

Dental Anthropology Newsletter

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Presidential Address

John R. Lukacs

Following my induction as the fifth president of the Dental Anthropology Association in Denver, Colorado, last March, I have had few opportunities to reflect upon the current and future direction of the Association. Therefore, my "state of the association address" will be postponed for a later issue of the newsletter, and this address will focus upon recent (summertime) developments in dental anthropology.

My spring and summer included two activities that were directly relevant to the membership: 1) G. Richard Scott and I planned the Albert A. Dahlberg Symposium on Dental Morphology and Evolution to be held at the annual meeting of the American Association of Physical Anthropologists in Oakland, California; and 2) Phil Walker, DAA president-elect, and I attended the Xth European meeting of the Paleopathology Association in Göttingen, Germany.

Planning the Dahlberg Symposium was a task I accepted due to sentiments expressed during the Denver business meeting that members of the executive board play a prominent role in DAA-sponsored symposia. While this might routinely consist of the president or president-elect presiding or serving as discussant at DAA-sponsored symposia, in this case the symposium topic, a memorial for Albert A. Dahlberg, was a meritorious one, and I agreed to co-organize and co-chair it with G. Richard Scott. The tentative list of participants and paper topics is provided below, and I feel the topical breadth of participants and the broad international participation stands as a true reflection of Dahlberg's impact on the discipline, both in the United States and internationally. I hope to meet many new members of the association at this important event. Details of date, time, and location of the symposium will be announced in the next newsletter.

My second summer activity was also novel, since it was the first time that I participated in the Paleopathology Association's European meeting. Michael Schultz (Zentrum Anatomie, Georg-August-Universität Göttingen) organized and hosted the meeting, which was a tremendous success. Twenty-eight nations were represented. Four days of scientific papers (83 papers), paleopathology quizzes, five poster sessions, mummy displays, 3-D x-ray videos, multi-colored histological preparations with musical accompaniment, and a diverse array of workshops made this meeting one of the best that I have attended.

While two small sessions were devoted to diseases of the teeth and tooth sockets, only six papers (about 7%) directly addressed issues in dental paleopathology. Caroline Arcini (Sweden) discussed one-sided chewing in association with very large unilateral accumulations of dental calculus covering the occlusal surfaces of cheek teeth. The dental pathology of two 19th century Dutch skeletal populations were described by Constance-Westermann (Netherlands), who focused on methodological issues, and by Wilbert Bouts (Netherlands), who presented epidemiological findings. The value of studying dental calculus by electron microscopy to evaluate the bacterial flora of the oral cavity was emphasized by J. Hershkovitz and B. Arensburgh (Israel), whose samples consisted of Natufian, Pre-pottery Neolithic, Bronze Age, Roman, and Arabian teeth. Three cases of uncommon enamel hypoplasia from pre-Columbian Mexico were presented by Jose Antonio Pompa (Mexico). My talk reported rates of antemortem tooth loss and dental fractures among prehistoric inhabitants of the Canary Islands, and hypothesized that traditional ritual combat might be partly responsible.

A "behind the displays" tour included an opportunity to examine "Junker's teeth," which are second and third lower molar teeth from the Vth Egyptian Dynasty first described by Hermann Junker in 1919. These teeth are held together by gold wire, which was originally interpreted as having been installed in life to hold



John Lukacs examining "Junker's teeth" in the Roemer-Pelizaeus in Museum, Hildesheim, Germany, during the Paleopathology Association's European Meeting. Photo by Wilbert Bouts.

the second molar, which had broken roots, in place. In the most recent *Dental Anthropology Newsletter* (8[3]:2-8), Marshall Becker suggested that the roots were broken postmortem, and that the specimen may have served as a talisman or amulet, an interpretation that I regard as more likely.

The next issue's presidential address will focus on the current state of the association and directions for the future. The president strongly urges members to write (address in membership section), fax (503-346-0668), or e-mail (JRLUKACS@OREGON.UOREGON.EDU) their comments, concerns, and ideas for future development and enhancement of the association. Members are encouraged to send the editor brief topical articles, news, and views. Especially welcome are summaries of current work and events pertaining to dental anthropology in departments. This is our newsletter. It will grow and flourish as each of us takes an active role in submitting news, articles, current events, and letters to the editor. I am happy to serve as the association's president and look forward eagerly to communications from members.

Preliminary Program: Albert A. Dahlberg Memorial Symposium on Dental Morphology and Evolution

Sponsored by the Dental Anthropology Association. Organized by John R. Lukacs and G. Richard Scott Symposium will take place in Oakland California during the AAPA meetings March 29-April 1, 1995.

G.R. Scott and Mrs. Thelma Dahlberg: Introduction.

T. Brown: A century of dental anthropology in south Australia.

S.W. Hillson: Crown morphology and the processes of dental enamel formation.

P. Smith, S. Spitz, and J. Becker: Crown pattern changes during enamel apposition.

L. Alvesalo and E. Tammissalo: Enamel and dentine thickness in 48,XXXX females' permanent teeth.

J.T. Mayhall, L. Alvesalo, and G. Townsend: Dental Anthropology of 47,YYY males: molar cusp area, volume, shape, and linear dimensions.

Y. Mizoguchi: Size and co-variation among deciduous teeth.

G. Townsend and V. Farmer: Dental asymmetry in the deciduous dentition of South Australian children.

E.F. Harris: Ontogenetic intraspecific pattern of tooth size associations in humans.

D.H. Morris: Systematic angular and linear measurement side bias in five samples of human dentitions.

A.M. Haeussler: Origin and relationships of people buried in large Ukrainian Mesolithic Era cemeteries: the evidence from dental morphology.

J.D. Irish: High frequency archaic dental traits in modern sub-Saharan African populations.

C.G. Turner II and D.E. Hawkey: Whose teeth are these: Carabelli's trait.

A. Cucina and M.Y. İşcan: Assessment of enamel hypoplasia in a high-status burial site.

P.L. Walker, L. Sugiyama, and R. Chacon: Variation in dental health of American Indian horticulturalists.

J.R. Lukacs and Mrs. Thelma Dahlberg: Discussion, Comments, and Closing.

