca*. S.M. Garn (University of Michigan, Ann Arbor, MI).

3:30 On Sociopolitical Influences and the Perception of Hominoid Differences. R.W. Wilkinson (SUNY, Albany, NY).

3:45 Is There an Asian Pelvic Morphology? K.R. Rosenberg (University of Delaware, Newark, DE).

4:00 Species Boundaries, Bounding Fossils: Odontometric Variation in Anthropoidea. V.J. Vitzthum (University of California, Riverside, CA).

4:15 Energy Flow and Hominid Ecology. W.R. Leonard and M.L. Robertson (University of Guelph, Guelph, Canada).

4:30 The Relationship of Medical Genetics to Eugenics and Early Genetics in America. S.L. Smith (University of Texas, Arlington, TX).

4:45 Invisible, Becoming Visible: Genetic Underpinnings of Dental and Skeletal Traits. K.M. Weiss (Pennsylvania State University, University Park. PA).

5:00 Childe Loring: Personal and Professional Reminiscences of Colleagues, Friends, and Family. R. Kaplan (RAND Corporation, Santa Monica, CA).

5:15 Discussion: A Last Word from Loring Brace.

PREHISTORIC HUMAN SKELETAL BIOLOGY IN ISLAND ECOSYSTEMS: CURRENT STATUS OF BIOARCHAEOLOGICAL RESEARCH IN THE MARIANAS ARCHIPELAGO

Friday Morning, March 31, 1995

Podium Presentations

1. A Biocultural Perspective on Marianas Prehistory: Recent Trends in Bioarchaeological Research. D.B. Hanson (Forsyth Dental Center, Boston, MA).
2. Population History and Dynamics: Prolegomenon to Marianas Skeletal History. J.H. Underwood (University of Arizona, Tucson, AZ).
3. Toward an Explanation of Diversity in Late Phase Burials on Guam. R. Hunter-Anderson (Micronesian Archaeological Research Services, Guam).
4. The Population Affinity of the Prehistoric Inhabitants of Gognga-Gun Beach, Guam. B.E. Anderson (U.S. Army Central Identification Laboratory, HI).
5. A Preliminary Assessment of Health and Disease in the Prehistoric Inhabitants of the Mariana Islands. M. Pietrusewsky, M.T. Douglas, and R. Ikehara-Quebral (University of Hawaii, HI).
6. Skeletal Biology of Apurguan, a Pre-Contact (pre-1521) Chamorro Cemetery on Guam. M.T. Douglas, M. Pietrusewsky, and R. Ikehara-Quebral (University of Hawaii, HI).
7. Dental Enamel Hypoplasia in Guam Late Phase Burials. A.L.W. Stodder (Paul H. Rosendahl, Inc., HI).
8. An Epidemiological Evaluation of Stress-markers in Prehistoric Human Remains from Guam. T. Suzuki (Tokyo Metropolitan Institute of Gerontology, Japan).
9. Stable Isotope Analysis of Human Diet in the Marianas Archipelago. S.H. Ambrose (University of Illinois, IL), B.M. Butler (Southern Illinois University, IL), D.B. Hanson (Forsyth Dental Center, MA), and R. Hunter-Anderson (Micronesian Archaeological Research Services, Inc., Guam).
10. Mitochondrial DNA Polymorphisms in Modern and Ancient Pacific Islanders. E. Hagelberg (University of Cambridge, Cambridge, UK).

Poster Presentations

1. Spatial Distribution and Mortuary Procedure in the Marianas. M. Ryan (University of Latrobe, Melbourne, Australia).
2. The Prehistoric Inhabitants of Afetna, Saipan: Health and Social Status. N. Tayles (University of Otago Medical School, Dunedin, NZ).
3. Occipital Superstructures in Pacific Islanders: Differential Diagnosis. G.M. Heathcote (University of Guam), D.H. Hanson (Forsyth Dental Center, MA), and B.E. Anderson (U.S. Army Central Identification Laboratory, HI).
4. Cultural Modification of Human Teeth in the Mariana Islands. R. Ikehara-Quebral and M.T. Douglas (University of Hawaii, HI).
5. A Morphological and Elemental Examination of Betel-stained Teeth from Pre-contact Remains from Guam. D. Stern and D.B. Hanson (Forsyth Dental Center, MA).
6. Treponemal Infection in Pre-contact Western Micronesia. D.L. Trebly (Paul H. Rosendahl, Inc. HI).
7. Spondylolysis in Prehistoric Human Remains from Guam. B. Arriaza (University of Nevada at Las Vegas, NV).
8. Craniofacial Affinities of Mariana Islanders and Circum Pacific Peoples. T. Hanihara (Tohoku University, Sendai, Japan).
9. Skeletal Morphology of Prehistoric Human Skeletal Remains from Guam. H. Ishida (Sapporo University, Sapporo, Japan) and V. Dodo (Tohoku University, Sendai, Japan).

PALEOPATHOLOGY AND DENTAL ANTHROPOLOGY II: CONTRIBUTED PAPERS

Saturday, April 1, 1995

2:15 PM Physiologic Stress in the Prehistoric Northern Great Basin: Malheue Lake, Oregon. G.C. Nelson (University of Oregon, Eugene, OR) and B.E. Hemphill (Vanderbilt University, TN).

3:15 Preliminary Observations of the Dental Pathologies of the African Burial Ground Skeletal Populations. M.E. Mack, M.L. Blakey, and M.C. Hill (Howard University, D.C.).

3:30 Modernization Changed the Frequencies, But Not the Onset Age of Linear Enamel Hypoplasias in Maya Populations from Yucatan, Mexico. F.D. Gurri (Indiana University, Bloomington, IN) and G. Balam (CINVESTA-Unidad, Merida, Yucatan, Mexico).

3:45 Antemortem Tooth Loss and Dental Fractures among Prehistoric Canary Islanders: Evidence of Traditional Combat? J.R. Lukacs (University of Oregon, OR) and J.D. Irish (Cultural Resource Group, Louis Berger & Associates, Phoenix, AZ).

4:00 Continuity/Discontinuity in Central-southern Italian Populations During the Metal Age: Dental Metric and Non-Metric Trait Evidence. A. Coppa, M. Colafranceschi, R. Vargiu (University of Rome, "La Sapienza", Italy), A. Cucina (Catholic University of Rome, Italy), and D. Mancinelli (University of L'Aquila, Italy).

4:15 Trade or Travel: A Dental Morphological Examination of Diachronic Variations between the Oxus Civilization and the Indus Valley. B.E. Hemphill, A.F. Christensen (Vanderbilt University, TN), S.I. Mustafakulav (Uzbek Academy of Sciences, Uzbekistan).

4:30 Dental Morphological Variability among Middle Holocene Native Americans: A Reassessment of the Greenberg Model. J.F. Powell (Texas A&M University, TX).

4:45 Parametric Survival Analysis of Deciduous Tooth Emergence in Four Populations. D.J. Holman (Pennsylvania State University, University Park, PA) and R.E. Jones (University of Wisconsin, Madison, WI).

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