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Great interest has been aroused in dental circles over the alloplastic endosseous implants. These refer to implants constructed of an inorganic material other than metal. Because of this interest, a study in depth has been completed of the true historical prece-dents of this ingenious technique.

Dental writers down through history have mentioned either implants or transplants. Even Abul Kasim, who wrote in the beginning of the 11th century alludes to implants. However, these were not true implants in the sense in which we understand the term. Yet experience gained in these operations did ultimately come to fruition in the implants of today.

The first reference in modern literature to an endosseous implant is in an 1807 monograph by Maggiolo, a dental surgeon of the Faculties of Genoa and Pavia who practiced in Nancy, France. He described an endo-alveolar infibulation by a metallic root of gold which supported a pin tooth. (Fig. 1).

Nevertheless, recent evidence has shown that implants were used far earlier than this. In his recent book, Sandhaus mentions a black stone which was implanted in place of a lateral incisor, citing as his source a work by Andrews in 1893, and one by...
Jeanneret in 1961. Marcon also quotes Andrews' work in his discussion of oral implants in pre-Colombian civilizations.

Andrews in his article, which was originally published in the International Dental Journal, describes the find as taking place in 1890 in Copan, Honduras, the ancient Mayan metropolis near the border with Guatemala. This was the first year of the archeological expedition under the direction of John G. Owens, and which was sponsored by Harvard University as well as several wealthy Boston patrons. Owens, the young archaeologist, died there during the first year of digging and was succeeded by Marshall H. Saville.

The specimens referred to came originally from Copan, Honduras and were listed as being at the Peabody Museum of Harvard University. Therefore the author traveled to this museum to examine this important evidence ex novo, but found to his disappointment that the piece had disappeared. A study of the private correspondence of the Department of Anthropology of the university was made available through the kindness of Mrs. Katherine B. Edsall, in an attempt to track down the missing specimen. This turned up the fact that on March 24, 1969 Dr. R. B. Johns, Lecturer in Conservative Dental Surgery of the University of London had inquired about the specimen and had received a reply on May 1, 1969 from Mrs. Cathleen Papudopoulos of the Bone Laboratory stating that the specimen could no longer be found.

Records of the Peabody Museum, however, list the stone as having been used as a substitute for a lower left lateral incisor in a jaw belonging to Skeleton No. 8 from Mound 36 in Copan. The lower jaw was described as having the contiguous teeth carious. The incisors of the upper jaw had facial cavities which bore traces of a reddish cement, while one incisor was described as still having preserved in it a green jade inlay. Curiously, Andrews' article was accompanied by drawings of the individual teeth and implant rather than a sketch of the whole jaw itself, and these are reproduced in Fig. 2. In this figure item 7 represents the stone implant while item 8 denotes the incisor which carries the inlay, still attached to a fragment of the alveolar process. Most significantly, Andrews assures us that the stone implant had a lot of tartar adhering to it, inferring thereby that it had been implanted during life.

![Andrews' original drawings of Mayan teeth: 5 and 6 are carious cusps; 7, the implanted "tooth" carved from a dark stone; 8, incisor bearing a stone inlay and adherent fragment of bone.](image-url)
This specimen was listed as No. C-481 in the catalogue of the Bone Laboratory, and as previously stated, can no longer be found. In its place are to be found what are described as "fragmentary remains," (consisting of small particles of bone.) A most interesting coincidence exists, however, with reference to No. C-482 in the collection. This is described as "... consisting of 18 isolated teeth (as) collected by Saville and Owens from Copan, 1894." Some of these teeth are clearly recognizable as those which were previously described and drawn by Andrews.

The conclusion thus seems very obvious: the practically pulverized fragments of bone originally belonged to Skeleton No. 8, the bearer of the implant described by Andrews. Once the brittle bone became fractured (possibly in rough handling) the lithic implant became separated and thus freed from the bone, became confused with a stone of little importance and thus discarded.

How old was this implant? Sandhaus estimates that it is "... something more than 1000 years, according to the director of the excavations." Andrews writes that "... this implantation antedates Dr. Younger's experiments by about 1500 years." Younger was engaged in implantation experiments in New York City in the period from 1875 to 1888, and his procedure was described by Chapin Harris as "... an operation known as implantation. It consists of drilling artificial sockets in the maxillary bones, and inserting therein natural teeth of the proper size, shade and shape." 8

The author's researches in the Peabody Museum, however, ultimately resulted in a most extraordinary discovery: a large fragment of an almost entire lower jaw, missing only the left ascending ramus. The natural teeth present were the left lateral incisor and cuspid and the right cuspid, both bicuspids and first and second molars. Where the three incisors were missing were implanted three artificial teeth made of the shell of a bivalve mollusc! The imitation of natural teeth is truly extraordinary in spite of their being flattened antero-posteriorly. Their overall form is triangular, with the apex of the triangle serving as the root of the implant.

The fragment was found by Dr. Wilson Popenoe and his wife Dorothy F. Popenoe at the Playa de los Muertos in the Ulloa Valley of Honduras, in 1931. It has been determined to be of Mayan origin and was received by the museum on Feb. 24, 1933 and was duly catalogued as No. 20/254 - Acc. No. 33-19.

Playa de los Muertos, on the river Ulloa in northwestern Honduras' Department of Yoro, is of great archaeological importance because of its situation at the eastern limit of the Mayan culture area. 9 For this reason, since the end of the last century, many excavations have been carried on in this area. G. B. Gordon 10 was the first, followed by the Popenoes in 1929.

In the fragment the natural teeth do not show any sign of caries; in those of the left hemi-arch some small lines of fracture of the enamel are visible, horizontally on the vestibular face, and vertically on the canine.
The implanted teeth were even characterized near the incisal border, mostly on the left lateral, with transverse furrows. (Fig. 3). The left central incisor is implanted in a very irregular way, almost turned on itself, with the horizontal diameter set in an anteroposterior position. That this has not always been its true position is borne out by a photograph taken in the museum in 1935 by F. P. Orchard, which shows the implanted shell tooth as being less twisted. It is possible that the "tooth" had fallen out and had been carelessly replaced in an incorrect position.

![Fig. 3](image)

*Fig. 3*

*Lower jaw bearing three shell implants, found by the Popenoes in Honduras in 1931. (Courtesy of the Peabody Museum of Archaeology and Ethnology, Harvard University.)*

Further evidence concerning these shell implants was secured from correspondence on file in the Peabody Museum archives. A letter of March 2, 1956 from the then director of the collection, J. O. Brew, was a reply to an inquiry from the British implantologist Boris Trainin. Referring to the opinion of the members of the expedition which discovered the fragment, Brew suggested that the piece dates from the 7th century, and went on to state that the shell substitutes were implanted post mortem. He further postulated that the implantation was probably in the nature of a funerary ritual, similar to that practiced by the ancient Egyptians who, in order to make the corpse as whole as possible, replaced missing teeth with wooden pegs, tying them to the natural teeth with threads.\(^\text{11}\)

Our findings tend to disprove this assumption. On June 25, 1970, radiographs of the jaw fragment were taken by the author at the Harvard Medical School. (Fig. 4 and 5.) These show a compact osteogenesis surrounding the implanted substitutes. The teeth were extremely firm in the bone, except for the aforementioned abnormally placed incisor. The bone surrounding all implants was radiographically similar to that which would surround a blade implant of today. The radiographic appearance of the teeth and the
small size of the jaw lead one to believe that the fragment was from a woman of about 20 years of age.

Consequently, these shell implants would be the earliest authentic endosseous alloplastic implants which have yet been discovered.

There is an additional importance to the discovery of these artificial implants, however. Fastlicht, who is probably the world authority on dentistry of the Mayan civilizations, concluded in his definitive work *La odontología en el México pre-Hispanico* that the meso-American civilizations, and in particular the Mayan, in spite of their dental inlays of jade and other minerals and their well developed concepts of oral hygiene and diseases of the mouth, practiced no restorative dentistry and utilized no artificial replacements. In spite of the fact that Seville 13 mentioned in 1913 the finding in Esmeraldas, Ecuador of a presumed replacement of a central incisor with one bearing a gold inlay, Fastlicht doubts its authenticity. In addition, if this were truly a replacement, Fastlicht feels that it would have been intended for ornamental or religious purposes.

The only other possible true prosthetic replacement of this nature cited by Fastlicht is one in which a jade molar was inserted into
the lower jaw of a Mayan. This was presented at the IVth Pan-American Congress in Guatemala in 1969 by Dr. Oscar Cifuentes Aguirre.

Nevertheless, the implanted lower shell incisors described in this paper would undoubtedly represent the first authentic dental prosthesis of that ancient civilization yet found. Perhaps discoveries in the future will add to our knowledge of this fascinating branch of dental history.

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Some Ethnographic Insights Into
the History of Dentistry:
Contemporary Barber-Toothdrawers

—RICHARD PRICE, Ph.D.
New Haven, Connecticut

The anthropologist sometimes finds himself in a position to lend understanding to the past by carefully examining the present. Today, for example, in southwestern Andalusia (Spain) the tradition of the barber-toothdrawer still persists in some rural towns. Several years ago the author investigated one such practice in order to throw light on the instruments and techniques of this anachronistic art. The resulting data suggest that at least in the hands of a dedicated practitioner, the nineteenth century patient, operated on without anesthesia, often received intelligent and highly skilled care. In fact, though barber-toothdrawers were limited by rudimentary instruments, they differed surprisingly little from the modern dentist in their application of general principles. I would suggest that today's oral surgeon, given the same working tools, might be hard-pressed to improve on the results of the dedicated barber-toothdrawer, and would likely arrive at similar operating procedures.

"DENTISTRY" IN AN ANDALUSIAN VILLAGE

In the village of Los Olivos, the local practice can be traced back for nearly a century, through four generations of kinsmen. Since the time when an ambitious young farmer learned the art in a neighboring town, neither instruments nor techniques have been subject to outside influence, nor have they significantly changed. Andalusian practitioners are traditionally farmers and barbers first and dentists second; the local practitioner, whom I shall call Gregorio, is also the village mailman. Throughout the region, tooth-drawing by barber-dentists is gratis.

A visit to the toothdrawer is usually a last resort. Patients have assayed a slew of home remedies and are often in severe pain when they arrive at the barbershop. Some patients, upon seeing Gregorio grasp his trusty "key" jump up and flee. "But they always come
back in a few hours, when their pain gets the better of them again," he comments. Gregorio seats his patient in a straight-backed wicker chair (his two Victorian barber chairs are considered inappropriate for extractions), removes his varnished instrument case from its hook on the wall, and rapidly passes each of the four instruments (Fig. 1) through the flame of a match or, nowadays, a cigarette lighter. (His maestros always emphasized sterilization of instruments "to purify the infection left by the last person"). As he sterilizes, Gregorio chats with his patient, eliciting a brief history of the problem at hand. Though most patients arrive with an inflammation covering an entire side of the face, Gregorio effectively narrows the potential locale of infection by pointed questions: is there eye pain? (signifying an upper tooth on the appropriate side), ear pain? (signalling a lower tooth on that side), and so forth. A brief visual examination is followed by manipulation of decayed teeth with the key to evaluate reaction to pressure, looseness from hidden infection, and proper direction for removal. Gregorio prudently extracts but one tooth at a sitting, selecting the one which produces maximum discomfort upon manipulation. Four to five days later, if pain persists, he proceeds to extract the next most likely suspect. When there is a visible abscess, Gregorio never operates, fearing infection. He advises the patient to hold a heated handkerchief to the outside of the cheek until the swelling recedes - often a matter of several days.

The separation of the tooth from gum tissue and bone with the scalpel is the first step in every extraction. Canines and incisors are drawn directly with the forceps, as Gregorio firmly grips the jaw with a napkin-draped hand. Molars and pre-molars are extracted with the key - the most delicate kind of operation. Gregorio carefully applies pressure, trying by sight and feel to discern root placement, tilting uppers outward and lowers inward. Whenever he is
afraid of breaking roots, Gregorio performs the whole operation with the key. Broken roots are generally extirpated immediately, either with the key or with the rusty elevator, often being dug out chip by chip. (Fig. 2) Sometimes broken roots are inaccessible or their extirpation proves too painful; if left, they often exfoliate spontaneously within several weeks or can be drawn easily at that time. An immediate post-operative rinse of vinegar in water is always administered to aid clotting, and Gregorio strongly denounces his competitors' use of cognac or wine, claiming that alcohol impedes proper clot formation.

When operating on lower molars, pre-molars, and wisdom teeth, Gregorio stands directly behind his patient, pressing the latter's head firmly against his chest. But when operating on corresponding uppers, he mounts a second wicker chair placed back to back with that of the patient. From this position, securely cradling the patient's head between his thighs, he can easily - in his own words - "dominate both the upper and the lower jaws" (fig. 3). Gregorio stands on the floor during extractions of incisors and canines, sometimes calling on a bystander to support the patient's head.
LEGAL RESTRICTIONS AFFECT ANCIENT PRACTICES

Since the demise of barber-dentistry, set in motion more than a decade ago by a decree of the Spanish Government and enforced by the feared Guardia Civil, Gregorio has drawn no more than two hundred teeth, and then only clandestinely, for indigent friends. The people of the pueblo were therefore forced to seek outside dental care, and most turned to "Antonio," the amiable toothdrawer of Montilla, who lived less than an hour away by foot, and was Gregorio's friend as well as his personal dentist. Antonio was originally a barber-dentist, having inherited from his father a practice identical to Gregorio's. But in the early nineteen fifties, on the advice of the local physician, he enrolled in a brief course in Seville, becoming a "doctor's assistant", licensed to administer injections. (This same doctor later offered to teach Gregorio the use of anesthesia, but he proudly refused: "I did not want to compromise my skills"). Antonio's diploma gave him the minimal medical training eventually required of dentists, and he soon abandoned shaves and haircuts to concentrate on professional toothdrawing. Nevertheless, until his recent death, Antonio's instruments and techniques remained very similar to Gregorio's. Although at first Antonio charged only 10 pesetas an extraction, and had learned to use anesthesia, no one from Los Olivos - except Gregorio - became a patient until the local practice was closed by law, a tribute to both Gregorio's skills and his altruism. Today, several dentists from outside the Pueblo share the local practice. Most popular is an unlicensed clandestine operator who charges only half the government dentist's fee, and whom Gregorio, with some justification, dismisses as a "butcher".

