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Identification Through Dental Records

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IDENTIFICATION THROUGH DENTAL RECORDS

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Victims of civil catastrophes, of crimes, and of accidental death are frequently identified by their teeth. More victims might be identified by their teeth if a standardized method of dental recording were available and practiced.

The dental enamel is the hardest and most indestructible tissue in the human body. It is highly resistant to the elements. It can be destroyed only at exceedingly high temperatures. Not being soluble in water, it resists submersion. Being composed almost entirely of inorganic elements (97%), unlike organic tissue, it is not subject to the forces of decomposition. The materials used in dental restorations (silver, gold, platinum, fused porcelain) are also highly resistant to destruction by chemical and physical forces.

The deciduous or temporary teeth begin to develop in the embryonic jaw about five months *before* birth; the first of the permanent teeth, one month *before* birth. There are, then, dental characteristics before birth, during life, and even after death. After the extraction of all teeth the residual bone retains certain "x-ray" characteristics: the arch forms are typical and individualistic; the palatal surface or roof of the mouth is exactly the size, shape, and

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contour that it was before the loss of the teeth. The edentulous (without teeth) jaw and the artificial appliances (dental plates) that they might support are subject to classification and identification. Dental appliances could easily carry identifying symbols similar to the hall-marks used by jewelers.

Classification Variants

In the adult there are thirty-two teeth, each with five exposed surfaces. This gives 160 variants for classification. In normal teeth each of the surfaces has individual contours; the grinding surfaces particularly are marked with characteristic grooves and fissures. Rising from the grinding surfaces are eminences or cusps. The shape and position of these cusps are peculiar to each person. These cusps are subject to wear under chewing stress. The type of wear may suggest the age of the person or his nervous and occupational habits.[1] Rotations of teeth, missing teeth, and extra (supernumerary) teeth are additional factors to be classified as deviations from normal.

Habits Revealed by the Teeth

Under nervous habits may be listed toothpick-biting; finger-nail-biting; grinding of teeth and pressure habits, probably during sleep; tongue-thrusting; lip-biting; biting on the ear piece of eyeglasses; pencil and fountain pen biting; clenching of teeth. Occupational habits include thread-biting in sewing; the pin-and-needle habit (dressmakers keep pins or needles between their teeth); holding nails between the teeth (such as by a cobbler, upholsterer, carpenter, and electrician); biting of cigars during manufacture; the use of a reed during the playing of a wind instrument; keeping cord constantly between the teeth (as package wrappers do). There are also miscellaneous habits that may leave their mark; pipe-smoking; abuse of a cigaret-holder; opening tops of bottles with the teeth; cracking nuts with teeth and the bone-chewing habit; the abuse of teeth by acrobats during stunts requiring mouth props; chewing of cigars; mouth-breathing; thumb-sucking; wedging of toothpicks between teeth; athlete's orange-sucking habit. It is seen, then, that teeth may give important evidence regarding the habits and occupations of a person.

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[1] Sorrin, S., "Habit; An Etiologic Factor of Periodontal Disease," The Dental Digest, 41:290 (1935).

Normal Occlusion and Malocclusions

The roof of the mouth is an arch that curves in the superior-inferior plane as well as the anterior-posterior plane. The vault thus formed may be high or low, narrow or wide. Probably no two arches are the same in size, shape, and contour. The relationship between the two jaws and between the teeth of the jaws varies. This occlusion of the teeth in the two jaws is normal when a certain cuspal relationship between the first permanent molar teeth exists. Deviations from normal in this cuspal relationship, either forward or backward, produce malocclusions or irregularities of the teeth which are usually reflected in the contour of the face. When the cusps of the molar teeth are in normal relationship, but the front teeth are irregular the condition is described as a Class 1 malocclusion. The receding chin, the prominent projecting upper teeth, the adenoid face—these are typical of a Class 2 malocclusion. The heavy, undershot, protrusive lower jaw is an example of a Class 3 malocclusion.

The point to be stressed is that teeth have definite individual characteristics; that the relationship of the teeth to one another varies; that the size and shape of the jaws and palate vary with each person; that the relationship between the two jaws is an important characteristic in determining the appearance of the structures of the lower part of the face.