Mirror Imaging in Twins: Some Dental Examples

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Mirror imaging is a fascinating phenomenon that has been estimated to occur in around 25% of monozygous (MZ) twin pairs (Springer and Deutsch, 1981), although we are unaware of any detailed studies of its frequency in human populations. Other terms used to describe instances where one twin "mirrors" the other for one or more features include specularity, enantiomorphy, and asymmetry reversal. Numerous examples of mirror imaging have been described for different body features such as fingerprint patterns, direction and position of hair whorls, position of body organs (*situs inversus*), and discordance for handedness.

We recently reported cases of mirror imaging in the dentitions and faces of South Australian twins enrolled in an on-going study of dentofacial variability at the Department of Dentistry, University of Adelaide (Townsend et al., 1992; Brown et al., 1992). Examples included mirror imaging for dental crown size, crown morphology

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(e.g. Carabelli's trait), timing of tooth emergence, tooth rotations and crowding, tilting of teeth, agenesis of teeth, and dental arch shape. Several other authors have also reported interesting cases of mirror imaging in the dentition (e.g. Staley and Green, 1974; Schneider, 1985; West, 1985; Carton and Rees, 1987; Nik-Hussein and Salcedo, 1987; Beere et al., 1990).

The classical explanation for mirror imaging arose from early experiments where *situs inversus* was produced in twin newts by ligating the embryos. The twins were thought to have arisen from opposite halves of the original embryo, with the missing halves being replaced by uncommitted tissue (see Boklage, 1980). More recently, mirror imaging was suggested as possibly being associated with a delay in the timing of the twinning event. Monozygous twins can form at any time up to about ten days post-conception. Those with separate chorions are presumed to develop during the first five days, whereas those who share a chorion are thought to have formed sometime between six and nine days after conception. Approximately 30% of MZ twins are dichorionic, while about 60% are monozygotic. A small percentage of MZ twins have a single amnion and chorion, and these individuals are thought to have formed around nine to ten days after conception. Further delay in the twinning process is thought to lead to the rare occurrence of conjoined twins (Boklage, 1981).

If mirror imaging is associated with delayed cleavage of twins, one would expect a greater frequency of occurrence in monozygotic twins than in dichorionic twins. Unfortunately, evidence for this is limited (Hay and Howie, 1980), although our preliminary findings in South Australia twins indicate that this is a line of research worth pursuing (Townsend et al., 1992).

The two examples of mirror imaging presented in this article involve unilateral agenesis of permanent mandibular second premolars in MZ pairs. In both cases zygosities were confirmed by comparison of blood groups, as well as by various serum and enzyme polymorphisms. No information on chorion-type was available for either pair of twins. Birth weights were 3.4 and 3.6 kg for the males and 3.0 and 2.9 kg for the females.

Figure 1 shows MZ twin boys (A and B), aged 14 years, nine months, along with panoramic radiographs of their dentitions. The mandibular right second premolar is congenitally absent in twin A, whereas the mandibular left second premolar is missing in twin B.

Figure 2 depicts MZ twin girls aged 10 years, nine months, also with missing mandibular second premolars. In twin B the left tooth is missing, whereas in twin A the right tooth is absent.

Assessments of dental age based on the system described by Demirjian et al. (1973) indicated delays of 24 to 26 months in dental development in both sets of these twins. Furthermore, crown sizes of emerged

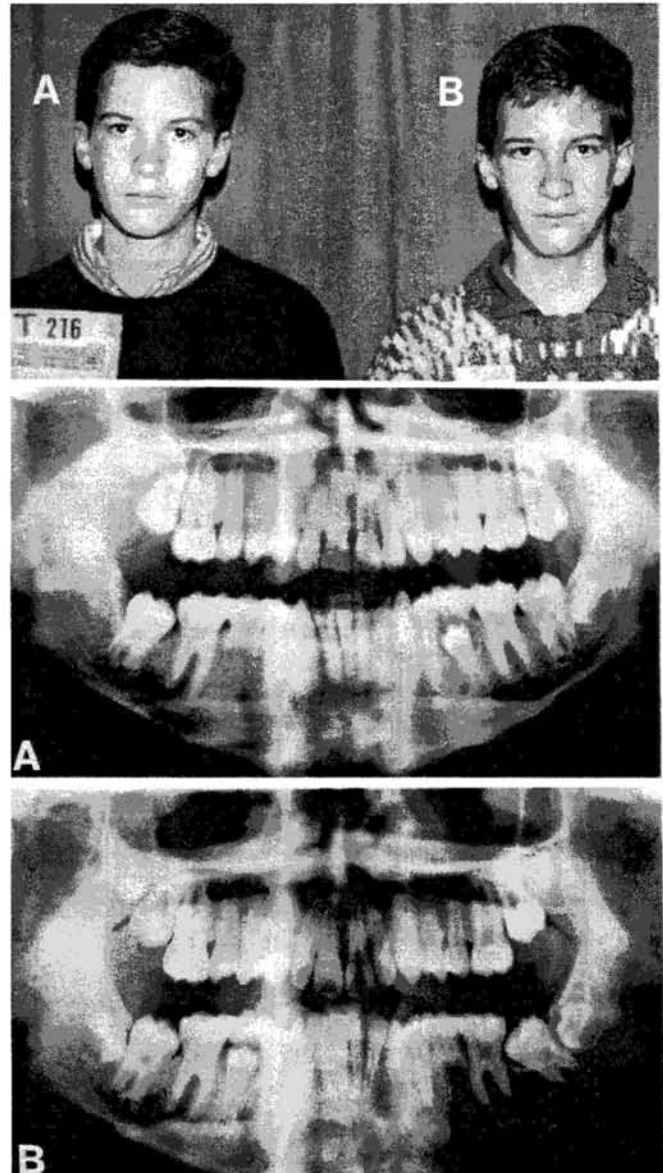


Fig. 1. Monozygous twin boys (A and B), aged 14 years, 9 months. Panoramic radiograph A (twin A) lacks a right mandibular second premolar (empty socket under right dm2, seen on the left in the photograph). Panoramic radiograph B (twin B) lacks a left mandibular second premolar (empty socket under left dm2, seen on the right in the photograph).