Complete dental histories, collected from forty people in Los Olivos, bear witness to the relative soundness of the techniques of Gregorio and his maestros. Of a total of 238 teeth extracted, only 21 post-operative "infections" developed, a rate slightly better than 9 per cent. Infection is defined crudely for present purposes as "severe pain continuing for several days, generally accompanied by a fever, usually forcing the patient to bed, and often necessitating a physician's visit".

Females are especially apprehensive about extractions. Only three of the fifteen old women interviewed had undergone an operation without anesthesia, though almost all older men had. Many women have spent whole months of their lives in bed with toothaches rather than face the key, but anesthesia has already softened the attitude of many younger women. Most octogenarian, black-shrouded widows have only a rotten stump or two in their mouths - every other tooth having fallen out on its own, "some with pain, some without". Toothaches lasting weeks on end, especially during and after pregnancy, were reported by many women, most of whom had never patronized Gregorio. Women are fond of repeating a local saying: No man ever died from the ache of a tooth
But some have, it is said, at the dentist's hand.
As the exception proves the rule, women love to chuckle about the toughest of their kind. Not long ago, Josefina stormed into the barbershop, interrupted a shave and, refusing the ministrations of the still lathered customer who tried to grasp her hand, yelled to Gregorio “For the love of God, pull!”, pointing at an upper eyetooth. As Gregorio wrenched it out, Josefina leaped up, disdaining the prescribed vinegar, and strode proudly into the plaza spitting blood onto the cobblestones. “¡Que mula!” — “What a mule!” — Gregorio exclaimed.

Women’s fears are not unjustified. In the 1890’s, an itinerant apothecary who drew teeth as a sideline attempted to compete with Gregorio’s predecessors. This patent medicine sharpster also cashed in as village veterinarian, and was apparently more adept at animal than human toothdrawing. Withered oldtimers still sweat at the memory of his instruments: a blacksmith’s hammer, large wire snippers, and a pair of pliers to pry open the patient’s mouth. The same tools served both burros and men. And this tradition lives on. Only last year, a harried itinerant practitioner pulled children’s teeth and injected novocaine literally in one motion, almost driving people to reconsider the “high-priced” government dentist in the next town. Perhaps it is because of encounters with similar technical know-how that most Olivenos claim that anesthesia, in the long run, hurts more than Gregorio’s methods.

If the women’s dictum quoted above is not true locally, this is largely because of a close physician-toothdrawer relationship since at least the beginning of this century. When a patient passed out following an extraction - often as a result of a direct trip from the dentist’s chair to the local bar - the relatively well-trained village physician was ready with appropriate medication. Several years ago, one of Antonio’s Olvero patients fainted in the heat returning to the pueblo, and had his life saved by an adrenalin shot. And throughout the forties and fifties, the village physician gave free antibiotic injections to anyone going to the dentist, as a precautionary measure.

HOME REMEDIES

Home remedies for toothache are a dime a dozen in Los Olivos, and the hard-headed village folk often run through eight or ten before surrendering to the dental chair. The following recipes come mostly from older women, who are the acknowledged sages in dental pain-killing:

1. Crush the stalk of the flor adelfa (unidentified), and drop its milk into the eye opposite the painful side of the mouth.

2. Rinse your mouth with
   a) creosote - “This makes dust of teeth”, says Gregorio
   or b) fuel oil
   or c) Zotal - a black, liquid flea-killer used to disinfect pigsties
   or d) vinegar
   or e) aguardiente
   or f) your own urine.
3. Pack into rotten tooth
   a) pulverized aspirin
   or b) cotton soaked in alcohol, agua de colonia, or in iodine
   or c) pieces of thread soaked in spirits of cloves
   or d) crushed garlic mixed with a few grains of salt
   or e) wads of tobacco.
4. Boil, gargle, and drink
   a) lime-flowers in water
   or b) two or three ivy leaves in white wine
   or c) clover in water
   or d) dock in water
   or e) orange blossoms in water
5. Let candle smoke waft into the mouth and over the rotten tooth.
6. Boil sedge and apply it on compresses to cheek.
7. Smoke cigarettes made from hemp. This will loosen the teeth.
8. Rub fresh olive oil into the skin just behind and above the ears.
9. Hold spurge flax in the mouth. (This is also tied around the necks of goats with diarrhea.)

All these remedies are still used today, though less frequently than a decade or two ago. Several middle aged women sport scars on their cheeks where, during a night of pain, iodine-soaked threads once ate through the flesh. Gregorio, when queried on home remedies, replied

   If I know one, I know a hundred — all equally useless. Perhaps they calm the nerves for a moment, but in the end no good can come of them. Zotal, for instance, makes teeth into absolute charcoal! Short of extraction, there is only one procedure that works. First take a mouthful of very cold water, and if it doesn't calm the pain, take another. If this still has no effect, switch to hot water, and keep with it. It is peculiar; one of the two always works but you can never tell which beforehand.

It is interesting that modern dentists use this same principle for diagnosis. During the initial stages of hyperemia, cold hurts, heat soothes; as the nerve deteriorates further, the reverse is true.

THE NEW ORDER SUPPLANT THE OLD

Last summer, as Gregorio idly leafed through a catalogue of the latest barbering equipment (he hopes to buy an electric clippers soon), he expressed a certain sadness that his toothdrawing art will not be passed down to his only son, who is now his assistant barber. Gregorio is acturely aware that modern dentists do not simply pull teeth, and must know how to do “forty-thousand things”. But though his art will die with him, Gregorio would be gratified to know that most of my forty informants would gladly switch back to his injectionless practice today, were it not for legal restraints.

With the aid of x-rays, antibiotics, anesthesia, and modern surgical techniques, many of Gregorio's primitive problems have disappeared. But even in a modern dental office, eye or ear pain is an important diagnostic aid, and pain on percussion tell-tale evidence. Many surgeons still prefer to wait until an abscess opens, even though they substitute hot rinses and poultices inside the mouth for
the heated handkerchief. In any extraction, the gum is first separated from the bone, forceps are avoided when root fracture seems probable, and root tips are sometimes left for exfoliation. In the absence of x-ray pictures, which now disclose the proper path of tooth removal, Gregorio's "tilting" procedures are excellent. And though there are better methods than the use of astringents such as vinegar to form a clot, Gregorio's principle is sound.

Despite his century-old armamentarium and lack of formal training, Gregorio's skill, judgment, and professional integrity suggest that our uncharitable stereotype of the mid-nineteenth century barber-toothdrawer may be at least somewhat unfair.


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A Thieving Quack

—JOHN W. HOWARD, A.M.
Morgantown, West Virginia

In his essay on quackery delivered to the Illinois State Dental Society in 1872, Dr. G. O. Howard decried a poetical advertising dentist, supposedly a graduate of the Pennsylvania College. According to Howard,¹ the following lines had recently appeared in the Galena Daily Gazette:

Would shield defenseless infancy from harm,
Call on B. & S., Dentists.

And patient merit never wants a friend,
Call on B. & S., Dentists.

But when from loss of teeth the food must pass
A crude, one rigid, one unbroken mass,
To the digestive organs, who can know
What various forms of complicated woe
May rise terrific from that single source,
breeds of fearful things.
Call on B. & S., Dentists.
The teeth, deciduous, tartar and decay
Call on B. & S., Dentists.

In secret whisper the kind truth impart,
There is a remedy, --- the dental art
Can every varying tone with ease restore,
And give the music sweeter than before.
Call on B. & S., Dentists.

While Dr. Howard was incensed at such behavior on the part of one who had allegedly graduated from a respectable school, he made no mention of the literary conversion that had been practiced upon the citizens of Galena. The injunctive refrain aside, every line is taken, more or less accurately, from Solyman Brown’s epic work Dentologia: a poem on the diseases of the teeth, and their proper remedies,² first published in 1833. A comparison of the language of the advertisement and the original poem is interesting.

<table>
<thead>
<tr>
<th>Advertisement</th>
<th>Dentologia</th>
</tr>
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<tbody>
<tr>
<td>Would shield defenseless infancy from harm.</td>
<td>Be watchful, ye --- whose fond maternal arm. Would shield defenseless infancy from harm. Mark well the hour when nature’s rights demand, The skillful practice of the dentist’s hand. (p. 14)</td>
</tr>
<tr>
<td>And patient merit never wants a friend.</td>
<td>On just desert let all success attend, And patient merit never went a friend. (p. 15)</td>
</tr>
<tr>
<td>But when from loss of teeth the food must pass</td>
<td>But when, from loss of teeth, the food must pass,</td>
</tr>
</tbody>
</table>
A crude, one rigid, one unbroken mass,
To the digestive organs, who can know
What various forms of complicated woe
May rise terrific from that single source,

breeds of fearful things.

A crude, and rigid, and unbroken mass,
To the digestive organs: who can know,
What various forms of complicated woe,
May rise terrific from that single source?

For nature, once resisted in her course,
Breeds frightful things — a monstrous progeny!
Consumption, fevers, palsy, leprosy,
The hobbling gout, that chides, at every breath,
The lingering pace of all-destroying death;
And apoplexy, dragging to his doom
The half surviving victim of the tomb. [pp. 41-42]

... ere the sun
Has through the first septennial circle run,
The teeth, deciduous, totter and decay,
And prompt successors hurry them away. (1. 13)

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Advertising in Dentistry

—MILDRED ROMANS, D.D.S., M.S.D.
Washington, D.C.

The position of the American Dental Association as it relates to advertising is stated in Section 12 of the Principles of Ethics with clarity — clarity which cannot be ignored by any dentist who accepts the obligations inherent in his profession.

Section 12 Advertising. Advertising reflects adversely on the dentist who employs it and lowers the public esteem of the dental profession. The dentist has the obligation of advancing his reputation for fidelity, judgment and skill solely through his professional services to his patients and to society. The use of advertising in any form to solicit patients is inconsistent with this obligation.

Yet the long history of dental public relations is peppered with advertisements. As recently as January 3, 1950, the following ad appeared in the Los Angeles Times (in the classified section under Personals):¹

Abscess & Pyorrhea
Treated teeth replanted.
Bites rebuilt. Dentures & Bridges.
Folder on Request
Joseph Homer, D.D.S. 444 Larchmont

A century and a half ago, November 18, 1802, to be exact, a reader may have found in his copy of The Maryland Gazette, the following lengthy advertisement by one who would one day become one of America’s great dental practitioners.

H. HAYDEN,
Dentist.

Offers his thanks to the ladies and gentlemen of Annapolis, for their generous encouragement during his former visits to this place, and by his strict attention to delicacy and tenderness in all operations on the teeth and gums, and the most implicit candour in his advice, he hopes to merit a continuance of their’s and the public’s patronage.

Mr. Hayden begs leave to remind those who may need the assistance of a dentist, that in all cases of decayed teeth much real good may be rendered by a seasonable application, the which if neglected often puts it out of the power of the most skilful to save or to render them any real service, particularly in folving or plugging of teeth, and also where artificial teeth are required, the remaining stumps if taken in season are of the utmost importance.

Natural and artificial teeth set from one to full sets, so as not to be distinguished from the real; he extracts teeth with safety, cleans and restores their native whiteness, and plombs such as are defective, so as to render them useful, and prevent their further decay; also every necessary operation on the teeth and gums that can possibly come within the line of his profession.
Any person wishing to be waited at their place of residence, will please send a line or servant to his lodgings, at Mrs. Brooks Boarding house, Churchstreet. Genuine tooth powder, warranted good, and brushes for sale.

N.B. Mr. H. returns to this place hereafter only once in twelve months.²

Is one to conclude that these two men, separated by one hundred and fifty years of scientific, economic, and technical development, were oblivious of their professional responsibilities, ignorant of the reflection they might cast on their colleagues, or charlatans concealing their lack of skill?

ADVERTISING—A REFLECTOR OF THE TIMES

In all fairness, one cannot evaluate historical events without considering the context of the times in which they occurred. Newspapers furnish a realistic window on past events—one through which the viewer might watch with fascination the development of dentistry in the United States.

As one looks back on life in the eighteenth century, one sees not a world of vast cities and industrial complexes, but a world without electric lights, rapid transit systems, telephonic or telegraphic communication. The major cities were little more than villages by today’s standards and newspapers were usually published weekly.

Until about 1766, the few individuals who were what could then be considered as dentists, were not looked on with favor because there were so many “quacks”. Therefore, what dentistry was done in the Colonies, (and that consisted primarily of extracting teeth and treating toothache,) was done chiefly by the physicians. The medical profession itself, however, was experiencing distressing times. The year 1760 saw the establishment in New York of the first medical examining board to curtail the practice of medicine by untrained practitioners. Although the first medical school in the United States (at the University of Pennsylvania) was founded in 1765, attendance at a medical school was not compulsory for physicians with the preceptorship system continuing into the nineteenth century.

After 1760, with the arrival of Dr. John Baker and Michael Poree from Europe, there was a gradual arrival of other “dentists”, “surgeon-dentists”, and “operators for the teeth.” These men brought with them the latest methods then known in Europe and greater attention was paid to the care of the teeth.