Tooth Forms and Face Forms Correspond

Dental anatomists have observed that there are three typical tooth forms; the square, the ovoid, the tapering. Generally speaking the square type of tooth is found in the corresponding type of face. The same is true of the other types. Other observers have noted that an anatomic pattern is apparently followed in three morphologic planes. The shape of the upper central incisor, the shape of the arch, and the shape of the face are usually of the same general type: square, ovoid, tapering. This fact is so widely accepted among dentists that baked porcelain artificial teeth are manufactured in molds of this classification. Dentists with an eye to esthetics supply artificial teeth of a size and shape to match the face, and this determination is not left to chance but follows some kind of biologic pattern of symmetry. Loss of teeth, undue loss of the vertical dimension of the teeth caused by excessive wear produce changes in the face: loss of contour, inversion of the lips,

lines and furrows around the mouth and nose, loss of height between the chin and the nose. The modern dentist is as interested in preserving and restoring facial harmonies as he is in preserving and restoring individual teeth.

Factors in Complete Dental Classification

In any classification of dental tissues, therefore, there is the opportunity to record individual tooth size, color, and contour; to record arch sizes and types; to record relationships between the jaws; finally, to classify facial types. Any complete system of dental classification will include all these factors.

Identification through Teeth

Many cases could be cited to show the value of dental identification of the victims of catastrophes and crimes. In 1477, according to Humble[2] the body of Charles The Bold was identified on the battlefield of Nancy by his teeth. In recent years the bodies of the American sailors[3] who lost their lives in the sinking of the submarine S-51 were similarly identified. If the Bureau of Medicine and Surgery of the Navy Department did not keep accurate dental records, this would not have been possible. In two comparatively recent crimes against children the bodies of the young victims were definitely identified by dentists and dental records. After six years the body of Grace Budd[4] of New York was removed from the shallow grave in which her murderer buried the body and was identified from her dental chart made at the Northern Dispensary Clinic at New York Hospital. Dorothy Ann Distelhurst, a six year old girl of Nashville, was kidnaped on her way to kindergarten. Two months later her body was found, and identified by the dentist who had attended her. John Hamilton, one of the Dillinger gang, was identified by his teeth.[5] In such a catastrophe as the school explosion in New London, Texas, accurate dental records would have helped in identifying the unknown dead.

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[2] Humble, B. H., "Identification by Means of Teeth," British Dental Journal, 54:528 (1933).

[3] Taylor, J. H., "Identification by the Teeth," United States Naval Medical Bulletin, 25:49 (1927).

[4] Voorhies, J., "Crime Detection Through Dentistry: Identification of Grace Budd Made by Two New York Dentists," Oral Hygiene, 25:1082 (1935).