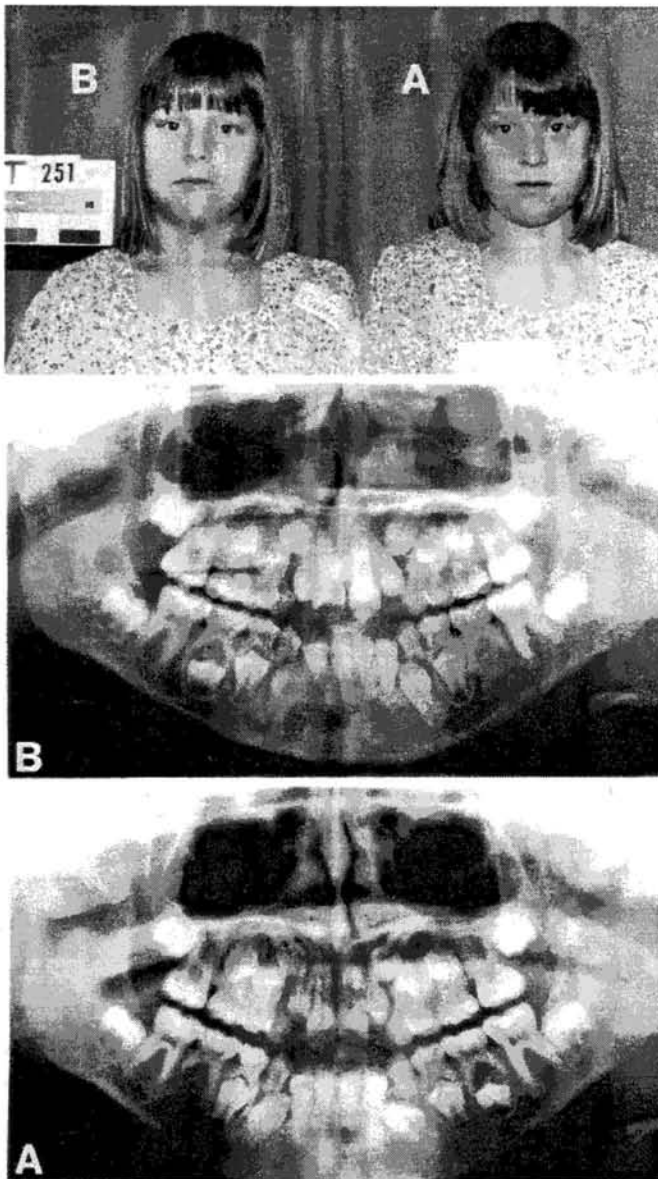


Fig. 2. Monozygous twin girls (B and A), aged 10 years, 9 months. Panoramic radiograph B (twin B) lacks a left mandibular second premolar (empty socket under left dm2, seen on the right in the photograph). Panoramic radiograph A (twin A) lacks a right mandibular second premolar (empty socket under right dm2, seen on the left in the photograph).

likely result from the chance effect of minor developmental disturbances of bilateral structures, rather than being due to some basic alteration in determination of body symmetry associated with the twinning process.

As we have suggested previously (Townsend et al., 1992), more studies of twin pairs who display mirror imaging for several features, as well as their families, are needed to unravel the biological basis for mirror-imaging. If any DAA members can help us, we would be very interested to hear from you.

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permanent teeth are generally smaller than normal, particularly in buccolingual dimensions of mandibular incisors where sex-specific Z-scores ranged from -0.6 to -2.3. Neither of the twin pairs showed any other obvious mirror imaged features, apart from their missing teeth

These two cases raise interesting questions, not only about the biological basis of mirror imaging, but also about the genetics of missing teeth. The genetic basis of hypodontia is accepted, but the exact mode of inheritance remains unclear. Both monogenic and multifactorial etiologies have been proposed (Graber, 1978). That agenesis tends to be more common in certain teeth, e.g., permanent upper lateral incisors, second premolars, and third molars — the distal, later-forming teeth in each class, is also known. Furthermore, agenesis, delayed calcification, and reduced size of the remaining teeth are associated with one another (see review by Garn, 1977).

Brook (1984) has proposed a multifactorial threshold model, including polygenic and environmental influences, that links tooth size and number. This model postulates an underlying continually variable distribution or liability related to tooth size, with superimposed thresholds determining missing teeth or supernumeraries. He postulates that the genetic component of the multifactorial system is distributed throughout the genome.

An inherited liability to agenesis, therefore, may not target specific teeth, but rather affect the whole dentition. However, later forming teeth, that form over long periods, may be more likely to be influenced by developmental disturbances, and, therefore, fail to develop. Under this general polygenic model, discordance between twins for sidedness of agenesis could purely be a chance event, occurring in those MZ twins whose similar genetic constitution places them below a developmental threshold. Indeed, many, or perhaps most, isolated examples of mirror imaging in twins

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SPURIOUS "EXAMPLES" OF ANCIENT DENTAL IMPLANTS or APPLIANCES Part Two of a Series

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ABSTRACT In addition to the various copies of ancient dental appliances, enormous numbers of reports deal with fanciful and unverifiable examples. These spurious dental bridges (or fake ancient crowns, inlays, or fillings) have been traced to their sources. While most of these spurious examples, such as the "stone" implant from Turkey (Atilla, 1993), discussed below, are found in the secondary literature, a few are accepted by scholars who were well versed in ancient dentistry (Guerini, 1909:68,n 1). In most cases, these spurious examples are the result of wishful thinking combined with poor referencing of earlier secondary sources, ignorance of the technology involved in the construction of dental appliances, and a lack of scholarly communication.

SPURIOUS DENTAL IMPLANTS

The classical literature is filled with references to ancient gold dental appliances in the Circum-Mediterranean region (Clawson, 1933; Becker, 1992; Ms. A), with the first documentation of discovery of an Etruscan gold dental appliance dating to the end of the 18th century (Böttiger, 1797). The archaeological verification of these publications appears to have spawned numerous reports which cannot be confirmed. Spurious accounts of ancient dental appliances were so common that Van Marter (1885, 1886) spent considerable time attempting to trace supposed Egyptian examples, which generally turned out to be amulets (Bonner 1950). Mummery (1870) had already discounted claims of early Egyptian examples, but the poor scholarship and the gullibility of authors over the decades has filled the literature with fanciful accounts. Weinberger's (1948:77-81) excellent review dismissed most of these tales, but he later generated still more mythical examples (Waarsenburg 1991:243, notes 13, 20). A review of commonly noted examples of spurious dental appliances and implants appears below.