The microfilm files of the Newspaper Reference Room at the Library of Congress reveal an occasional advertisement by these early European arrivals which stirs the imagination. The following ad of Dr. Baker appeared in The Maryland Gazette on Thursday, September 1, 1774:

Dr. Baker, surgeon dentist, from Williamsburg, Virginia, is just arrived in the city in his way to Baltimore, and intends returning the beginning of October next; that those who are disposed to apply
to him may not be disappointed, he will be at the coffee-house, where
they may consult him in all disorders of the teeth, gums, sockets,
ulcers, cancers, abscesses, fistulas, suppurations and inflammations
in the gums, which are more or less of a malignant nature; and in
this way not only the gums are destroyed but also the teeth. Those
persons who have had the misfortune of losing their teeth, may have
teeth transplanted, and natural teeth grafted on the old stumps; also
artificial teeth from a single tooth to a complete set, so that they may
eat, drink, and sleep with them as natural ones. His antiscorbutic
dentifrice for preserving the teeth and gums, is quite free from any
corrosive preparation, and is a certain cure for all disorders of the
teeth, gums, and foul breath. Its superior efficacy over anything yet
offered to the public will be evinced in one using. It concocts the
vitiating juices, and renders a juvenile fragrance to the breath beyond
description; which no nauseous tincture, or cloying odours of per-
fumed essence can give; it also makes the teeth white and beautiful,
causes the gums to grow firm to the teeth, makes the saliva pure
and balsamic, is perfectly innocent, will eradicate the scurvy, and
restore the gums to their pristine state, if the teeth and gums have
been thoroughly cleaned by some skilful dentist: Its efficacy is well
known to the principal nobility, gentry and others of Great-Britain,
France, Ireland, Holland, and other principal places in Europe, also
to some thousands in America. The dentifrice may be had with
proper directions at Mrs. Howard's coffee house, and at his house
in Williamsburg, where all merchants, shopkeepers, masters of ves-
sels, may be supplied with any quantity to send to foreign parts,
with proper directions in any language. Each pot is sealed with his
cocat of arms, as in the margin of the directions to prevent fraud.
--Vindicat veritas.  

One wonders what hope Dr. Baker's ad, as well as the one by
Dr. Poree which appeared in the same Gazette on September 1st
and 8th, 1774, stirred in the breasts of the miserable sufferers
from the manifold dental diseases to which they were subject. And
how fared those who were brave enough to submit to the operation
of having 'natural teeth grafted on the old stumps.'

While one may not question their use of the advertisement in
view of the limited means of communication of that day, he might
well marvel at the confidence with which these men made their
claims for "anti-scorbutic" preparations and other dental treat-
ments. It is left to the reader of these early ads to decide for him-
self the character of the practitioner. Witness, for example, the very
different impression one gets from reading the advertisement of
Dr. H. Hayden.

In commenting on dentistry of that early era, Dr. Bernhard Wolf
Weinberger, the eminent dental historian, stated that advertisement
with dignity would appear justified based on the social conditions,
sparsity of settlements, limited means of communication. At any
rate, he pointed out, advertising had not yet come under the ban
of professional disapproval.

Dr. Weinberger went on to state that, in the period from 1800
to 1835 "...dentistry found itself gradually slipping into the hands
of the unscrupulous, so that men were compelled to organize in
order that the progress of dentistry might continue unhindered."
in 1834, divided the practitioners of dentistry into three groups: first, the group which qualified itself by thorough course of study of the principles of medicine and surgery and practiced it with a view not only to earn a living but to raise its status from disrepute; second, the group which had a course of medical studies but began to practice without acquisition of practical technique (many of whom eventually did reach a certain degree of excellence); and third, "all others who are engaged in the practice of dentistry; among whom may be found shoemakers, ostlers, locksmiths, watchmakers, constables, bakers, sailors, and in fact men of all occupations, who went from want of capacity for, or success in, the employment to which they were bred, or for some other reason, have taken advantage of the unprotected state of the profession, and assuming the title of dentist, have scattered themselves up and down the land, proving a disgrace to the profession and, as we truly believe, a curse to those who are so unfortunate as to be the dupes of their assurance and artifice." Yet Mr. Kimball was of the opinion that the public esteem of the profession was rising and with the united efforts of its best proponents it could secure the confidence of the public and eventually protect it from the then current malpractice.4

EARLY ATTEMPTS TO CURB ADVERTISING

The first dental society in the United States was formed in 1834 - the Society of the Surgeon Dentists of the City and State of New York. It was planned that the Investigating Committee of the Association would petition the Legislature of the State of New York for a charter and would examine the character and professional qualifications of candidates for membership. One of its tenets was: "In order more effectually to promote the honor of the profession, as well as to preserve good feeling and harmony among its members, it shall not be deemed honorable for any member, by means of advertisements, handbills, circulars, or in conversation with his patrons, to claim to be the exclusive manufacturer or possessor of good incorruptible or other teeth; or to claim any superiority over any other member, either as to his mode of performing any operation, in the quality or kind of teeth, or other material or instrument used by him." This Society of the Surgeon Dentists of the City and State of New York went out of existence after only a few short years, however.5

In 1840 the first dental college was established, the Baltimore College of Dental Surgery, and the first national dental society was convened,5 The American Society of Dental Surgeons, with Horace H. Hayden, M.D., of Baltimore as president.

In the colorful language of its Constitution, one of the purposes of the Society was "... to give character and respectability to the profession, by establishing a line of distinction between the truly meritorious and skillful, and such as riot in the ill gotten fruit of
unblushing impudence and empiricism." The American Society of Dental Surgeons disbanded in 1856, and the American Dental Convention, which first met in Philadelphia in 1855, went out of existence in 1876. Organized dentistry had nevertheless secured a foothold: the American Dental Association was formed in 1859, the Southern Dental Association was formed in 1869, and the two were consolidated into the National Dental Association in 1896.

Newspaper advertisements of the mid-nineteenth century began to reflect the technical advances being introduced into dentistry. Witness this excerpt from an ad by Dr. Casadavant, Surgeon-Dentist of Washington, D.C. in a newspaper of 1853:

He has made arrangements with one of the best workmen to assist him in the manufacture of ARTIFICIAL TEETH, single, or in blocks with gums, which are superior and more solid than any in use in this city. They are inserted by the atmospheric pressure, mounted on the finest gold plates, are of incomparable lightness, and not easily distinguished from the natural -- they are sufficient for every purpose of mastication, imparting to age the freshness and intelligence of youth, and are worn without the least uneasiness. For his great improvement he has received many testimonials from his patients and the press.

With an experience of seven years he will give perfect satisfaction, and all his operations will be warranted.6

In like fashion, the ever widening acceptance of nitrous oxide anesthesia brought forth many ads, of which the following is typical:

COLTON DENTAL ASSOCIATION EXTRACT TEETH without pain, with the gas, for all ages, from 3 to 76 years, with all conditions of health. Never a failure or accident. Office No. 19 Cooper Institute.7

ADOPTION OF CODES OF ETHICS

The first code of ethics for the dental profession was that submitted by J. Allen, D.D.S. to the American Dental Association in 1865. The work was an impressive effort to raise the status of dentists and provided guidelines to maintain it on that high plane. "As a learned profession", it began, "the time has come when a more elevated position should be taken and maintained by its members than has heretofore been observed . . . As a body, dentists should take a high and honorable position, and do all in their power to maintain it." The 6th article stated, in part:

"And it shall be held derogatory to the dignity of a dentist to advertise to do work for half price, or in any way to underrate the value of good operations, for it betrays a spirit of empiricism which should not be tolerated by our profession." 8

Although Dr. Allen's code was not adopted, he was one of a three-man committee appointed in 1866 which drew up a code of ethics which was adopted in that year. The adopted code was even more specific than Dr. Allen's original proposal in its ban on advertising. It stated in Article II, Section 3:

"It is unprofessional to resort to public advertisements, cards, handbills, posters or signs calling attention to peculiar styles of work,
lowness of prices, special modes of operating; or to claim superior-
ity over neighboring practitioners; to publish reports of cases or
certificates in the public prints; to go from house to house to solicit
or perform operations; to circulate or recommend nostrums; or to
perform any other similar acts." 9

The adoption of a code of ethics no doubt had a beneficial
effect on the profession as a whole and the public conception of
it. Nevertheless, there was no dearth of dental advertisements in
the newspapers of the last decades of the nineteenth century. How-
ever, that period did see decided advances in dental legislation and
licensure. Thirty states adopted legislation creating and empowering
dental boards between 1868 and 1888, and the remaining states
passed dental laws by 1903. For example, in New Jersey, one of
the earliest states to adopt dental legislation (1873), the Act pro-
hibited the practice of dentistry by anyone who had not either
graduated from, or received a diploma from, a dental college char-
tered under authority of a State or foreign government, or received
a certificate from a board of dentists. For those who studied den-
tistry under private tutelage the New Jersey State Board was em-
powered to prescribe a reading course and to grant a certificate
only on satisfactory passage of an examination given by it. 10

THE FLOURISHING OF UNSAVORY ADVERTISING

At the turn of the century, advertising, instead of gradually dis-
appearing from the newspapers, became more flagrant. A column
of five dental ads in the Saint Louis Daily Globe-Democrat on Jan-
uary 16, 1900, illustrates the violation of practically every injunc-
tion in the book - soliciting, price-cutting, claims of superior ser-
ves, guarantees of success, etc. 11

The dental advertisements of the first part of the twentieth cen-
tury are studded with such inducements as "Lady attendants"; 12
"My office is the home of painless dentistry, the place where suf-
ferring ends, instead of begins"; 13 "My Anchor Suction Teeth Never
Slip or Drop, $5 a Set Guaranteed 20 years"; 14 "Roofless plates
. . . Does not cover the roof of the mouth and makes eating a
pleasure . . . my plates are a guaranteed success. Stick tight and
look natural. You can cough, sneeze, sing, whistle or eat corn off
the cob and they never drop"; 15 "Not a dental Parlor. A private
high-class, up to date sanitary dental office with sterilized instru-
ments, and gentlemanly operators, one you will not be ashamed to
recommend to your friends. X-ray service free with other dental
work." 16 The early days of the economic depression of 1929 wit-
nessed a frantic attempt by a few dentists to compete for patients
by false claims and unscrupulous ads.

Despite those unprincipled individuals who disregarded author-
ity and scoffed at professional conduct and ethics, dentistry was
on the march. More research was being done and there was a grow-
ing body of biological as well as technical knowledge. Through the
vigorous efforts of many dedicated men to raise and standardize
the requirements of dental education and to strengthen the laws of licensure and practice, dentistry was throwing off the shackles of a vocation and acquiring the characteristics of a true profession: "education beyond the usual level, the primary duty of service to the public, and the right to self-government." 17

The Code of Ethics of the American Dental Association which had been adopted in 1866 remained unchanged through 1886 and only a few changes were made by 1922 when a new Code was adopted. The Code of 1922 was revised several times, once in 1934 and again in 1951. Section 12 on Advertising in the 1951 Code states:

"The dentist has the obligation of advancing his reputation for fidelity, judgment, and skill solely through his professional services to his patients and to society. The use of advertising in any form to solicit patients is inconsistent with this obligation because it reflects adversely on the dentist who employs it and lowers public esteem of the dental profession."

Section 12 of the November 1964 revision of the Code is the same in principle. 18

STATUS OF ADVERTISING TODAY

As the years have passed the dental practice acts of the various states have become more emphatic and explicit in their ban on dental advertising. In many states the law is so worded that the Board may suspend or revoke the license of a dentist who is guilty of "unprofessional conduct" which includes advertising. This excerpt from the Missouri dental law is typical:

"332.160. Revocation or suspension of license -- grounds -- advertising limited -- procedure -- judicial review. - 1. Any dentist may have his or her certificate of registration or license, or both, revoked or suspended by the Missouri dental board for any of the following causes: Making use, directly or indirectly, of any advertising statements of a character tending to deceive or mislead the public, advertising, directly or indirectly, professional superiority or the performance of professional services in a superior manner; advertising, directly or indirectly, prices for professional services; advertising, directly or indirectly, by means of large display, glaring light sign, or containing as a part thereof the representation of a tooth, teeth, bridge work or any portion of the human head; employing or making use of, directly or indirectly, advertising solicitors of free publicity press agents, or advertising, directly or indirectly, any free dental work or free examination, or advertising, directly or indirectly, to guarantee any dental service, or to perform any dental operation painlessly; the use of radio, directly or indirectly, by any dentist to advertise his or her professional qualifications, or fees:" 19

Today one rarely encounters that type of advertisement in any of the media. And yet, where a loophole in the law exists, one canny individual may prefer to risk the respect of his colleagues and jeopardize the reputation of dentistry by violating, if not the law, the principles of ethics of his profession.
Perhaps no one has analyzed so well, in the context of modern life, the reason why advertising is severely censured, as Dr. Willard C. Fleming:

"Have you ever wondered why we dislike and bar from our organizations those who advertise? . . . In my opinion our unfavorable reaction to advertising is due to the fact that the public has been granted the right to judge what is best for the patient or client. In the commercial world, the customer is supposed to have some discretion as to the value of a commodity: this radio is a good buy, that automobile is over-priced and so on. In the professions, particularly the health professions, the patient does not have this ability to distinguish between a good and a poor professional service. If we resort to advertising, we place the public in the position of having to distinguish between the claims of superior services, relative costs, and the value of services to be rendered. We know that this is not possible and to condone advertising is basically unsound - if not dishonest." 20

Most recently, the Board of Trustees of the American Dental Association meeting on December 12, 1971 approved revised advertising and exhibit standards for the Association itself. The new standards were designed to facilitate their enforcement as well as to revise others to respond to the "truth in advertising" campaigns that governmental and private agencies are currently conducting to protect the general public. 21

Those words of a hundred years ago are vibrant still: "As a body, dentists should take a high and honorable position, and do all in their power to maintain it."

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DR. ROMANS is Assistant professor, Department of Orthodontics, Howard University College of Dentistry, Washington, D.C.
Dr. H. Martin Deranian (left), past-president of the American Academy of the History of Dentistry presents the annual Hayden-Harris Award of the Academy to Professor Gardner P.H. Foley at the meeting of the Academy at Atlantic City on October 8, 1971. The award is made in recognition of outstanding contributions to the field of dental history.