[5] Lester, W. H. D., "Modern Scientific Crime Detection and the Dental Profession"—read before the Chicago Dental Society, February 7, 1936.
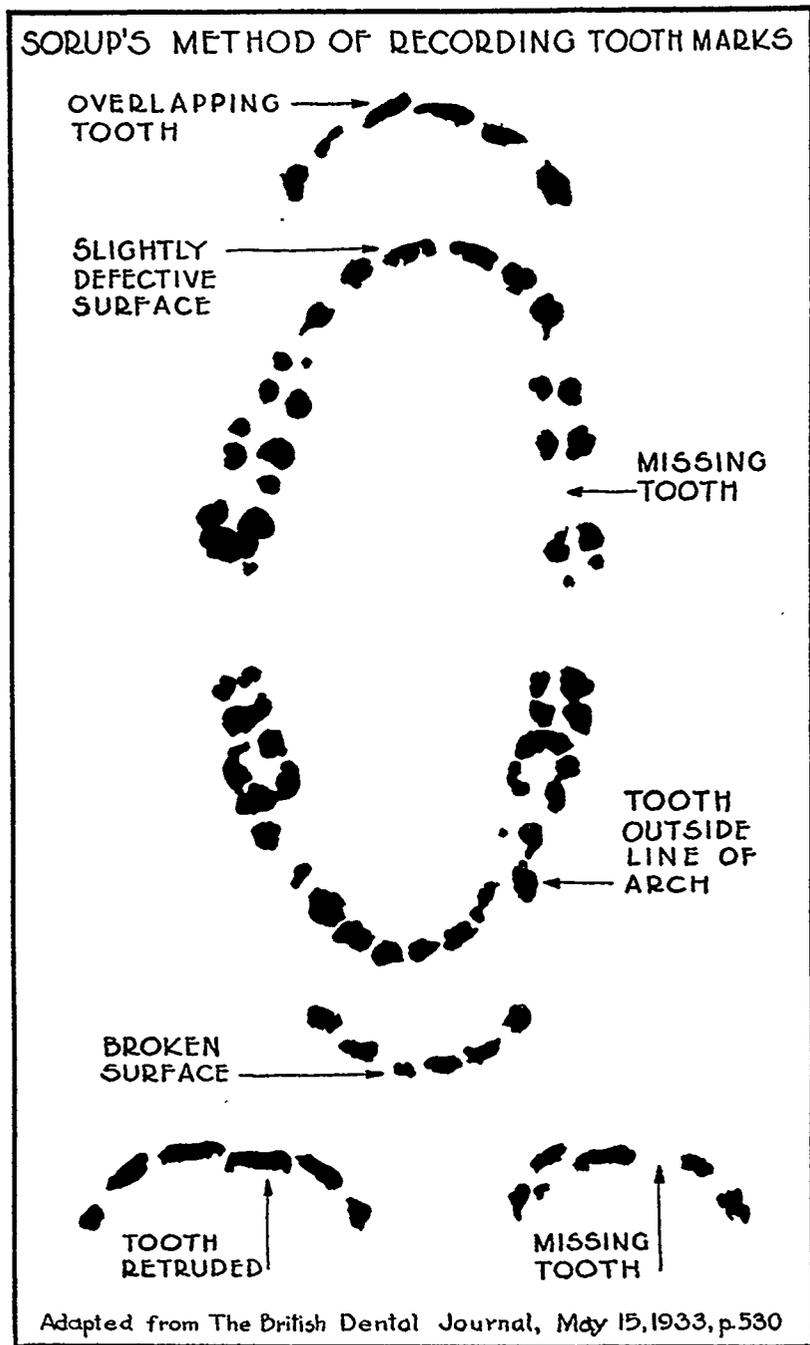
Methods of Dental Record-Keeping

There are several different methods by which accurate dental records may be kept. Some are extremely complicated; others, simple. It is fundamental, however, that any system that is to be universally applicable, must be simple, inexpensive, and easily understood by non-dentists as well as dentists. The most complete system would include plaster casts of the teeth and jaws, a face mask, full-mouth x-rays, intra-oral photographs, and a complete record chart showing existing fillings, crowns, and bridges, for example. The data on this chart could be added to whenever another dental operation was performed. Obviously such a complete record is not practical for wide application in private life; it would not be unpractical or economically prohibitive, however, for persons in military services or for those incarcerated in corrective institutions where there are regular staff dentists.

Plaster casts with tooth markings made after the method of Sorup[6] (Fig. 1), and a complete record chart would be a definite and accurate system. Again, this system would not be practical. In the first place the making of the casts would take time and would be relatively expensive. In the second place the storage and preservation of such a large number of casts would present a definite problem. Unfortunately, at the present time a method for direct imprint of the teeth from the mouth to paper has not been developed. Such a modification of the Sorup method, so that prints might be made without using plaster casts, would be a valuable simplification. An ink or other marking agent that could be applied directly to the teeth without injury to them or to other tissues, and a paper that would accurately record the tooth marks in the presence of saliva without blotting would make such a modification practical.

A record chart to be generally applicable should have the following characteristics: (1) The teeth should be represented with anatomic accuracy. (2) The size and shape of the teeth should be represented in exact scale and measurement. (3) The chart should show the five tooth surfaces that are exposed to view. (4) The teeth should be represented as white on a dark background, so that missing teeth may be recorded by "blacking out" with a soft lead pencil. (5) The chart should be reproduced on a paper that will take colored pencils in order to record metallic restorations of gold

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6 Reported by Humble, *supra* note 2.