The "Dental Bridge" in the Skull of Pliny A skull with a non-matching mandible, together with "Pliny's sword," is now on display in the Museo Storico dell'Arte Sanitaria of the Accademia di Storia dell'Arte Sanitaria in Rome. Although, the provenance is imprecise (Waarsenburg, 1991), the skull and a mandible have been "identified" as belonging to Pliny the Elder, who died in the eruption of Vesuvius in 79 AD (Cannizzaro 1901; Micheloni 1976: 311).

According to Baglioni (1952), evidence suggests that the mandible had been fitted with a dental bridge and had undergone oral surgery. In January of 1991, Dr. Waarsenburg took me to the Museo dell'Arte Sanitario in Rome to examine the mandible. No indication of any dental appliance, artificial drilling, or filing could be found in the mandible (Becker, Ms. B). Unfortunately, Waarsenburg's (1991) manuscript repeating the story about the dental bridge had already gone to press.

Baglioni's "Bridge" In addition to the "dental work" in the "skull of Pliny," Baglioni (1952:14-20) also suggested great antiquity for a gold dental plate with a set of 12 sockets purported to hold teeth, which came from "la campagna etrusco-laziale" in private hands. Bobbio (1958:370) gave the date for this piece as the Roman Imperial Period, but this clearly appears to be in error. This item may be an example of dentistry dating from after 1700 AD, the "golden" age of dental bridges.

The specimen now is missing or unknown (De Vecchio, 1939:85,fig.), but Bobbio (1958:370,fig.16) contains an illustration of the piece with a note stating that the object or the photograph was in the collection of Prof. S. Baglioni in Rome. In my opinion, given Baglioni's fabrication on the "skull of Pliny," one may discount this reference to ancient dentistry. Waarsenburg (1990:n.5, No.16, notes 5,8,n13), however, accepted Baglioni's statement and included this spurious "denture" in his inventory, thereby adding support for this second "spurious" example to the literature.

Cali's Creations Three spurious examples were created or listed in a single publication by Cali (1901). Since no other author has incorporated any of Cali's specimens into a subsequent inventory, all three are listed here together. They are a mummy (?) in Thebes found by Prof. Sanders about 1880 (Cali 1901:5), a maxilla from a mummy in the Meyer Museum in London (Cali 1901:10, and a specimen in the Vatican Museum (Cali 1901:11).

Cali's (1901:11) reference to a real specimen from the Museo di Papa Luigi, the Valsiarosa appliance shown in Figure 1 (Becker Ms. A:No.15), is one and the same as his piece from the Museo di Antichita' nella Villa di Papa Giulio III. Cali believed they were 2 separate pieces, as did Weinberger (1948:125, 145), who attributed "one" to the Etruscans and the "other" to the Romans (see Waarsenburg 1990:note 20). Thus, the Valsiarosa appliance has multiplied in the literature.

Platschick's Piece from "Populonia" According to Waarsenburg (1990:n.1), Ghinst (1930) took this appliance from Valsiarosa, one of the less documented specimens, and "moved" it to a maxillary position. He then claimed that it came from a IV century BC context from Populonia.

Marzabotto near Bologna Count Pompeo Aria apparently provided Dunn (1894:4-5) with the following information (Waarsenburg, pers. com.). The Count had in his possession a gold pendant in the



Fig. 1. Valsiarosa appliance in the Museum in Civita, Castellana, Italy. The appliance does not derive from this skull. The appliance fit over four maxillary incisor spaces with a false tooth for a central incisor. However, the maxillary incisors for this skull were present at death. Note the rivet dividing the third "ring" from the left. Photo by M.J. Becker.

form of a human incisor (Dunn 1894:4), which Platschick (1904-05:239) described as a deciduous tooth mounted in gold with a ring for suspension. This pendant, which may have incorporated a real human tooth, is not a recycled dental appliance, as some authors suggest.

Count Aria also said that he once possessed a skull, which contained an artificial tooth attached with a gold wire (band?). According to Dunn (1894:5), "This skull was sent with other Etruscan objects to a foreign scientific society, but was never returned to Count Aria." However, Dunn (1894:4) indicated that he owned the skull and mandible with a complex gold band (from Poggio Gaiella) which he subsequently donated to the Museo Archeologico Etrusco in Florence (Inventory No. 11782), where it can be found today (Fig. 2). The

appliance can now be demonstrated to have been made for another person, not for the skull in which it is now found (Becker MS. A:No.5).

Vetulonia "Crowns", Florence This series contains perhaps the most cited "examples" of artificial dentistry from antiquity. It consists of eleven human dental crowns from which the roots had deteriorated postmortem. All the teeth had been stained green from contact with a corroding copper or bronze coin placed in the mouth or from a bronze artifact that was part of the tomb offerings (Capasso, 1986:52). The teeth were found in four different tomb contexts, and thus represent at least four different people.

The teeth, were recovered from the Vetulonia necropolis area, northeast of Monte di Colonna (Falchi, 1885:98-114, 398-417, Tav. VI, XII, VII-IX; Levi, 1931; Casotti, 1957, fig. 1). They are now in the collections of the Etruscan Archaeological Museum, Florence (Inventory Nos. 7820-7824; Bliquez, in press). Early references on the teeth include Dunn (1894:3) and Falchi (1885, 1891, 1908).

Several reviews of archaeological data and interpretations of the stained teeth contain conclusions that the teeth are human dental crowns, stained from contact with bronze, whose dentine and roots had disintegrated postmortem (Platschick, 1904-05:239, fig. 1; Brown, 1934:958-9; Weinberger, 1941:1853; Casotti, 1957:105-111, fig. 7, citing Falchi, 1891:67; Bobbio, 1958:368, fig. 15 from Casotti, 1957). However, the teeth have also been identified incorrectly as early artificial cast gold crowns or a dental appliance by Guerini (1909:70, figs.13, 14), who may have been confused by the metallic appearance of the teeth (Bliquez, in press), and as appliance from Chiusi by Ghinst (1930:406). Therefore, these teeth remain imbedded as an "appliance" in the literature (Boissier, 1927:25, fig.1; Tabanelli, 1963:92, Tav.49; Emptoz, 1987:546).

Falchi's (1891:Tav. XIV, 15) report on Vetulonia also contains an illustration of two teeth that look like those of a small dog. The possible band binding these teeth, if the sketch is accurate, may reflect their use as a charm. These small teeth clearly are not those of a dog, and may represent human teeth bound in an actual appliance. However, what appliance may be indicated is unclear. Also not a dental appliance are the crowns of four human teeth with the roots reconstructed are shown in Falchi (1885:Tav. VII, Tav. XV, 2 and XVII). However, according to Falchi (1891:67, 68, 309), the graves from which three "human" teeth derive may actually have produced material from a necklace.