Doctor W. Harry Archer, formerly Professor and Chairman of the Department of Oral Surgery, University of Pittsburgh, School of Dental Medicine and now University Professor, was presented with The Horace Wells Medal, Diploma and Pin by the Brazilian Dental Association for his original research on the Life of Horace Wells which lead to the publication of the most interesting and factual book: “The Life and Letters of Horace Wells, Discoverer of Anesthesia.” The presentation took place during the recent annual meeting of the American Dental Association, where Professor Amedo Bobbio, on behalf of the Brazilian Dental Association, pinned the medal on Doctor Archer. Doctor Bobbio who is a member of the American Academy of the History of Dentistry is Professor of the History of Dentistry at the University of Sao Paulo, and a noted author in this field. He is also the editor of “The Review of The Sao Paulo Dental Association”, Brazil’s largest Dental Journal.
Historian of the Dental Society of the State of New York, Dr. Joseph H. Kauffman (left) is here seen chatting with Dr. Malvin E. Ring, Editor of the Bulletin of the History of Dentistry at the annual meeting of the American Association of Dental Editors held at Atlantic City, N.J., October 9, 1971.

Ancient Mexican dentistry was called upon to provide the symbol for the XVth World Dental Congress of the Federation Dentaire Internationale which will be held in Mexico City this coming October 22 through the 27th. This figure represents a medicine man treating a mouth ailment. The spiral-like ornament, representing the spoken words, indicates an invocation to the gods for the patient's health. This emblem forms part of the mural entitled “La Ciencia Medica” (The science of medicine), from the Mexican pre-Hispanic culture of Teotihuacan.
A Short History of Local Anesthesia

—JOHN P. RAHART, B.S.
Buffalo, New York

That pain is unpleasant seems to be a characteristic of life and, easily following, is the assumption that man in pain would try to relieve his discomfort in any way possible. History seems to bear this out; from earliest times writings of most major civilizations reveal that myriads of substances were sought and described which were supposed to, but seldom did, relieve pain. Several substances, notably alcohol and opium, were known and used with varying success by the ancients.\(^1\)\(^2\) The fact that they often proved unpredictable and difficult to administer, coupled with the fact that when they did work, their effect was to impair bodily function and control as a whole, left unsatisfied the search for an effective substance which could remove pain from the locus of injury.

The search for anesthetic substances, particularly local anesthetics, has been very interesting and often quite baffling. The Assyrians were said to compress the vessels of the neck in order to reduce sensation during the circumcision of their young. The Assyrian language is quite difficult to decipher and, as a consequence, the validity of the translation of the account of this procedure is open to question.

The first description of a local anesthetic procedure which has been translated with certainty is attributable to the Greeks. In Homer's *Iliad* (Book II) Patroclus is described as "Having cut an arrow out of the thigh of Eurypylus, cast (on the wound) a bitter root . . . that took the pain away and ended all his anguish, the wound began to dry and the blood ceased." Another early mention is of the "Memphian Stone" which is thought by some to have been marble, and which when moistened with vinegar was thought to release carbon dioxide. Hippocrates was aware of the analgesic action of cold as is evident in his *Aphorisms*, but he never prescribed it for any surgical procedures. Aristotle's writings indicate that the Greeks knew of the procedure attributed by many to the Assyrians, of constriction of the large vessels of the neck to reduce conscious sensation.

As medicine expanded with Rome, so did the search for reliable anesthetics. A physician to Marcus Aurelius is known to have prescribed opium paste as a remedy for a toothache. Opium has no local analgesic action, and therefore it is unlikely that this remedy had any effect.

As medicine expanded with Rome, so did the search for reliable anesthetics. A physician to Marcus Aurelius is known to have prescribed opium paste as a remedy for a toothache. Opium has no local analgesic action, and therefore it is unlikely that this remedy had any effect.
progress was made. As a rule, the agents and methods prescribed in those dark times to remedy pain were sheer quackery. A recipe taken from a typical medieval collection of remedies given for the painless extraction of teeth reads:

Take some newts, by some called lizards, and those nasty beetles which are found in ferns in the summer-time. Calcine them in an iron pot, and make a powder thereof. Wet the forefinger of the right hand, and insert it in the powder, and apply it to the tooth frequently, refraining from spitting it off, when the tooth will fall away without pain. It is proven. 3

In the midst of such quackery there was occasionally a sound idea. Shortly before the Norman conquest a Saxon monk compiled a leechbook with various magical and superstitious remedies among which was the recommendation that chilling by the application of cold water would deaden the pain. This seems to be the first record of refrigeration anesthesia. The method was forgotten and independently rediscovered many times throughout the ensuing years, including the entire Renaissance period. It was not until 1807, in the aftermath of the battle of Preuss-Eylau, that Napoleon’s Surgeon General, Baron Dominique-Jean Larrey discovered amputations were more painlessly performed on soldiers who had lain in the snow for long periods of time; refrigeration anesthesia would not be forgotten, thereafter.

Although the effects of cold were known to many after 1807, it was not until 1848 that a physician, James Arnott, realized the practical value of cold for the local supression of pain. Between 1848 and 1867, he published a long series of articles, the first of which he entitled "On Cold as a Means of Producing Local Insensibility." Impressed by Arnott’s success Benjamin Ward Richardson began to search for other means of regional pain supression. As fate often has it, success is delivered through the most unlikely of events. A description of the occurrence is best heard through the words of Richardson:

One night my wife and I went to a ball after I had been busy in the laboratory for many hours. A young lady with whom I was about to dance let a little eau de'Cologne fall on my forehead, by blowing briskly through a small tube. The cold produced was intense, and pinching the bit of skin affected by it, I found that it was benumbed. Thank you! I said, and seized upon the fact. 4

Richardson’s freezing spray became immensely popular and was the main method of inducing local anesthesia until 1884 when a consolidated series of events led to a chain of developments which ultimately culminated in modern local anesthesia.

Local anesthesia, as we know it today, consists of reducing the sensitivity of the nervous tissue in a particular region through the use of drugs. The successful achievement of this goal depended upon two things: the discovery of a suitable drug, and the invention of a method to accurately deliver the drug. In 1853 Charles G. Pravaz invented the hypodermic syringe and Alexander Wood invented the hollow metallic needle; together these inventions led
to a simple means of accurate delivery of a liquid substance into a
specific area of the human body. Prior to this, any such injections
were made with quills which proved unreliable and were often
unsterile.

The story of the discovery of a suitable drug is quite interesting
and, at times, seems more like medieval alchemy that any attempt
to isolate a satisfactory pain reliever. For ages it was known that a
plant native to Peru, the coca plant, was supposed to affect users
of extracts of the plant in a very strange fashion. On a world-
wide expedition, an Australian naturalist, Scherzer, heard of the
mystical qualities of the "divine plant of the Incas." He brought
back samples of the dried leaves, some of which reached the lab-
oratory of Friedrich Wohler in Gottingen, who entrusted them to
an assistant Albert Niemann.

Young Niemann, in need of a theme for his inaugural thesis, ex-
austed the leaves with acidulated alcohol, treated the tincture with
milk of lime, and then filtered it. He added acid to this filtrate and
distilled off the alcohol. Now, he had a syrupy mass from which he
separated the resin and water. The residue he precipitated with
sodium carbonate; the deposit he subjected to a vigorous shaking with
ether. Then he allowed this ethereal solution to evaporate. The ether
disappeared into space, but the crystals remained behind. Niemann
knew he had isolated coca's active principle, which from the parent
plant he called cocaine. Niemann declared that it "numbs the nerves
of the tongue, depriving it of feeling and taste." 7

This occurred in 1860. Five years earlier, in 1855, a German
named Gadicke reportedly isolated an alkaloid substance from the
leaves of the coca plant which he named erythroxylin. Niemann
was the first, however, to isolate the substance responsible for
producing numbness in crystalline form, and his name of cocaine
stuck.

The importance of these discoveries was not realized, however,
until 1873 when Alexander Bennett demonstrated the anesthetic
properties of cocaine. It was another five years, 1878, before a
thorough study of the pharmacological properties of cocaine was
done by Vasili Konstantinovich von Anrep. Von Anrep injected a
solution of cocaine into his own arm and reported anesthesia
which lasted thirty-five minutes. In spite of these findings the value
of cocaine as a local anesthetic was to be ignored for several more
years.

In Vienna General Hospital Carl Koller, a surgeon, and his good
friend Sigmund Freud were studying the possibility of curing patients
addicted to morphine through the use of cocaine treatments. Both
men became familiar with the anesthetic properties of cocaine
salts. About this time, however, Freud was involved in his theory
of psychoanalysis and was also suffering pangs of romance, and
his interest in the anesthetic properties of cocaine abated con-
siderably. Koller continued to experiment with cocaine and dis-
covered that the application of a few drops of cocaine to an
animal's eye, made it insensitive to mechanical, chemical, thermal
and electrical stimuli. He experimented further upon human subjects and in September of 1884 presented a paper on producing anesthesia of the eye to the Congress of Ophthalmology at Heidelberg. His findings rocked the medical world!

Effective chemical local anesthesia was at last documented for the medical profession. Experimentation with, and the use of, cocaine spread rapidly throughout the medical and dental professions. William S. Halsted of the Johns Hopkins Hospital injected cocaine into the trunk of the mandibular nerve in 1884 to become the first man to obtain "conduction anesthesia" in peripheral areas. Halsted conducted his experiment upon R. J. Hall who published an account of the experiment on November 26, 1884. Further experimentation expanded the potentials of cocaine by developing methods of injection into the central nervous system, enabling the induction of local anesthesia in large regions of the body. Notable contributions in this area came from Corning who was able to inject cocaine into the spaces between the two spinous processes of a dog and obtain epidural and selective regional anesthesia. Quincke in 1891 demonstrated the diagnostic value of the spinal tap but failed to realize its possibilities for spinal anesthesia. It was August Bier who is credited with attaining the first true spinal anesthesia by injecting cocaine between the third and fourth lumbar spaces.

Experimentation with cocaine not only continued with the goal of finding new applications for the drug, but, due to several toxic side effects of the drug, it became immediately apparent that much refinement had to be done upon the drug itself. In 1897 Braun was able to demonstrate that the toxicity of cocaine was directly proportional to its rate of absorption; as a consequence, he suggested the use of epinephrine to reduce the rate of absorption and increase the effective duration of anesthesia. Other experimenters sought to develop other compounds formed from cocaine with less toxicity. In 1891 Giesel isolated tropacaine; in 1903 Fourneau introduced stovaine; and in 1904 the great breakthrough came when Einhorn produced novocaine. In years to follow many new drugs were developed which eliminated many of these drugs' undesirable side effects. Effective controlled local anesthesia was at last a reality!

Novocain was introduced into America by W. S. Schley in 1907 and was quickly accepted by the leading dentists of the United States. Prinz described its use in dentistry as early as 1910 and Theodor Blum was instrumental in disseminating its use by establishing one of the first courses of instruction in its use in 1912. Among the pioneer publications in the field of local anesthesia were Guido Fischer's Local Anesthesia in Dentistry, published in English in 1912 and Kurt Thoma's Oral Anesthesia: Local Anesthesia in the Oral Cavity was brought out in 1914.

And so came about the realization of one of man's earliest dreams. After eons of existence, through blind groping, witchcraft, and scientific endeavor... today man is freed of pain.
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From My Earlier Years;
Reminiscences by
William D. Coolidge

(Editor's note: Next year will mark the hundredth birthday of one of the great benefactors of dentistry. William D. Coolidge was born on October 23, 1873, marking the beginning of a lifetime of research which culminated in the discovery of ductile tungsten which alone made possible the modern X-ray tube. This Coolidge tube is the one which permits the modern dentist and physician to make diagnoses of great accuracy, and his diligent efforts were acknowledged by his receiving many awards from American and European scientific societies, among them the Rumford, Hughes, Faraday, Duddel and Franklin medals. Principal among his recognitions is the honorary membership bestowed on him several years ago in the American Academy of the History of Dentistry.

In answer to a request by Dr. Louis B. Amyot of Schenectady, New York, Dr. Coolidge jotted down these reminiscences of his early life.

Dear Dr. Amyot:

I was glad for the opportunity to meet with you again recently, and I hope the following are the sorts of "reminiscences" you requested.

It's interesting to look back over the path of one's life and to see its many direction changes, often radical, although due to events which seemed, at the time, almost trivial.

When I look back over my 97 years, I see that first of all, of course, I inherited much from my parents... long life for example. Father lived to be 94, had good health all that time, went to sleep one night and didn't wake up in the morning. Mother lived to be 85.

Father worked in a shoe factory. We had, at home, a seven acre place devoted largely to the raising of apples and peaches, with a little devoted to the family vegetable garden. Mother added somewhat to the family income by taking in dressmaking.

I was an only child, but the family income did not suggest my going to college. In grade school, I hated to get up before the class and "speak a piece." My father, knowing this, arranged for me to take some private lessons in elocution. The young lady teacher was very good. She must have been, for she made what had been torture for me almost a pleasure. I think that I still feel the effects a little.
In my home-town a Mr. Frank Knight had a small machine shop and allowed me to make small gadgets there for myself, using his tools. He often showed me how to do a better job, and gave me an active interest in things mechanical and electrical. His son George, a classmate of mine in high-school, suggested my applying for a state scholarship for M.I.T. I did so, and was awarded one. It was in the freshman chemical laboratory at M.I.T. that I first met Willis R. Whitney, my teacher there who was subsequently to exert the strongest influence of anyone, on my life.

While a student at M.I.T. during the last year of my electrical engineering course, one day asked the physics teacher, Prof. Goodwin, this question: supposing I had a drinking glass half-full of water and that I added to the water a substance such as sugar, for instance, which dissolved in the water, what would happen to the height of the liquid level in the glass? To my surprise, he said that some added substances would raise the level, while others would lower it! This took my mind somewhat away from engineering, as it seemed more fundamental. Following this experience, an M.I.T. classmate in our last year, suggested that I apply for a fellowship for advanced study abroad. This application was made and granted and resulted in my studying physics, chemistry and geology at the University of Leipsic for over two years.