SORUP'S METHOD OF RECORDING TOOTH MARKS

OVERLAPPING ——→
TOOTH

SLIGHTLY ————————→
DEFECTIVE
SURFACE

MISSING
—TOOTH

TOOTH
OUTSIDE
LINE OF
—ARCH

BROKEN
SURFACE ————→

TOOTH
RETRUDED

MISSING
TOOTH

Adapted from The British Dental Journal, May 15, 1933, p. 530

FIGURE 1.

and silver amalgam. (6) The chart must be so simplified that it can be filled out by non-dentists as well as dentists. Such a chart has been developed and is herewith reproduced (Fig. 2).

In a study made among the thirty-eight dental colleges of the United States, it was found that no two dental colleges used the same method of record-keeping. In addition to this number there are various modifications developed by practicing dentists. It would be conservative to say that there are probably more than
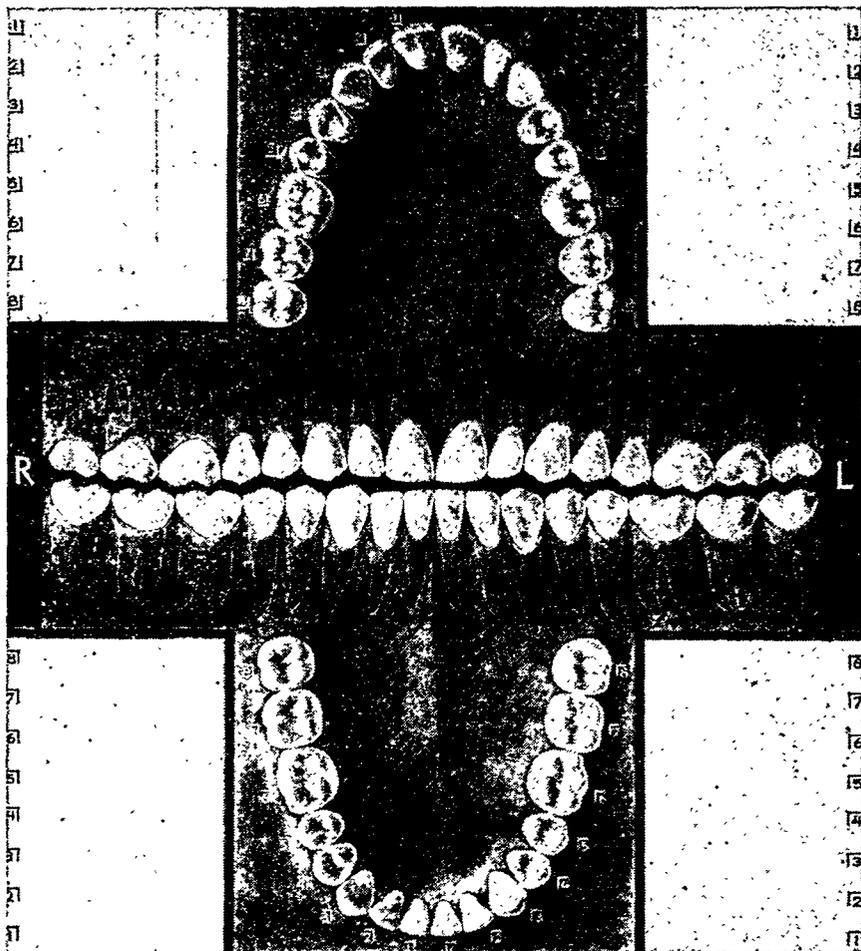

FIGURE 2.
A Chart for Standardized Dental Examinations (Reduced).

one hundred different types of dental records. To dental publications of national circulation, police officers and coroners frequently send in dental charts asking that they be published as an aid in identification of bodies. The charts are so complicated and involved that a dentist in one part of the country, not familiar with the method of charting, would have difficulty in interpreting the markings used by a dentist in another part of the country.

Standardization of Dental Records Advisable

Dentists should be encouraged to use similar types of records in private practice. A beginning toward a universal dental record system could be made if a chart were developed or adapted for use in the army, navy, and marine corps, the veterans' hospitals, the federal and state institutions. If on admission to a corrective institution, federal and state penitentiaries, a standardized dental chart were employed to be filed with other data concerning the inmate or prisoner, it might prove to be an extremely valuable record at some later date.

The problem of dental identification is one that should be developed by the dental profession; but the impetus for cooperation between law enforcement agencies and the dental profession should come from the public agencies.