The Purland "Egyptian" Examples Purland (1857) reported that he had a "pivot" tooth from the "head of a mummy in the collection of a lamented friend." A "pivot" tooth is a false crown affixed to a natural root by means of a gold post or "pivot." Brown (1934:830-831) clearly indicated that the date and origin of such an example must be considered unreliable. What Purland identified as a false tooth remains unknown.

Purland (1857/1858:I:63) also repeated the story that Belzoni had found false teeth and teeth filled with gold in Egyptian mummies and reported that examples of dental prostheses existed in the collection of Joseph Mayer in Liverpool (Becker Ms. A:Nos. 13 and 14) and in collections in Berlin and Paris. Aside from the true appliances in Mayer's collection, these other "examples" may refer to gold items associated with mummies. However, evaluations of them as actual appliances cannot be determined. Meanwhile, Purland's claims to ancient Egyptian examples of dental prostheses unfortunately have been cited as if they were valid (Perine, 1883:163; Casotti, 1947; Micheloni, 1976:159).

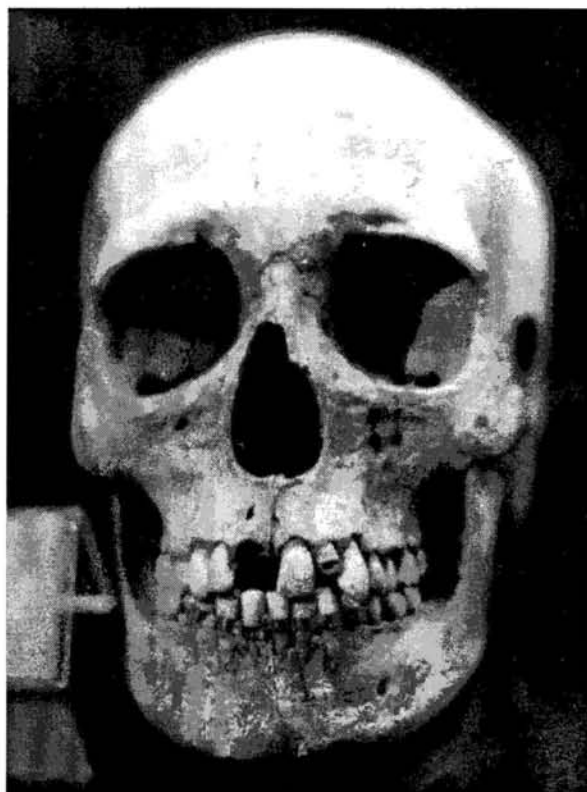


Fig. 2. Poggio Gailla appliance. The missing maxillary incisor is a post-mortem loss. This appliance (or appliances) is not original to this skull. Photo by M.J. Becker.

Other Spurious Ancient Egyptian Examples Supposedly from before the Hellenistic Period

As noted previously, a vast literature stating that "ancient" Egyptians possessed dental prostheses exists. Textual evidence suggests that the Egyptians were not pulling teeth, but were practicing complex oral medicine as early as 2,900 BC (Jonckheere, 1958). However, no evidence for dental appliances before 600 BC can be documented, and none of the early examples are from Egypt. Artifacts most commonly mistaken for dental appliances are votive objects, which are the subject of another paper.

Quenouille (1975) effectively discounted the possibility that these Egyptian artifacts were anything else than votives and Bardinet (1990) has summarized direct evidence discounting many spurious claims. However, Trillou (1976) reported questionable and indirect "evidence" in an attempt to prove that early examples of dental prostheses existed in Egypt. Another repetition of the misconceptions involving several of these votives appears in Puech, Cianfrani, and Puech (1970:2006).

St. Benedict's Dentures St. Benedict, the founder of the Benedictine Order, who died in 543, is often claimed to have worn dentures or a dental appliance. Brown (1934:835,n6) examined the skull and found no evidence for this story.

The Nabatean "wire implant" A skull of a male from a mass grave in the northern Negev, dated to 200 BC, was found with a bronze wire approximately 2.5 mm in length firmly implanted in the canal of a maxillary right lateral incisor (Zias and Numeroff, 1986a,b, 1987). Zias and Numeroff suggest that the pin had been deliberately inserted after artificially expanding the chamber; in effect, as a primitive root canal operation or an attempt to prevent 'tooth worms'. The authors also suggest that the wire may have been a pin to hold an artificial tooth in place, or that something had been done (drilling?) to provide a drain for a large palatal cyst which they identified at the root of the tooth.

All of these inferences are equally unlikely, given what is known about the state of dental medicine and technology at that time. None of the implants has been demonstrated through scanning electron microscopy or other techniques which might confirm these speculations. Equally unlikely is the insertion of a bronze pin, or even a gold pin, for any of the tasks suggested by Zias and Numeroff (1986a,b, 1987). A remote possibility that a false crown might have been mounted on this tooth exists, but this idea also is unlikely. Powers (1989) clearly pointed out these errors, and noted another similar example from Lackish (British Museum BM1944.1.20.518), which is believed to have resulted from an accidental situation.

Another case of an insertion in a tooth has been reported from the Aebelholt monastery in Denmark. According to Bennike (1985), a "bead" (or "pearl") was found "fixed into a caries cavity" from a medieval context (Møller-Christensen, 1958). Later, Bennike (1986:81) quoted Møller-Christensen (1969) as having reporting this medieval "implant" as a deliberately placed "pearl." One may infer that this "pearl," like the "bronze wire" noted above, found its way into this context by accident, as no reasonable dental treatment appears to have been intended in this situation.

The "Stone Implant" from the Kalabah Necropolis, Klozomenai, Turkey This stone, thought to be the size and general shape of a maxillary right canine, was found in a looted limestone sarcophagus with a limestone lid (Tomb Nr. 81/6) in the Kalabak Necropolis (Atilla, 1993). The site is situated to the east of the ancient Ionian city of Klozomenai on the Aegean coast. The date is given as 550 BC, based on the placement of the tomb over a cremation burial (Tomb Nr. 81/3) which contained associated materials dated to the first half of the sixth century BC (600-550 BC). Although no inventory of osteological or dental materials were given, Atilla (1993) reported that the individual was female due to the presence of a gold hair spiral and between 14 and 16 years old from eruption of mandibular teeth.