Many other events made a marked change in my lifeline, but I remember one in particular. I had gone to a Dr. Pettengill, a dentist in Hudson, Mass., my home town, for the filling of a cavity in one of my teeth. As I watched the preparation of the filling material, silver amalgam, I was much interested and impressed by its physical properties. Made from liquid mercury and metallic silver, it was a somewhat sticky mass, plastic over a considerable temperature range. Years later the memory of that material led me to use an amalgam, this time cadmium and mercury, in the production of squirted tungsten filaments for the incandescent lamp. Tungsten is a metal which had always been as brittle as glass; but these filaments taught us how to make it ductile and as strong as steel; and in this form it is used for incandescent lamps and other purposes, and has led to the present X-ray tube. This has all followed from having that tooth filled.

Sincerely yours,

Wm. D. Coolidge.

Wm. D. Coolidge.

DR. COOLIDGE is Director Emeritus of the Research Laboratory of the General Electric Company, Schenectady, New York.
March 20, 1972 marked the passing of one of the world's greatest dental historians: Curt Proskauer died in New York City at the age of 85.

Few men in their lifetimes have had the variety of experiences as did Dr. Proskauer, and fewer yet the honors bestowed upon them as he. His contributions to dentistry were numerous, but it was in the field of the history of his profession that he made his greatest impact, and for this he was awarded honorary membership in the American Academy of the History of Dentistry, as well as his being made the recipient of the Academy's coveted Hayden-Harris Award in 1969.

Dr. Proskauer was born October 24, 1887 in Breslau, Germany. After attending the Universities of Breslau and Berlin, he received his degree in dentistry in 1909 and was appointed as an assistant at the Dental Institute of the University of Jena, a post he occupied until 1911. In 1919 he was made Director of the Dental Historical Collection of the University of Breslau, a post which he held until 1923. In 1927 he was appointed Director of the Research Institute for the History of Dentistry of the University of Berlin, and he continued in this position until 1933 when Hitler's advent to power forced him out because he was a Jew.
Dr. Proskauer had maintained a private practice of dentistry in Breslau from 1911 to 1939 when he was forced to leave his native Germany because of the ruthless Nazi terror, and he immigrated to Italy. While there, awaiting passage to America, he carried on research at the Vatican Library. From October 1939 until May 1940 he prepared a catalog of the dental collection of the Accademia di Storia dell' Arte Sanitaria of Rome, of which he was a member.

Arriving in the United States in 1940, he quickly made his mark, and soon received a Fellowship at the New York Academy of Medicine, being named in 1949 as consultant to the Academy's library.

Among other honors, in 1946 he was appointed Consulting Editor of the Journal of the History of Medicine and Allied Sciences of Yale University. From 1950 to 1951 he was Research Fellow of the Dr. Simon Baruch Foundation for Medical Research.

From 1951 to 1965 he held the position of Curator of the Charles H. Land Museum of the Dental Department of the Presbyterian Medical Center of Columbia University. The United States Department of Health, Education and Welfare awarded him a grant in 1962 so that he might write his "History of Oral Hygiene", but ill health kept him from ever completing this project.

Dr. Proskauer's vital interest in dentistry caused him to be chosen by his peers in 1926 as the official German delegate to the International Dental Congress in Philadelphia. On that occasion he exhibited his extensive private collection of dental pictures and objects which in 1927 was acquired by the Reichsverband der Zahnärzte Deutschlands and which formed the nucleus for the museum of the newly organized Research Institute for the History of Dentistry. It was from the position as director of this museum that the Nazis expelled him. Most of Dr. Proskauer's collection is today in the museum of the Bundesverband der Deutschen Zahnärzte (Association of German Dentists) in Cologne.

Besides the Congress in 1926 he was also in charge of the German exhibition at the International Dental Congress in Paris in 1931.

His great knowledge of the field of dental history resulted in his having published over one hundred scholarly articles in numerous dental and medical journals in many countries, among them Der Deutsche Monatsschrift fur Zahnheilkunde, Zahnärztliche Rundschau, Schweizerische Monatsschrift fur Zahnheilkunde, the Bulletin of the History of Medicine, the Journal of the History of Medicine and Allied Sciences, Tic, Ciba Symposia, the New York Journal of Dentistry, the Journal of the American Dental Association, the Bulletin of the New York Academy of Medicine and the Journal of the American College of Dentists.
He was widely sought after as a speaker and delivered lectures in Paris, Stockholm, Lund, Zurich, Berlin, Munich, Nuremberg, Karlsruhe and Kissingen.

His major works were two widely acclaimed books: *Iconographia Odontologica* (The Dentist in Art) was originally published in 1926 and reissued in 1967 with a new introduction by Prof. Dr. Hauser, by Olms of Hildesheim, Germany. In 1962 he co-authored with Germany's late, great dental historian, Dr. Friedrich Witt "The Pictorial History of Dentistry."

His standing in the academic community was fully recognized by the New York Times when, on April 11, 1956, it published on Page One Dr. Proskauer's interpretation of a newly found fourth-century fresco in a Roman catacomb as the first pictorial representation of a human dissection.

His affiliations were numerous. Besides his honorary membership in our Academy, Dr. Proskauer was a corresponding member of the Anglo-American Dental Society of London, the Deutsche Gesellschaft für Zahn-, Mund-, und Kieferheilkunde of Berlin, the Subcommittee on Dental History of the Federation Dentaire Internationale, the American Association of the History of Medicine, the American Medical Library Association, and the New York History of Science Society. In 1967 he served on the Advisory Committee to the Smithsonian Institution for the Hall of Dentistry. Recognition by his native land came to him in 1968 when he was awarded one of that nation's highest commendations, the Commander's Cross of the Order of Merit of the Federal Republic of Germany.

Dr. Proskauer was married in 1914 to Erna Cohn, and their fifty years together was ended by her death in 1964. They are survived by two sons, Henry G. Proskauer and Professor Paul F. Proskauer.

Such is the story of a great man who left this earth immeasurably richer for his having lived and worked here. His name will go down in history along with those other outstanding personalities who spent their lives in the advancement of one of the most important branches of the healing arts - dentistry.

Malvin E. Ring, D.D.S., M.L.S.
Oddments in Dental History

—MALVIN E. RING, D.D.S.
Batavia, N.Y.

Most students of the history of dentistry are aware of the fact that early dental practitioners carried on their dental practice as a sideline to some other, frequently more profitable, business. Thus one of the earliest colonial Americans engaged in dental practice, James Mills was a wig-maker. Isaac Greenwood, sire of a long line of prominent dentists, and himself one of Boston’s most notable dentists was an ivory-turner who sold billiard balls and umbrella handles along with his dental services. Historians generally are familiar with Paul Revere’s other career as a silversmith. Charles Wilson Peale dabbled in dentistry along with his painting; and of course apothecaries and physicians doubled as their community’s dentists when none of the latter were available.

However, what is probably one of the most curious combinations of the practice of “dentistry” with another vocation is the following which appeared in an advertisement in the New York Journal and Weekly Register of July 19, 1787.

—By Permission. At Mr. Corres’ City Tavern, on Saturday, the 21st Inst. The surprising performances of the celebrated John Brenon from Dublin, in the curious and ingenious art of dancing on the Slack Wire, Balancing both on and off the wire, without the assistance of a balance pole as it is at present performed in London and Dublin.

I He balances a straw, or a single tabacco pipe on the wire.
II Balances a sword on the edge of a wine glass
III Goes through a Hoop on ditto.
IV Beats the drum on ditto.
V Walks the wire in full swing.
VI Goes through the manual exercise of the firelock, loads and fires while on the wire.

The whole of his performance being Collected from the different parts of the globe, where such amusements are in repute, would be too long for this advertisement, his ground balancing being past description. Singing, by Mrs. Brenon. Concludes with various Feats of the Dexterity of Hand.

To begin precisely at Eight O’clock. Tickets, First seat, four shillings, Second Ditto, two shillings to be had at the place of performance and at Mr. Mortons’ printing office No. 22 Water Street.

His performances will be continued on Wednesday and Saturday Evenings. Said Brenon cures the tooth ache without drawing. No cure, no pay, for the Poor. Gratis.
To the Editor:

I am very grateful for your gift of the back issues of the Bulletin of the History of Dentistry which you kindly sent us to complete our files. We now have it complete from vol. 1 and can now get them bound. We now have a subscription to it through the university of Toronto Library Serials Dept.

I have found that this very interesting publication has provided me with important historical information, so I, for one, appreciate the great effort put forth in its publication.

I was pleased to hear from Dr. Swanson that your meeting went well and that the stamp collection from our Library gave it an added interest.

Thank you again—
Sincerely,
Phyllis M. Smith, Librarian
The Dental Library
The University of Toronto

To the Editor:

I enjoyed the issues of the Bulletin that you were kind enough to send me. They were interesting, readable and not trivial—you should be proud. I am looking forward to the June issue, not primarily because your review of my book will be in it (I would be dishonest if I would not admit that I am curious and hopeful), but because it will be another interesting issue about dental history.

With best wishes,
Isaac Sissman, D.D.S.
To the Editor:

I have just read with unbounded delight the various tributes paid in the Bulletin to C. Edmund Kells.

It is merely elementary justice that we, of today, should offer due homage to an undoubted pioneer in our profession.

Incidentally, I had the honor to correspond with him on several occasions, and his kindness revealed itself to me by presenting me with a copy of Three Score Years and Nine inscribed "To my friend far overseas."

Without in any manner attempting to minimize the tributes, already so ably expressed about him, may I mention that in an article "Dentists Notable in Other Spheres" (Brit. Dent. J., 1968, 125, 122-4) I was proud to refer to his many outstanding achievements.

With cordial greetings,
Honorary Lecturer, History of Dentistry
University of Edinburgh

To the Editor:

Your December 1971 issue of the Bulletin of the History of Dentistry just arrived, with some most interesting articles. I look forward to going through it.

Best wishes to you and for the continued success of the Bulletin.

George C. Paffenbarger, D.D.S.

[DR. PAFFENBARGER is the President of the William J. Gies Foundation for the Advancement of Dentistry.]

To the Editor:

I am taking a six months Study Leave starting in May this year, and during my trip I am visiting dental historians as well as periodontists, and after some time in Europe will be going to the U.S.A.

I hope to attend the meeting of the American Academy of the History of Dentistry of which I am a member - as you know - and perhaps I could meet you there.

I have been friendly with Dr. Milton Asbell for many years and will meet him in Philadelphia. I will also be seeing R. A. Cohen in England, Ake Lofgren in Sweden and F. deMaar in Holland.

I want you to know that I enjoy the newsletters and think the Bulletin a fine publication. I am looking forward to meeting members of the Academy in San Francisco.

Yours sincerely,
Sydney Levine

[DR. LEVINE is Senior Lecturer in Periodontics at the Department of Preventive Dentistry of the University of Sydney, Australia.]

A seemingly impossible task has here been accomplished with outstanding success: an account of life in a working-class London neighborhood in the period from about 1550 to 1625, as culled from the parish records of St. Botolph Without Aldgate, has been turned into a reading experience!

Thomas Forbes, the author, is Professor of Anatomy at the School of Medicine of Yale University and spent a year in Aldgate on a grant from the National Library of Medicine studying the many records as kept by the parish clerks of that church during that three-quarters of a century. Forbes recreates the physical aspect of London of those days, evoking the image of a teeming population center devoid of elementary hygienic devices, subject to devastating visitations from the plague every few years. What adds all the more to the poignancy of the reporting is the fact that the author reproduces the original entries as written down by the clerks and the immediacy of the report becomes striking:

A Poore woman being vagrant whose name was not knowne shee dyed in the striete under the seate before Mr. Christian Shipmans howse called the crowne without aldgate an she being in high striete. And was buried the xxiiijth day of Aprill anno 1597. yeares xxiiij she was no parishioner with us neither cowld we learne from whence she came she dyed of the plague.

The author, working from these records has admirably put together a set of statistics regarding the causes of death in that community, as well as a recounting of the primitive medical care which was afforded to the people of that day. Poverty was rife and the
indigent formed a large part of the population; and the official governmental measures which were in force to deal with the large numbers of truly poor people was to issue to them licenses permitting them to beg! The lack of hospital facilities was shocking; the usual method of treating the ill was to have them taken in to the homes of the well.

There is nothing in this book about the history of dentistry and precious little about the practice of medicine in Elizabeth's London. Nevertheless, any dental historian would be immensely benefitted in his understanding of the medicine and dentistry which was being practiced by the reading of this work. It is highly recommended for anyone who has an interest in the past, and the fact that it is written in such a marvellously interesting style is an added boon. Add to this the fact that the author has supplied an excellent bibliography which can serve as a good jumping off place for further study of that period and a good complete index, and one can understand why this reviewer cannot recommend this book too highly.


The author, professor of surgery and head of the Division of Neurosurgery at the School of Medicine of the State University of New York at Buffalo has an excellent grasp of historical processes and this, coupled with painstaking research and a marvellously facile writing style, makes for a fascinating monograph.

Although directed primarily at neurosurgeons, the dentist interested in the development of his profession will find in it much that is of value.

The author bases most of the book on the writings of an extraordinary surgeon, Joannis Scultetus of Ulm, Germany (1595-1645) who was atypical in that he was a physician as well as a surgeon. The techniques of this advanced practitioner are discussed in absorbing detail and are augmented by numerous selections from his writings as well as case histories from the writings of, among others, Ambroise Pare and Guy de Chauliac.

Scultetus' age was dominated by the ceaseless struggle of the Thirty Years War. This war, its participants - the soldiers and their weapons, are described in wonderful detail, since the surgeon's life could not be disassociated from those turbulent and agonizing times.

Of great interest to the dental historian is Bakay's description of the various types of surgeons in practice in Europe in the seventeenth century, with a short but admirable discussion of the growth and development of the professional surgeon from the ranks of barbers and barber-surgeons.

Of equal interest is the last chapter which details the history of man's attempts to fathom the working of the central nervous system.
system, ranging from the suppositions of Galen to the penetrating studies of da Vinci and Fabricius.

This is a beautifully produced and copiously illustrated book which can provide a fascinating excursion into the past for any interested historian.


