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## FORENSIC ODONTOLOGY — AN OVERVIEW

**ABSTRACT.** — *Forensic odontology — the application of dental expertise to legal matters in the interest of the proper course of justice — is utilized in misrepresentation, fraud, and malpractice; child abuse, rape, and murder; individual and mass casualty identification; and anthropological and archeological research. Its greatest utilization is in the identification of unknown deceased, although bitemark evaluation is becoming increasingly important. The impact of studies concerning aging problems and individual or racial dental traits and morphology is discussed; current procedures, reviewed; and recent court cases, presented.*

**KEY WORDS:** *Forensic odontology — Racial dental traits — Dental morphology.*

Forensic odontology, in international terminology forensic odontostomatology, may be broadly defined as the application of the science of dentistry to the fields of law and matters of public concern in the interest of justice (Sopher, 1976; Pederson, 1977). Its major utilization is in the identification of the unknown body, although it includes such other areas as: child abuse, rape, and murder; dental trauma, research, malpractice, fraud, and misrepresentation; and civil as well as criminal litigation (Goldman, 1982). It is quite probably as old as the other forensic sciences, dating back to the dental evidence in the tomb at Giza of 2,500 B.C. and the descriptions of bitemarks in the Kama Sutra of Vatsyana written over twenty-five centuries ago (Suvannabha, 1980). Probably the first recorded dental identification in the United States was that of Sir Peter Halket at the Braddock's Field battleground in 1758 (Cigrand, 1910). The first book on forensic dentistry was written in French by Oscar Amoedo in 1898; the first in English was by Gustafson in 1966.

### PERSONAL IDENTIFICATION

One of the more important areas of forensic odontology is the identification of unknown bodies,

especially that of severely mutilated victims of mass casualty situations. Quite often these generate large numbers of deceased who cannot be identified by any other legally acceptable method. A recent compilation, which included such tragedies as the Canary Islands crash and the Jonestown suicide-murders in Guyana, gave a dental identification rate of 83% (West, 1982). Some countries and authorities have declined to recognize the value of forensic dental expertise — an example was the Paris DC-10 crash of 1974, when France and Professor Leon Derobert spurned dental assistance. Well over half of the 346 deceased were never identified and were eventually buried in a common grave (Haines, 1974; Johnson, 1976).

### BITEMARK IDENTIFICATION

Bitemark work has been receiving increased attention in the United States, although its history is probably as old as any aspect of forensic dentistry. The first published bitemark case was in Germany in 1874 (Cameron, 1973); this antedates the first published anthropometric case by Alphonse Bertillon, in 1883 (Kind, 1982), and the first published fingerprint case of 1892, by Vucetich, in Argentina (Odell, 1982). The increasing acceptance of bitemark



work may be indicated by the fact that it has not been refused in evidence by any known Court of Record in the United States, and has been held Court acceptable by rulings of at least twenty state and federal appellate or higher courts (Pitluck, 1983).

#### FORENSIC ODONTOLOGY AND ANTHROPOLOGY

Forensic dentistry and physical anthropology have long enjoyed a rich tradition of cooperation — even friendly rivalry — in their common efforts (Stewart, 1979). Although their efforts in the forensic field interlock, they usually have a different approach to a problem. There is a general tendency for the dentist to concentrate upon rather general nonmetric and anthroposcopic features, especially dental restorations, which is quite probably due to the fact that most forensic dentists are general practitioners in private practice (Lang, 1980).

In contrast, the physical anthropologist is seldom privately employed and is usually on the faculty of a college or university, and is more accustomed to the study of anthropometrics and other features of races, tribes, or other groups. The journals are replete with observations of the penetrance and expressivity of dental phenotypic traits. It remains that little of such material is of practical value to the forensic dentist attempting to identify unknown skeletal material. Changes in dental development from any of many factors can result in different ultimate morphology or expression (Dahlberg, 1971); and many voids exist in the genetic model explaining variation in measurement and morphological traits of the human dentition (Biggerstaff, 1977). This is not to imply that such studies are to be disregarded. On the contrary, it is felt that the forensic dentist should seek affiliation with the other disciplines, should study their journals, and should actively seek interdisciplinary exchange in their concepts and with their members. Also to be considered, is the ethnic or racial heterogeneity resulting from (1) admixture within both past and present populations, (2) the population turbulence caused by socio-economical and other changes, and (3) the recent acceptance of inter-racial marriages and adoptions or what have been termed the social black and the social white identities (Schell, 1983).

#### AREAS OF CONCERN

At present there seem to be three areas of concern for forensic dentistry. The first is a lack of theory, or set of standards, in both dental and anthropological forensic areas, for the standardization, weighting, and comparison of the many physical and societal data used in the identification of the unknown individual. Socio-physical data are often difficult to obtain or accumulate due to social re-

sistance; it is often retained in many unrelated agencies; and it is often systematically destroyed. If there are no socio-physical data concerning the deceased that are a matter of record and retrievable, no identification can be established (Warren, 1978). There is some improvement in this area, at least in the United States. Several states now have laws requiring the submission and compiling of the dental records of missing persons and the unidentified deceased (Rawson, 1983); these records will be entered in the National Crime Information Center computer, which also contains the dental records of missing children. The federal services and some states have laws requiring the insertion of identification in dental prostheses, and several states have laws requiring the preparation of dental records suitable for identification and their retention by dentists for several years after the last treatment of the patient (Michigan, 1982). It is estimated that 80 % of the United States population now have dental records, as compared to less than 20 % fingerprinted (Rawson, 1983).

A second area of concern is the education, training, and utilization of forensic dentists. In the United States there is very little formal training for the forensic dentist, with very few schools of dentistry offering such courses, and even these are on an elective rather than required basis. There is a growing number of post-graduate short courses in forensic dentistry for those who can afford them, probably the most rewarding being the four-day course presented by the U.S. Armed Forces Institute of Pathology (AFIP, 1983). Unlike some countries, there are no chairs or faculty positions for forensic dentistry in the U.S. dental schools and no known paid or salaried positions in either the private or the public sectors. The great majority of the forensic dental work is performed by individual dentists, usually those in private general practice. Most contribute their expertise on an unpaid basis as a service for the benefit of their communities (Long, 1980). Their education is derived at their own expense from attendance at forensic courses and meetings, from the literature, and from whatever associations they can make with other forensic dentists and those in the allied disciplines.

#### SUMMARY

Forensic odontology is the application of dentistry to matters of legal and public concern. Its importance lies in the facts that in the living persons the teeth are the only normally exposed part of the skeleton and that the dental apparatus constitutes the most often diseased, the most often repaired or reconstructed, and the least destructable of the human tissues. Its three main areas, i.e. personal identification, mass casualty problems, and bitemark work, have recently received increased attention in the United States. Intensified efforts have been made to improve the efficacy of this discipline in several areas of concern.



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