Geological studies demonstrated that the stone seems to be composed of a hematite travertine portion and a calcite section, the latter probably representing the pseudo-crown. Calcite is noted as having a hardness of 3 on Moh's scale, which is quite soft. The "crown" measures 6x5x11 mm, and fractures seen on it under a stereomicroscope are said to have led to the theory that this object had functioned as a tooth.

The anatomical identification of the stone "crown" was inferred from its length of 29 mm which Atilla (1993) suggested as "the same" as is generally noted for upper canines and from its "inclination" (bevel of the area believed to be the crown?). The shape of the stone, which Atilla (1993) says does not exist in nature, has led to the suggestion that the implant was attached to the adjacent tooth with special wires or

SPURIOUS DENTAL APPLIANCES

devices. Moreover, the neck area of the stone is believed to contain "erosion lines resulting from the gold wire or band" and a polarizing light microscope is said to have revealed "gold pieces a few microns in diameter," supposedly traces of a gold fastening. An artist's drawing (Atilla 1993:fig. 3) depicts the stone as wired to the upper right lateral incisor and first premolar.

I would place the date, given the evidence, at 600-550 BC, which is well within the period when the earliest examples of Etruscan dental appliances are known. Since one of these appliances was recovered from a Greek context (the Eretria example, from Euboea), an example from one of the famous Ionian cities such as Klozomenai is entirely possible. In addition, the Etruscan examples all were worn by women, strongly suggesting that decoration and vanity were motivating factors, but none of the documented examples derive from the burial of an adolescent.

However, none of the other evidence from this tomb appears at all convincing. Although this piece of stone is said by Atilla to have been "carved," he reported that it "did not resemble a piece of an ornament." In addition, although the report contained the observation that such an artifact does not occur in nature, such pieces are found by amateur archaeologists and interested geologists with great frequency. In my opinion, this clearly is a natural stone, differentially eroded (not worked), and with a slight resemblance to a tooth.

As mentioned, the stone was thought to have been bound in place by a gold wire similar to those known from various Phoenician locations. The reported traces of gold at the neck of this object may indicate that it was bound in a gold devise, but gold actually may be part of the mineralogical composition of the stone. None of the adjacent teeth (if such existed) were tested to support the theory that this stone was bound in place by a gold ligature.

At 29 mm, this stone piece clearly is too long to have served as a false tooth in a bridgework unit. Artificial teeth are always limited to the crown portion alone, being suspended in a pontic devise by bands in the Etruscan designs or by wires in Phoenician examples.

The stone of this tooth also is far too soft to have functioned as an artificial tooth. The preferred materials were ivory, human or animal teeth, and very dense woods. Gold was used in the singular tooth from Satricum, the earliest known dental appliance. Problems involved with the soft gold shell such as employed in the Satricum example probably rapidly led to the use of more durable materials. Despite the claim that stone has been used for other dental pontics, no such documented case can be verified.

Most likely this piece of stone was a chance inclusion within the opened sarcophagus, either entering when the tomb was looted or at another point when the box was open. Also possible is that some ancient, such as a young girl, found this interesting stone and carried it as a charm. Far from being a "dental implant," the stone artifact noted by Atilla appears to be one of the large number of spurious objects suggested as representing examples of ancient dental technology.

SUMMARY AND CONCLUSIONS:

Some 25 ancient dental appliances are known from throughout the Mediterranean region. All of these fall into two distinct major categories: Etruscan bands and Phoenician wires. "Spurious" examples exist as well. These spurious examples derive from incorrectly identifying artifacts, stone, and other objects as dental appliances, as well as through "creation" of "new examples" through the printing of illustrations in reverse or upside down. This article has identified eleven such examples and shown how their number has been augmented by such factors as imprecise reports and repetitions of published errors.

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Connate Incisors in a Pre-Columbian Mandible from Nasca, Peru

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While examining the skeletal material excavated from the Pre-Columbian site of Pueblo Viejo, Nasca, Peru, one of us (AGD) found a lower jaw of an infant possessing connate teeth (Fig. 1). This was the only case of connate teeth in this collection of some 214 skeletons. The individual came from the Huari cultural level which has been dated at 600 to 1,200 AD. The deciduous teeth were all fully erupted and the permanent lower first molars were visible in their crypts.

The teeth involved are the lower left di1/di2 and the lower right di1/di2, representing the combination of the two deciduous teeth from each side of the jaw. Incidentally, many earlier reports of connate teeth indicate that the lower deciduous incisors are more often involved in

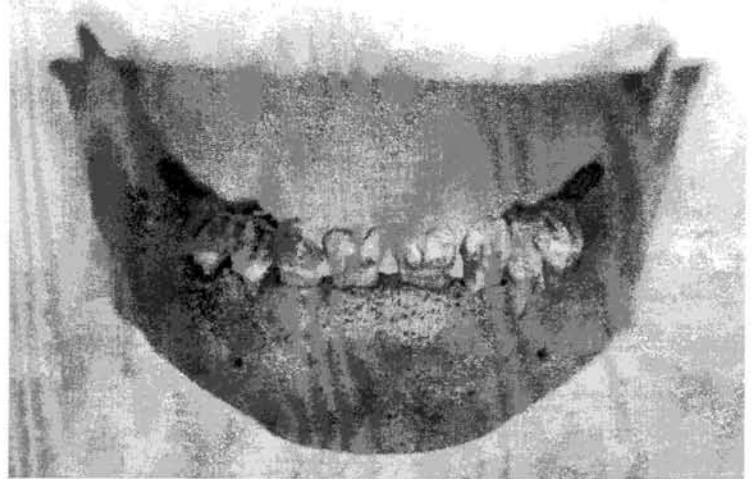


Fig. 1. Connate incisors in mandible of infant from Pueblo Viejo, Nasca, Peru. Photo by Andrea Drusini.

connate formation than other deciduous or permanent teeth (see Winkler and Swindler, 1993, for a review).