It is seldom that a history of a particular dental school will be of interest to dental historians as a whole, or that it would have value to researchers and others interested in that field. This book, however, is an exception to that rule.

Dr. Sissman has put together an eminently readable text which deals with much more than just his one dental school. It is in essence a history of dental education in the United States from the earliest attempt at a school by Chapin Harris' older brother John to the latest developments in curriculum design and community activity on the part of a school of dentistry.

From its early beginnings as a frontier outpost, the city of Pittsburgh grew to a sizable community in the 1880's, and in spite of the fact that Herbert Spencer said that "... a month in Pittsburgh would justify anyone in committing suicide" there were many who felt that this dynamic steel and commercial center had a great future. And so it was that a group of far-sighted dentists succeeded in persuading the trustees of the University that a professional school for the training of dentists was needed, and in 1896 that Pittsburgh Dental College came into being.

The story of how this came about is told in conjunction with the story of the whole of dental education in the country at that time. And this is a device used by Dr. Sissman in describing other aspects of the school's history. He has succeeded in showing the whole trend of dentistry in this fashion: his discussion of the Gies Report on dental education in 1926 is an excellent one with a sure grasp of the impact this report had on the whole status of dentistry in America; his report of the contribution of Pittsburgh to the war effort both in World Wars I and II mirror the efforts of American dentistry as a whole.

It is also a pleasure to report that so many distinguished leaders and dental educators who are associated with this school are active members of the American Academy of the History of Dentistry, from the Dean, Dr. Edward J. Forrest and the eminent oral surgeon, Dr. W. Harry Archer to the author himself.

The book is abundantly illustrated with pictures that run the gamut from early sentimentalism to modern practices. The sole fault
that this reviewer found with the book is its lack of an index; this is a hindrance in attempting to search out the history of a particular individual who was associated with the school.


Myths asserting the intellectual inferiority of Negroes are not supported by a knowledge of African history, nor by awareness of the history of blacks in the United States. First slavery and then an inferior castelike status has been the lot of all but a few fortunate individuals who broke free of these restraints. Even before the Civil War a number of Negroes had been well trained and had practiced medicine in the best tradition of their time.

Following the Civil War and in line with relegation of freed slaves to second-class citizenship roles, Negro medical schools and medical societies began to come into existence in response to a need to provide health services to freedmen and the fact that training opportunities still only existed for a token few.

The weaker Negro medical schools were forced to close, leaving only the two strongest ones, Howard and Meharry, after 1920. The number of Negro physicians remained constant at just under four thousand in the decades between World War I and World War II, at which time it became apparent that unless expansion of medical educational opportunity occurred, there would barely be a replacement of those who died or retired.

Since the 1950's, with the move of the mass of the Negro population, about half now live outside the South and the majority of blacks live in large cities. This has improved their access to health, education and employment resources, and has allowed them to develop sufficient social and political power to determine at least in part their future development.

Dr. Curtis' book provides a historical perspective relative to the development of professional education for black physicians, dentists, and nurses in the United States from the 1600's to the 1970's. Black college enrollment has been generally about six percent of the total with about forty percent of these students attending all-black colleges. Nearly eighty-five percent of all black medical students had, until recently, attended two predominantly black medical schools. However, at present over half of all black medical students are attending predominantly white medical schools. None the less, blacks are still underrepresented in the medical profession relative both to their proportion in the general population and to the need and demand for medical services, especially from black physicians.

In order to increase the enrollment of blacks in top colleges and professional schools, the number of black graduates from strong academic high schools must be increased. Few programs have been designed, however, to deal with the large number of children in
low-income minority families who are high in learning achievement as well as in conventionally measured intelligence. Special collaborative programs of medical schools working with black premedical students have been relatively successful in encouraging blacks to pursue medical careers. Due to changes in the admission policies of the seven medical schools in the New York City area, minority students' enrollment increased from less than two percent to approximately eight percent in 1970.

It is anticipated that the severe shortage of physicians and other health personnel will provide a powerful thrust to further reduce color barriers to health manpower development and a more effective health-care system in the United States.

—Reviewed by DR. LARRY J. GREEN, Professor, Department of Orthodontics, School of Dentistry, State University of New York at Buffalo.
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Contributions, which may deal with any aspect of dental history or bibliography, are invited. The maximum length for original articles is about 5,000 words. Manuscripts should be typewritten with double spacing and wide margins. The Editor reserves the right to make literary corrections. All references should contain name(s) and initial(s) of author(s) and full title of paper or work. Journal articles should also include name of journal, year, volume number and complete pagination, in that order. With books, the city of origin, publisher, date and full pagination should be given.

Manuscripts as well as correspondence relating to the publication of papers should be addressed to the Editor, Bulletin of the History of Dentistry, 4 Bank Street, Batavia, New York, 14020.

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Our New President

Our new President, Dr. John Victor Olson, a man of distinguished professional accomplishments, will do much to enhance the stature of our Academy.

Born in Kibbie, Michigan in 1913, Dr. Olson received his D.D.S. degree from the University of Michigan in 1936 and his M.S. degree from that same school in 1938.

After a period of four years in private practice in South Haven, Michigan he entered the U.S. Army during World War II and served until 1946. He then taught prosthetics at St. Louis University from 1947 until 1950 and also served as Director of the school’s postgraduate dental education program until 1950. He then accepted an appointment as Professor of Restorative Dentistry at the University of Texas Dental Branch at Houston, a position he has held until the present. In 1952 he was named Dean of that school, and he also currently holds the position as Dean-elect of the now-forming dental school at San Antonio.

His professional memberships are many and varied. In addition to our Academy he is a member of the American Dental Association, the Texas Dental Association and the Houston District Dental Society. He is a Fellow of the American Association for the Advancement of Science, the American College of Dentists and the International College of Dentists. He was named an honorary member of the Academy of General Dentistry. Other memberships include the National Institutes of Health Dental Education Review Committee, Phi Kappa Phi, Omicron Kappa Upsilon, Xi Psi Phi, the Rotary Club of Houston, the American Association of Medical Colleges, and the Board of Directors of the Houston Chamber of Commerce. He has also held the office of President in the American Association of Dental Schools and the Southern Conference of Dental Deans.

Married and the father of a daughter, Nancy, our new President brings to his new office years of administrative experience, garnered not only in his dental school but also from having served on the Executive Boards of many hospitals in Galveston as well as Houston.

Fortunate indeed are we to have a man of Dr. Olson’s standing at the helm of our organization, and we can confidently look forward to an exciting and productive year under his leadership.
History of the Dental Exhibit at the Smithsonian Institution

—SAMİ HAMARNEH, M.S., Ph.D.
Washington, D.C.

From September 1959 to September 1972 the author was associated with the Division of Medical Sciences of the Smithsonian Institution's National Museum of History and Technology. For over six years, in addition to my duties as curator of the section on pharmacy and health, I was in charge of dentistry and medicine. It was during this period, in August 1966, that the present exhibition in the hall of dentistry and dental surgery was completed and opened to the public. The museum specialist was Mr. Everett A. Jackson, M.S., whose help and advice were most appreciated.

In the preparation of these exhibits credit is also due to the following doctors whose help and cooperation were most valuable and appreciated: The past and present members of the American Academy of the History of Dentistry and its Advisory Committee to the Smithsonian Institution, and the friends who helped in obtaining the artifacts and preparing them for exhibition including C. Willard Camalier and Francis J. Fabrizio of Washington, D.C., Alfred M. Chandler of Chevy Chase, Md., Robert J. Nelsen of Rockville, Md., Robert M. Stephan of Bethesda, Md., J. Ben Robinson of Baltimore, Md., Jacob Sharp of New Haven, Conn., Donald A. Washburn and Allen G. Brodie of Chicago, Ill., Otto W. Brandhorst of St. Louis, Mo., James E. Aiguier of Philadelphia, Pa., and Francis M. Blauston of White Plains, N.Y. Alfred R. Henderson, M.D. of Bethesda, Md. served as a special consultant in organizing the exhibits.

The Smithsonian Dental Collection

The great advances in the profession of dentistry in the third quarter of this century can best be appreciated from a historical perspective. Anyone comparing present scientific knowledge and practices with those of past generations cannot but be overwhelmed by the remarkable achievements. Professional services, advanced therapy, and technology add to the patient’s comfort and confidence and assure adequate treatment. New drugs reduce pain and inconvenience. New instruments facilitate the dentist’s work and enable him to achieve the best of performances. Day by day, dental education and scientific research are taking advantage of an ever-advancing technology.

The Smithsonian’s reference collection and exhibits portray the past of the dental profession by showing history-making events, inventions, and documents which throw light on pioneer dentists, their ideas, equipment, and the environment in which they lived and practiced. Together with scientific and technical advances, one now also finds an emphasis on strict ethical standards in the teaching, research, and practice of dentistry.
During the past decade, curators in the Smithsonian's Division of Medical Sciences have enjoyed a close and rewarding association with the past and present chairmen and members of the Advisory Committee of the American Academy of the History of Dentistry to the Smithsonian, as well as with deans and faculties of the dental colleges of the Universities of Columbia, Maryland, Northwestern, and Pennsylvania. Through this assistance and cooperation, the division's collection has been greatly enriched until it has become the largest and most comprehensive of its kind in the Western Hemisphere. An attempt was therefore made to prepare a general display that would present various aspects of the history and practice of dentistry. This exhibition includes not only general themes such as dental prosthetics, operative and mechanical dentistry, and orthodontics, but also personal memorabilia and relics of pioneer dentists.

Figure 1. Busts, portraits, and personal memorabilia of two American dentists who pioneered in anesthetic surgery. On the left, Horace Wells (1815-48), who used nitrous oxide for tooth extraction as early as 1844. On the right, William T. G. Morton (1819-68), who was the first person (1846) to use ether successfully in a public demonstration. Donors: Dr. W. H. Archer, National Library of Medicine (through Army Medical Museum), and Dr. William J. Morton.

Anesthesia and Roentgen Rays

Since ancient times, practitioners have used several methods and drugs (such as opium, mandrake root, and henbane) for anesthesia, but with
limited success. The search for reliable anesthetics continued to the modern period. One of America's greatest single contributions to medicine was effective surgical anesthesia, and dentists played the leading role in its development, application, and propagation. An exhibit therefore is devoted to this achievement. In this exhibit is a bust of the dentist Horace Wells (1815-48) by J. Scott Hartley (fig. 1). Wells used nitrous oxide for tooth extraction in 1844 and tried to interest others in his work. Born in Vermont, Wells practiced in Connecticut and died in New York City. Besides the bust, the only other surviving memorabilia of Wells are also on exhibit—an engraved portrait of him, two hand-colored miniature paintings of him and his wife, and a brass stencil bearing his name, all donated by Prof. W. Harry Archer, D.D.S., of the University of Pittsburgh.

Also on display is a bust, a watch, and a miniature painting of William T. G. Morton (1819-68), as well as an early inhaler based on one Morton devised. Morton, a native of Massachusetts, was the first dentist to use ether successfully as an anesthetic in a public demonstration. The year was 1846. Crawford W. Long (1815-78) of Georgia is also represented in this exhibit. A doctor of medicine, Long performed surgical operations with ether from 1842 to 1849, when he published his results. Figure 1 also includes a pencil sketch of him in profile and his memorandum case and watch as they appear in the exhibit. In 1903, an Ohio dentist, Charles K. Teter, introduced one of the earliest apparatuses for administering anesthetic nitrous oxide combined with oxygen in measured proportions. The apparatus on exhibit was the second such machine brought to the United States from Europe.

C. Edmund Kells (1856-1928), of New Orleans, La., was the first dentist to introduce roentgen rays in dental diagnosis (1898). He continued to apply and investigate their uses until his death from their effects. On exhibit are his first two X-ray tubes, as well as the dental chair he used. Kells' contemporary, the dentist and inventor Charles H. Land (1847-1922), obtained a patent in 1883 for vacuum dentures (which have been donated to the Smithsonian by his grandson, the pioneer aviator Charles A. Lindbergh). The dentures were to be held against the palate by air chambers formed between the metallic portion of the plate and the palatal arch. Land also introduced a compound hydrocarbon and muffle furnace and perfected a method for applying porcelain to restorations in artificial dentures. Later he devised a method for making all-porcelain jacket crowns.

Landmarks of U.S. Dental Progress

Significant landmarks of dental progress in this country are also represented by instruments, historical documents, paintings, and dental furniture (such as the revolving cabinet in figure 2), from the School of Dentistry of the University of Maryland (formerly the Baltimore College of Dental Surgery). This school, founded in 1840, was the first institution in the world to give academic training in dental surgery and confer appropriate degrees in this field. Robert Arthur and R. Covington MacKall, its first two graduates, were awarded their degrees in 1841. Arthur's diploma of dental surgery is shown in figure 3. The Latin text is
Figure 2. A revolving dental cabinet made in 1905 by A. C. Clarke Dental Manufacturing Company, Chicago, Ill. Donor: University of Maryland School of Dentistry.

Figure 3. Doctor of Dental Surgery diploma of Robert Arthur (1819-80), who received one of the first two academic degrees conferred by a college of dentistry (1841). Donor: University of Maryland School of Dentistry.
signed by Horace H. Hayden (1768-1844), M.D., D.D.S., a professor of physiotherapy and pathological dentistry; H. Nillis Baxly, M.D., a professor of anatomy and physiology; Chapin A. Harris (1806-60), M.D., D.D.S., a professor of prosthetic dental surgery; and surgeon Thomas E. Bond, M.D., a professor of pathology and therapeutic specialist. In 1852, Arthur introduced the method of dental prophylaxis in which portions of the approximal surfaces of the crowns of separated teeth are filed away to prevent and arrest incipient caries. Four years later, Arthur introduced manual and automatic mallets for condensing cohesive gold foil. He later became one of the founders of the Pennsylvania College of Dental Surgery in Philadelphia and its first dean.

One historical object on display which has dramatic appeal is the set of gold and ivory dentures worn by George Washington between 1795 and 1798. It was made by his New York dentist, John Greenwood (1760-1819), with modifications Washington had suggested. These dentures (fig. 4), the most complete of four surviving sets used by Washington, were given to the School of Dentistry of the University of Maryland by the Greenwood family. The upper denture was constructed in two parts. The first part consisted of a swaged gold plate, which had been hammered in a mold. The second part consisted of the upper teeth, made of hippopotamus ivory; these teeth were riveted to the gold plate. (In 1971, Dr. Reidar F. Sognnaes, professor of oral biology and anatomy at the University of California, Los Angeles, tried to make an exact replica of a set of Washington’s dentures. He found that the hammered gold plate cost about $100.) Greenwood made the lower part of Washington’s dentures of ivory; the anterior teeth were carved in two sections, each of which was joined to a bar by two wooden dowels. Two spring wires, secured to gold posts—a common practice until the first decade of the present century—kept the dentures in place.
Reconstructed Dental Offices

Reconstructions of dental offices show, in retrospect, the development of dental practice; two such displays are on exhibit. One is a representation of the office of Dr. Greene V. Black (1836-1915) and includes the original fixtures and appliances he used in his Illinois office (fig. 5).

Figure 5. Reconstructed office of Dr. G. V. Black (1836-1915) being observed by (left to right) C. Willard Camalier, chairman of the Advisory Committee of the American Academy of the History of Dentistry to the Smithsonian and past president of the American Dental Association, and two other committee members who are prominent dentists—Dr. Henry A. Swanson and Rear Admiral Alfred W. Chandler. Donors: Northwestern University School of Dentistry and children of Carl E. Black, M.D.

Black became one of the most renowned Americans of his time in operative and pathological dentistry. He held four honorary doctoral degrees (M.D., D.D.S., Sc.D., and L.L.D.) and was dean and professor of operative dentistry, dental pathology, and bacteriology at the Northwestern University Dental School in Chicago from 1891 until his death in 1915. He was a well-known educator and author, not only in this country but in Europe as well. A 2-volume treatise on operative dentistry which he wrote ran into several editions and was widely circulated here and abroad. In this work, he discussed the pathological changes that can occur in the hard tissues of the teeth and described technical procedures in preparing fillings.

Black, through his teaching and research, introduced new techniques in operative and restorative dentistry. He contributed notably to the advancement of dental terminology, the treatment of caries, the preparation of fillings, and the use of gold foil and amalgam for restoring teeth. He designed an improved dental foot engine soon after Sandy Morrison, in 1872, invented the first treadle engine. Black's engine, which is in the exhibit, has a metal flywheel; the foot pedal is secured to a wooden base. It drills with the aid of a string cord. The dental chair in the simulated office is of the type that G.W. Archer, a dentist of Rochester, N.Y., patented in 1874. Black added a foot-rest—a forerunner of footrests on later models. Also on display is a binocular, achromatic R. & J. Beck.
microscope (No. 5949, London, about 1865) with a triangular brass base. In his private research, he used this microscope and a Bausch & Lomb model given to him in March 1899 by the Alumni Association (class of 1898) of the Northwestern University Dental School.

The second reconstructed room in the exhibition is the laboratory and study of the dentist and educator, Edward H. Angle (1855-1930) as it looked about 1916; it includes personal memorabilia and dental implements which Angle invented or developed (fig. 6). Angle established orthodontics as a medical specialty in the United States and for more than four decades contributed to its systematization. He also founded the first American school of orthodontics (in California).

Figure 6. Furniture, equipment, tools, and personal memorabilia from the original laboratory and study of Dr. Edward H. Angle (1855-1930). Donors: University of Illinois College of Dentistry (through Prof. Allan G. Brodie and Prof. Cecil C. Steiner); Spencer R. Atkinson and Carlotta A. Hawley, orthodontists.

Angle’s first set of dental appliances, patented in 1889, was followed by many more inventions designed to correct dental irregularities and the bite and to bring the teeth into normal occlusion. On display are an improved model of a ligature tying device, a set of retaining pipes, an experimental model of one-handed forming pliers with clamps for holding the band, a steel clamp-band positioning instrument (developed from tools that Angle had designed earlier), a variety of patterns of band-forming pliers, and cards that show various types of brackets and arches and the use of spurs on bands for rotating teeth. On the wall hangs an iron clock from Angle’s office, with four small wrought-iron side pieces (legs), a steel pendulum, and ornate grillwork. Angle’s many interests
included the study of American Indian cultures, as can be seen from the Indian skulls, baskets, and a rug on display, as well as from Angle's books and clippings about Indians and related subjects.

While a great number of today's orthodontic appliances have been derived from Angle's inventions, new techniques for correcting dental irregularities have been introduced which depart from his system in that, with these techniques, teeth are removed to provide more space in the dental arch. Angle's former student, the orthodontist P. Raymond Begg of Australia, for example, in the 1940's introduced a method for correcting one kind of malocclusion. It was based on removal of the first bicuspids while the orthodontic appliances were in place, followed by the removal at intervals of the adjacent teeth. At the end of the treatment, the dental arches were closed. Begg also introduced the technique of using a light, resilient arch wire in orthodontic treatment. In contrast, in about 1930, Spencer R. Atkinson, a dentist of California, devised the universal appliances method, which is based on Angle's technique but embodies modifications designed to minimize injurious stresses on the surrounding tissues of the teeth. Along with a wire for the lingual arch to control the molars, Atkinson used smaller arch wires for the remaining teeth. Charles A. Hawley, a dentist of Washington, D.C., in 1919, introduced the tooth retainers that have since been named "Hawley retainers".

**Dental Appliances and Dentures**

In displaying dental implements of various periods, it seemed desirable to classify them according to subject matter and in categories which would elucidate their functions, uses, and historical significance. The card catalog and reference collection of the Smithsonian's Division of Medical Sciences are therefore arranged and classified under such titles as mechanical, prosthetic, and operative dentistry, oral hygiene and surgery, and orthodontia. Thus, a few dental exhibits in the division's gallery were devoted to specific themes emphasizing the beginning of professional dentistry such as dentures, mouth hygiene, or operative dentistry, as the case might be.

The remains of early man, as well as documentary evidence, show that tooth care and mouth hygiene have been practiced since ancient times. Early man exerted much effort to replace missing teeth, both to preserve his appearance and to enhance his ability to chew. The practice of dentistry as a profession and advanced dental technology and science, of course, did not come until much later.

In an interesting, illustrated and detailed article, Prof. Hoffman-Axthelm explained early dental knowledge and techniques in ancient Egypt, Phoenicia, Mesopotamia as well as in ancient Greece and Rome.

In the West, however, the first climax was reached during the 18th century in the pioneering, scientific work of Pierre Fauchard (1678-1761) of France. In 1728, he drew one of the first known illustrations of full dentures. Up to Fauchard's time, and also much later, the individual dentist carved artificial teeth for his patients from hippopotamus ivory, bone, wood, and other available materials, such as human or animal teeth. This arduous task, although it often took long weeks of hard work, produced few satisfactory results for several reasons. Dentures made
from the substances mentioned tended to decay and to give off disagreeable odors. Many serious efforts were therefore made to find better materials for artificial teeth.16

A breakthrough came in 1788 when dentist Nicholas Dubois de Chemant (1753-1824), also of France made "mineral paste teeth." Interestingly enough, a pharmacist had much to do with this remarkable achievement. It was the French apothecary, M. Duchateau of St. Germain en Laye, who had the idea of using porcelain in dental prosthetics (1774). His friend, de Chemant, succeeded in manufacturing porcelain dentures and presented a set of teeth made of what he called "his" new composition to the Royal Academy of Sciences in Paris in 1789; he gave no credit to Duchateau. Soon thereafter, in England, Thomas Rowlandson illustrated these "mineral teeth" in his copperplates. In 1808, Guiseppangelo Fonzi of Italy (1768-1840), a practicing dentist in Paris at the time, made "terra-metallic teeth," also from porcelain. This dentist introduced the use of a single porcelain tooth, which was soldered with platinum pins to bases made of metal, such as silver or gold. Later on, the manufacture of porcelain teeth expanded greatly, with excellent results in terms of good, durable dentures.17

The introduction and successful use of nitrous oxide and ether as anesthetics ushered in a new and great era in dentistry in the United States in the 1840's. It also gradually, although dramatically, increased the demand for artificial teeth. The S.S. White Dental Manufacturing Company of Philadelphia and other dental manufacturing companies here and abroad greatly improved the appearance and durability of artificial teeth, making them available to dentists everywhere.18 During this period, several significant events took place in dentistry. Between 1846 and 1851, an Ohio dentist, John Allen, introduced a new kind of denture, the "continuous-gum" type. The teeth in these dentures were built up with porcelain body, were soldered to platinum bases, and were then fired.

Three years later, the dentist and inventor Mahlon Loomis of Massachusetts (1826-86) devised the all-porcelain dentures included in the exhibit. In the same year, molds for making artificial teeth were also introduced. Models for such molds were filed with the U.S. Patent Office in 1864, 1868, and later years and patented. Moreover, during this same period, the mass production of vulcanized hard-rubber base plates and of dentures with porcelain teeth met with great success. This production made it possible for a dentist to prepare dentures in a few hours instead of in weeks of tedious work. In the late 19th century the demand for this type of dentures thus increased, but competition was strong, and prices fell so low that a complete set of dentures sold for only $5.19

During this period, concentrated efforts towards progress and creativity in dentistry and dental technology began to move gradually from Europe to the United States.

In 1866, a dentist of Philadelphia, Eli T. Starr, invented a special flask for holding teeth molds during vulcanization. In the following decade, several vulcanizers were also devised and patented, including one in the exhibit, for which a patent was granted to John R. B. Ransom, D.D.S., of Ohio in 1874. One year later a patent for an improved Vulcanizer was
granted to F. Heindsmann (fig. 7). A heating apparatus for making celluloid dentures was also introduced in 1874.9

The invention of articulators for holding the casts of artificial teeth is attributed to a French dentist, J. B. Gariot. Gariot designed his first model in 1805 from impressions of the gum in a lifelike position. This invention allowed artificial teeth to be properly arranged. Some 35 years passed, however, before certain essential improvements on articulators were introduced that made them more practical and useful.

The dentist Daniel T. Evans of Philadelphia, in 1840, invented the first articulator with which dentists could reproduce the movement of the human jaw and make casts of the teeth and gums. With his articulator, which was two-dimensional and of the Gothic-arch type, Evans was able to demonstrate the movement of the condyles in a horizontal plane. Eighteen years later, W.G.A. Bonwill, a Delaware dentist, invented the first anatomical articulator, which became widely used after some modifications (fig. 8).

Figure 7. Model of a dental vulcanizer patented (No. 165 328) by F. Heindsmann of New York City in 1875. Smithsonian collection.

Figure 8. Model of an articulator patented (No. 90 706) by C. Von Bonhorst, Lancaster, Ohio, in 1869. Smithsonian collection.
Other models of articulators were subsequently patented—C. D. Chesney’s in 1875, H. C. F. Oehlecker’s (fig. 9) in 1878, J. B. McPherson’s in 1879 and Matthew M. Kerr’s in 1902.

Then, in 1910, a remarkable breakthrough took place as a result of the work and researches of a Swiss dentist, Alfred Gysi (1865-1957). Gysi invented an adjustable articulator in that year, which was the most ingeniously constructed of any articulator introduced up to the first quarter of this century. A graduate of the old Pennsylvania College of Dental Surgery, Gysi became a professor of prosthetic dentistry at the University of Zurich and assisted greatly in advancing a better understanding of the uses and applications of articulators.10

Oral Hygiene and Surgery

In the less technical aspects of oral hygiene, the exhibit features implements for cleaning teeth (fig. 10)—19th century highly ornamented gold and silver toothpicks with inlaid mother-of-pearl handles, elegant Victorian toothbrush holders, fiber-stick toothbrushes with bristles of
quill, wood, horn, ebony, and ivory, and handles of steel and gold inlaid with semi-precious stones; also, metal scalers assembled in ornate cases that often denoted the dentist’s prestige.21

Since tooth decay is as old as recorded history, instruments for extraction were devised long ago to help in pulling decayed teeth with the aim of relieving distress.22 A motif on a Greco-Scythian vase dating from about 300 B.C. appears to portray a tooth extraction. Extractions, furthermore, are mentioned in Greco-Roman medical literature up to the seventh century of our era.

Figure 11. Page from Abulcasis al-Zahrawi’s surgical treatise (completed about 1,000 A.D.), which contains illustrated sections on dental surgery. This Arabian author was the first to describe treatment of deformities of the mouth. He recommended and described in detail methods for removing hardened tartar with scalers and other tools. Photo courtesy of Khuda Bakhsh Oriental Library, Patna, India (Arab. No. 17).

Almost one thousand years ago, Abulcasis al-Zahrawi of Moorish Spain (deceased about 1013), devoted a portion of his medical encyclopedia “al-Tasrif” to oral surgery,23 as portrayed in several illustrations including the photograph of a sample page from this work (fig. 11). The encyclopedia is illustrated with drawings by al-Zahrawi that show in detail such dental tools as extractors, forceps, elevators, and scrapers, as well as the stabilization of loose teeth by means of fixed bridges and crowns made of gold. In his practice and teaching, this Moorish physician recommended the use of the tools he so meticulously described in the encyclopedia.24 This work, of which numerous copies are extant in the original Arabic, as well as in Latin translation, contains the first known independent surgical treatise with illustrations. The purpose of the illustrations was to instruct his students, as well as any others who would read his book, in the manufacture and subsequent use of dental instruments. The treatise influenced later surgeons and makers of surgical instruments, both in the East and the West. In fact, the French surgeon, Guy de Chauliac (d. 1368), in his book La Grande Chirurgie cited Abulcasis al-Zahrawi about two hundred times. Even as late as the European Renaissance, surgical manuals in Latin contained illustrations of implements similar to those in the encyclopedia, or slightly modified.25
Soon, however, improved dental instruments were introduced that provided the dentist with a better grasp of the teeth. In the 14th century, new and powerful instruments for extraction came into use which were called pelicans. These instruments were fashioned, seemingly, after the tools used by coopers in constructing barrels. The earliest pelican on display is 16th century French. In the late 17th century, the German-manufactured ueberwurf, an instrument for extractions which had a large bolster, came into wide use. (German authors of that century seem to distinguish between the pelican and the ueberwurf.) In the early 18th century, the famous German surgeon of the University of Helmstedt, Lorenz Heister (1683-1758) designed an adjustable pelican. Little change has been made in the pelican over the years, as can be seen in the example in figure 12 of a model made about 1800. Heister’s model was soon followed by a double-ended one and by the models of the Italian C. Vernetti, which are shown in figure 13.