The crowns are separate and fully formed and have developed from what appears to be a common root. Unfortunately, no radiographic equipment was available at the site. The root of the left connate tooth is slightly wider than that of the right and the crowns of both teeth are separated at the cemento-enamel junction. As the tooth buds grew, the crowns of both incisors appear to have diverged more obliquely than the crowns of the lateral incisors, resulting in a V-shaped separation between the two crowns. Moreover, the crown morphology of these connate deciduous incisors indicates their allocation to di1 and di2, as the latter tooth is mesiodistally wider than the former (Fig. 1).

The developmental mechanism or mechanisms responsible for connate teeth are not clear, but may involve different ontogenetic processes resulting in such tooth formation (Miles and Grigson, 1990). In the present case, it appears to us that these deciduous incisors were formed as a result of the fusion of the di1 and di2 tooth buds during development with subsequent early separation of the crowns.

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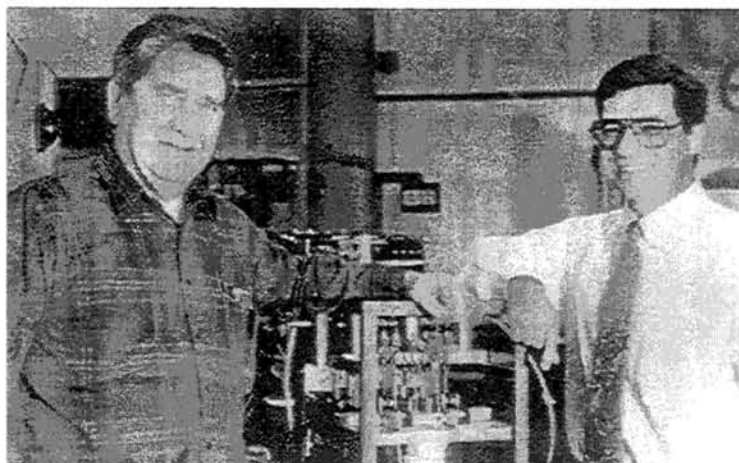
"CANNIBAL" MOVES DOWN UNDER

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For those who are not familiar with "Cannibal," this is the name by which Steve Molnar refers to his cam-activated tooth wear machine described many years ago (Brace and Molnar, 1967; Molnar, 1968a,b). Having recently seen "Cannibal" in action, I must say that the name is not in the least inappropriate. To paraphrase Steve's description, the machine is a motor driven, cam activated device that operates cables, simulating the muscles of mastication. The lower dental cast is fixed on the mechanical mandible and

CANNIBAL MOVES DOWN UNDER



Steve Molnar, John Kaidonis, and "Cannibal" shortly after the latter's installation in Adelaide.

brought into occlusion and motion against the fixed upper cast.

Recently, Steve kindly supervised the migration of "Cannibal" from St. Louis to start a new life in the Department of Engineering at the University of Adelaide. Collaborative research in Adelaide between the dental staff led by John Kaidonis and the engineering staff, with the help and interest of Steve Molnar, shown together in the photograph, will put "Cannibal" to good use in its new abode. It is intended to use the simulation model to assess the interrelationships between all components of the masticatory system with special emphasis on tooth wear.

A new second generation "Cannibal II," which will be computer-operated, is on the drawing boards and should be functional before long. The research will provide useful information to improve the treatment of the many elderly patients who have problems associated with advanced tooth wear.

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KEES KORENHOF (1929 - 1994)

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Cornelis Adriaan Willem Korenhof was born in Utrecht, The Netherlands, on January 18, 1929, and died in that city on March 11, 1994. He studied dentistry at the State University of Utrecht and, after qualifying, completed his military service. He then began working in the Paleontological Department of the Mineralogical-Geological Institute, Utrecht, on a research project under the guidance and supervision of the famous paleoanthropologist, Professor G.H.R. von Koenigswald. The latter had a collection of subrecent Malay teeth of Javanese origin which was unique in so far as the dentine had disintegrated leaving the enamel intact. This made it possible to study the inner and outer enamel surfaces which is exactly what Korenhof did.

He completed this work and in 1960 published his dissertation, *Morphological Aspects of the Human Upper Molar: a Comparative Study of its Enamel and Dentine Surfaces and Their Relationship to the Crown Pattern of Fossil and Recent Primates* (Utrecht: Uitgeversmaatschappij, Neerlandia). He compared features seen on the inner and outer enamel surfaces with those of fossil and recent primates, and at the same time pointed out the evolutionary significance of his observations. His book has been widely distributed and is regarded as a major reference work in the field of dental anthropology. Subsequently he published 33 papers but his thesis is undoubtedly his greatest contribution to dental science.

He lectured to first year dental students on evolution and comparative dental anatomy. These lectures were published by Utrecht University in 1977. An expanded version of the material formed the basis of a chapter in a 1987 book on development of the teeth and masticatory apparatus: *De Ontwikkeling van het Tand-kaakstelsel: Ontogenie en Fylogenie*. J.P. van de Velde edited the book and Samson Stafleu Alphen aan den Rijn (Nederland) was publisher. Both publications are in Dutch.

Kees Korenhof earned his livelihood by practicing dentistry. He was appointed to the staff of the Utrecht Dental School immediately after qualifying and became head of the subdepartment of partial denture prosthetics in 1964. He published several papers and lectured widely on this subject. Unfortunately the Dental School closed at the end of 1987 and he then gave all his time to a private practice conducted from his home.

Kees was a man endowed with a great enthusiasm for life and work. He had a tireless energy. He travelled to France in 1986, to Israel in 1989 and to Italy in 1992 on a motorcycle in order to attend meetings of the International Symposium on Dental Morphology. This provided him with a convenient means of transport and made it possible for him to use every spare moment between lecture sessions to do sight-seeing and visit places of historical interest. His main hobby was collecting and repairing old clocks and watches. He was well-known to all the most prominent collectors in Europe. He was also a gifted water color artist and during free moments in his busy program he devoted himself to this form of creativity. He had a confident warm personality and showed great interest in the research work of friends and colleagues. He was well-disciplined and always maintained a strictly professional attitude at meetings and on formal occasions. He will be missed by his friends all over the world and we extend our condolences to his wife and children.

Dental Anthropology Association Member News

Andrea Cucina (Catholic University of Rome) spent the months of July and August at Florida Atlantic University, Boca Raton, assessing dental hypoplasia in Ancient Florida under the supervision of **M. Yaşar İşcan**. Cucina's Ph.D. dissertation deals with a diachronic and synchronic study of dental enamel hypoplasia related to weaning and stress in general.

Jules Kieser sent the following information from Witwatersrand University Dental School, where he is working on two projects. One involves the effects of prenatal exposure to alcohol and the developing dentition and the other a biomechanical model for maxillofacial function. **Kevin Kuykendall** is active in three projects in the fields of dental development and phylogeny. First, he has been looking at establishing a radiographic standard for tooth calcification patterns in South African adolescents in the hope of providing vital comparative data of clinical and paleoanthropological importance. A second project focuses on the integration of dental and facial development in modern humans and other primates. Kuykendall's third focus of research involves the excavations at Makopansgat where he is collaborating with **Jeff McKee**. **Nadia Navsa** is involved with the final touchup of her doctoral dissertation, which centers on tooth morphology of the Namibian Herero's. Additional projects involve development of a biomechanical model to assess force distribution along the dental arcades of humans by Kasia Ksiezyska and a search for changes in the subodontoblastic capillaries of the human dental pulp with advancing age by Jo Daly.

Susan Loth, Florida Atlantic University, spent the summer in South Africa continuing her ongoing research on the morphological manifestations and evolution of sexual dimorphism. Loth worked with **Maciej Henneberg** of the Biological Anthropology Research Programme at the University of Witwatersrand Medical School.

During the summer, **John Lukacs** (University of Oregon) supervised a high school science apprentice (Jocelyn Wright, Willamette High School, Eugene Oregon) under the Apprenticeships in Science and Engineering program. In August, Wright presented the preliminary results of her measurements of dental arch dimensions and palatal depth in 1,400 Indian dental casts to the ASE Summer Conference in Salem, Oregon. In another project, Lukacs' data on dental morphology and odontometry of Canary Islanders, collected in 1991 at the Museo Arqueologico de Tenerife, are being analyzed by **Debbie Guatelli-Steinberg** (University of Oregon).

Greg Nelson (University of Oregon) and the radiology department at Sacred Heart General Hospital were recently featured in the Eugene, Oregon, *Register Guard*. As part of the dental pathology phase of Nelson's ongoing study of 2,500 year old skeletons from Oman, he obtained the collaboration of the radiologists to x-ray dentitions in order to ascertain whether fragments of root tips remained in their crypts.

MEMBER NEWS

A positive answer might have indicated that the people were practicing a form pre-historic dentistry and pulling or prying diseased teeth from their sockets, but no root tips were found.

Daris Swindler spent the month of May in the Dipartimento di Biologia Degle Studi de Padova, Italy. Together with his colleague, **Professor Andrea Drusini**, Swindler taught a course on primate evolution during the month. In addition to course lectures, Swindler presented a paper, "Major Events in Human Evolution," to the department. Drusini and Swindler also began a joint research project on 443 teeth, mostly molars, of pre-contact inhabitants of Easter Island. They hope that the results will be ready for publication sometime next year.

MEETINGS NEWS

The Dental Anthropology Association was well represented at international meetings during the past months. **M. Yaşar İşcan** (Florida Atlantic University), his colleagues, and graduate students in Turkey presented a workshop showing forensic anthropological techniques to forensic pathologists and residents at the National Forensic Sciences Meeting in Adonai, Turkey, in April.

In May **Daris Swindler** (University of Washington) presented the introductory paper, "Forensic Odontology in the United States of America: An Updating," at the first joint meeting of the Italian Associations of Forensic Anthropology and Odontology held at Lake Garde in northern Italy.

Diane Markowitz (Rowan College) attended the International Conference of Auxology in Szombathely, Hungary (June 27-30, 1994). Her paper, "Somatic Growth and Dentitional Changes during Orthodontic Treatment of Prepubertal Children," contained a report of a study comparing growth increases in arch width (not affected by treatment), knee height, and total height. Data from the study suggest a curve of growth of craniofacial basal bone that parallels that of the lower leg during the treatment period (7.5-12.5 years).

Ken Jacobs (Université de Montréal) presented a paper at the international conference, "The Indo-Europeanization of Northern Europe," (September 1-7) in Vilnius, Lithuania. The conference was coordinated by Gintautas Cesnys and Rimantas Jankauskas of Lithuania and dedicated to the memory Marija Gimbutas, who served as one of the Honorary Presidents of the Organizing Committee until her death. Organized by the University of Vilnius, UCLA, and several Lithuanian academic societies, the conference provided a stimulating venue in which to explore the ways in which bioanthropology, archaeology, and linguistics can cross-fertilize (and cross-check) in the investigation of subjects such "the Indo-European phenomenon." Over forty European and North American participants presented papers and engaged in lively discussions about topics ranging from the anthropology of pre-Bronze Age populations in northeast Europe to the finer points of Indo-European linguistics and on into the development of the historically known Baltic and Lithuanian peoples. Although in the minority, bioanthropologists were not invisible. DAA members who presented papers were **Natalia Khaldeyeva**, **Alexander Zubov** (both of the Institute of Ethnography and Anthropology, Russian Academy of Sciences, Moscow), and Jacobs, whose subject was "Theoretical, Methodological, and Moral Pitfalls in the Search for Anthropological Types in Pre-Indo-European Northeast Europe."

At the Ninth Congress of the European Anthropological Association in Copenhagen, Denmark (August 24-27), **Phillip Walker** (University of California, Santa Barbara) gave a paper on the dental health of modern south American Indians. A few days later (August 29-September 3), at the Xth European Meeting of the Paleopathology Association in Göttingen, Germany, **John Lukacs** presented data on dental trauma associated with traditional combat among prehistoric Canary Islanders; **Charles Merbs** (Arizona State University) spoke on infant mortality in the prehistoric southwestern United States; and **Phillip Walker** discussed the use of dental histology to document the timing of traumatic injuries in child abuse cases. Lukacs, Merbs, and Walker each chaired sections: Lukacs on "Diseases of the Teeth and Tooth Sockets," Merbs on "Mummies and Mummified Tissue," and Walker on "General Pathology."

Charles Merbs and **Phillip Walker** also attended the Gesellschaft für Anthropologie in Potsdam, Germany (October 4-8). Merbs' paper dealt with paleopathology of the Sadlermiut; Walker's, with enamel histology as an index of temporal variation in diet and developmental stress. After the Potsdam meetings, Merbs traveled to Prague, where, as the guest of Eugen Strohal and Luboš Vyhnánek, he examined collections in the National Museum and other institutes.

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