Figure 12. A double-ended dental pelican, made around 1800. This tool for extracting teeth has changed little over the years. Smithsonian collection.

Figure 13. Tools used in extractions—extractors, pelicans, keys, and forceps; also reproductions of artists’ depictions of dentistry. Smithsonian collection.
Figure 14. Dental extraction keys: Vernetti-type from Milano, Italy, made in late 1790's; pelican type, known as Douglas lever, made in early 19th century; ebony-handled key with rectangular wrought-iron arm and bent shift, also made in early 19th century. Smithsonian collection.

Upon looking at these displays, one cannot help feeling relieved to be living in the second half of the 20th century with its high professional standards in oral hygiene and its advancing dental science and technology. Today's visits to the dentist's office are no longer the painful and terrifying experiences our forebears faced in the "good old days" when dentists had only crude instruments and inadequate medications. Moreover, before the middle of the 19th century, no effective anesthetics for general and oral surgery were available. We cannot fail, therefore, to recognize and appreciate the humorous implications of such works of artists of the 16th and 17th centuries as "The Dentist" by Gerard van Honthorst (1599-1656), "The Tooth Drawer" by Gerrit Dou (1613-75), and "The Tooth Master" by Jan Steen (1626-79), reproductions of which appear in "The Dentist in Art". A similar sense of humor and anticipation, mixed with religious beliefs and aspirations, can also be seen in paintings representing St. Apollonia of Alexandria, Egypt, the patron saint of the art of dentistry and patients suffering from dental diseases.

During the 18th century, new instruments to use in extracting teeth were introduced into the practice of dentistry. These instruments were powerful levers, known as "keys" because of their shape (fig. 14). During the extraction, unfortunately, these levers occasionally broke the bone as well as the tooth. Nevertheless, because of the convenience they afforded in quick and easy extraction of teeth, their popularity extended almost to the close of the 19th century. Various types of keys were invented—with shift claws from right to left, straight claws, perpendicular claws, bent claws, and claws in different sizes for the young and old. Because of the dangers in using the keys, however, forceps, in a variety of shapes and styles, gradually became the principal instrument for extractions, and they have been used continuously from the Renaissance. Around 1900, one U.S. manufacturer alone offered more than 100 styles, including a model with an adjustable handle, interchangeable blades, and jaws that could be adjusted and reversed.
Drills and Filling Material

Drilling, another phase of operative dentistry, is also represented by the implements and engines used for it over the years. From medieval times, if not earlier, dentists prepared cavities by digging out the decay with excavators or by filing down the teeth if the decay was not too deep. Files, file carriers, and excavators were the only tools used until hand drills were devised in about the middle of the 19th century. For reaching the parts of teeth inaccessible to the ordinary straight drills with a revolving head socket and to the bow drills, a variety of hand-powered mechanical drills, were invented, such as the 1850 drill of W. W. H. Thackston, a Virginia dentist.

A goodly number of the drills on display have elegant ivory handles. To rotate the bur, the handles were twisted on the opposite ends, squeezed together, moved in and out, or spun by pulling out a cord. A model invented in 1850 by a New York dentist, J. D. Chevalier, exemplifies the spinning type. The Everett drill, on exhibit, with the mother-of-pearl handle is similarly of the same period (fig. 15). The most successful of the hand-powered angled drills of this period, however, was one invented by the dentist Charles Merry of St. Louis, Mo., in 1858. His invention paved the way for the dental engine with a flexible cable.

Efforts to supplant hand power in dental drilling began in 1864 with the introduction of Harrington's spring-driven "automatic" drill, which had a separate key. The so-called "pneumatic" drill of a Michigan dentist, George F. Green, followed in 1866. In this drill, compressed air from a foot bellows provided the power for a Roots-type blower, which was geared to the bur. In response to the increasing popularity of electricity and the growing demand for its application to medical treatment, Green, in 1871, invented the first known "electric" drill. In 1870, Joaquin Bishop patented a drill with an electromagnetic plugger (fig. 16).
What vastly enhanced the dentist's ability to cut tooth structures, however, was the introduction of the dental engine (fig. 17). It also made possible the adequate preparation of cavities that is consonant with a precise knowledge of tooth hygiene. J. B. Morrison, a dentist of St. Louis, invented a foot-powered dental engine in 1871 which superseded all previous types of drills. Shortly thereafter, significant improvements were made on Morrison's foot-treadle engine by an Illinois dentist-educator, G. V. Black. The S. S. White Dental Manufacturing Company, which was originally founded by dentist-inventor Samuel Stockton White (d. 1879), and which donated several objects in our collection, introduced other refinements. During the early part of the 20th century, electric motors gradually replaced the foot-powered engines. New dental methods and implements, including the air-abrasive technique introduced in 1945 by the dentist R. B. Black of Texas and the belt-and-gear-driven drills, permitted safe, rotational drilling at a slow speed.
There remained, however, an urgent need for dental cutting instruments that would incorporate precision along with effective high speed. This need was met in 1953 with the introduction of the turbine contra-angle handpiece by Robert J. Nelsen, D.D.S., and his associates, Carl E. Pelander and John W. Kumpula, all three of whom were then at the National Bureau of Standards. This handpiece drastically revolutionized restorative dentistry, serving as the basis for the present-day high-speed turbine dental drills in use all over the world. It practically eliminated vibration, lessening the patient's unpleasant feelings or discomfort and permitting more efficient preparation of the tooth. In 1956, Paul H. Tanner and Oscar P. Nagel of the U.S. Naval Dental School further improved dental cutting instruments by installing a handpiece driven by an air turbine.

Another phase of operative dentistry represented in the display is tooth filling (fig. 18). For several centuries, practitioners filled cavities with wax, noncohesive gold, or other "stoppings." Contacts between adjoining teeth, however, could not be restored with these materials. Soft, ductile metals like tin and lead were also used without much success. Although tooth restoration was usually done by men who were highly skilled, both artistically and technically, and in cooperation with experts in gold beating, gum damage often resulted that caused unnecessary loss of teeth. Mallets and hand pluggers for packing gold into cavities, as well as shears and spatulas (with elegant mother-of-pearl handles), were used in manipulating the gold foil.

Figure 18. Tooth filling materials, condensers, and furnaces used in restorative dentistry. Donors: Hoskins Manufacturing Company, University of Pennsylvania School of Dentistry, and K. L. Wilkinson.
In the early 19th century, the attention of dentists was turned toward finding materials that would permit easier and faster fillings. In 1818, the first fusible amalgam, the Dracet alloy, was introduced in France. Throughout the second quarter of the 19th century, silver amalgam (silver coin fillings combined with mercury) was widely used. Later, tin and gold-tin alloy replaced the unsatisfactory mercury-silver amalgam. The use of cohesive gold fillings, introduced in 1855 by Robert A. Arthur (1819-80), a dentist of Philadelphia, continued until the early 20th century. The invention of condensers to cut gold foil into strips and the increased knowledge of tooth structure and improved techniques in operative dentistry all contributed to better preparation of cavities, to restoration of the natural contours of the tooth, and to better protection of the teeth and gums. During this same period, the studies and research of Sir Charles Tomes of London (1846-1928), of his American counterpart, Black of Illinois, and of others led to the development of stable composition materials for cavity preparations and to standardized tools for cutting and fillings, some of which are shown in figure 18.

In 1897, the dentist B. F. Philbrook of Iowa described his method of casting inlays. One year later, another dentist, N. S. Jenkins, introduced low-fusing porcelain, which has the advantage of fusing on gold without requiring high temperatures (over 2100 ° F.) to melt the gold. Shortly afterwards, artificial enamel and other silicate cements came into use, primarily for filling front teeth. In 1907 a dentist-inventor, William H. Taggart of Chicago (1855-1933), invented a machine for making cast-gold inlays (one sample is on exhibit), in which an inverted pattern procedure was used. This technique revolutionized operative methods for filling cavities and for making crowns and bridge abutments. About the same time, the electric furnace began to replace platinum heating elements as the agent for fusing porcelain with chromel-alumel.

Aims and Choice of Exhibits

The questions of the aims, as well as the choices to be made, and the selection, design, arrangement and labelling of this dental exhibition were numerous. Extensive as it may seem, the exhibition contains only a small fraction of the very large and comprehensive collection of dental instruments and equipment at the Smithsonian’s Division of Medical Sciences.

The exhibits are located on the first floor (northwest wing) of the National Museum of History and Technology in Washington, D.C. Most of the remaining dental collection is arranged and preserved in the reference hall of the division on the fifth floor of the same museum. The collections at both locations are available to interested researchers, dentists, scholars, and students who wish to see or examine them. A third part of the dental collection is in storage, but accessible by special arrangement with the curator in charge.

The purpose in preparing and designing this dental exhibition was threefold:

1. To present the fascinating story of the dental profession and explain its origins, development, and the salient events that have shaped its course.
2. To entertain the public and help it appreciate the remarkable advances that have occurred in dental surgery, teaching, and practice, as well as the increased scientific and technical knowledge of dentistry and mouth hygiene that have resulted from dental research and academic training in dentistry.  

3. To demonstrate, through personal memorabilia, dental equipment, and artifacts, the ingenuity, professional efficiency, and skill that man has shown in tackling dental diseases and performing oral surgery. The aesthetic and educational values reflected in the objects on display demonstrate the efforts, dedication, and achievements of the profession of dentistry through the centuries and in many different cultures. Although my connection with, and supervision over, these dental exhibits has come to a close, my admiration and dedication to the history of dentistry and related health sciences continue to increase. In my estimate the display of artifacts and equipment demonstrating the development of dentistry and dental surgery ranks as one of the finest examples of the remarkable growth and maturity of technological advances that helped to promote and enhance human dignity and well being.

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The History of Acupuncture and its Relation to Dentistry

—ROBERT E. LOCKE
Portland, Oregon

A young lady sits down in the dental chair, fully prepared for her operation. The dentist, skilled in his operation of needle therapy, or acupuncture, inserts a set of stainless steel needles in various bodily locations and immediately extracts all four third molars, painlessly and with minimal blood loss. Miraculous? Too far into the future to be imagined? No. Operations such as this are occurring in several parts of the Oriental world at this very moment. Western countries are just beginning to adopt this form of medical treatment and anesthesia, but the history of this mysterious art finds its roots in the annals of ancient China, an area still shrouded in mystery and the secrets of the ages.

In order to understand acupuncture, we should at first sincerely try to do so in the way that the ancient Chinese herbalists and medical practitioners did, in their own terminology, trying to adjust our thoughts as they did. Physicians and dentists trained in the western manner are apt to understand only their own terminology; confusion ensues when a totally different concept or unique definition is encountered.

To explain the history of acupuncture, a separation of the medical and dental fields is impractical, for the ancient Chinese did not categorize subjects; nor at that time was the theory of dentistry as we know it today even developed in thought, much less in practical application. The very practice of medicine knew no definitions as of yet.

Traditional Rationale for Acupuncture

“Needling” was first mentioned in the oldest Chinese medical work, the *Yellow Emperor’s Classic of Internal Medicine*. However, the actual name, acupuncture, was derived from the Latin in the 18th century, *acus*, needle, and *pungere*, to prick. According to the Chinese legend, the Emperor Huang-i-ti (2698-2598 B.C.) noticed that the arrows of battle sometimes relieved ailments in other parts of the body. Since that time of 2700 B.C., the Chinese have been practicing this art exactly as it was first done, developing over the centuries an elaborate philosophical and logical theory of vital energy flow through twelve invisible channels, or meridians.

The whole life of the body they felt, is dominated by two principles or forces, the *Yang* and the *Yin*. The *Yang* is the masculine positive dominance that represents the sun, light, force, and other heavenly bodies and qualities. The feminine, negative, *Yin*, is identical with moistness,
destruction, darkness, cold, death. The *Yang* should always dominate and be in proper relation to the *Yin*. Preponderance of *Yang* or of *Yin* would manifest character, sex, sickness, or well being. Thus all of the bodily functions were felt to be governed by their proper balance and flow, for they were in a constant state of flux and would circulate throughout the body in the twelve hypothetical meridians, or *Chin*. The course of these channels is not strictly laid down and anatomical relations are unknown, but they begin near the fingers and toes and radiate to different parts of the body. The system is not directly connected to the blood vessels; however, it influences the entire body and circulation of the blood in particular. When the balance of vital essences (the *Yang* and the *Yin*) is disturbed, acupuncture, by means of driving a needle deeply into the flesh, is resorted to in order to restore normal fluid balance and to regain health. In this way the dyscrasia of the dual forces would be disrupted, letting the morbid secretions escape and the positive forces regain entrance into the body by way of these points over the body. (Most acupuncture charts indicate a total of 365, or possibly as many as 700 puncture sites). At one time in China stone needles were used, but now metallic points are utilized. Through practical application of their invention, the tobiscope, two Russian workers have found over 700 points where the needles can be inserted. The tobiscope is used to scan the body and pick up particular electrochemical sensations and thus identify them by means of a light indicator.

A certain relationship occurs between the organs and the viscera. For example, the lungs relate to the large intestines which in turn respond to the skin; or the heart bears a relation to the small intestines, which respond to the arteries. So when the needle punctures the skin the lungs are affected, or when puncture of the muscles is attained at a certain depth, the spleen is affected. Three burning spaces of the abdomen are said to exist, considered as probable storage places of *Yang* and *Yin*.

Today many acupuncturists have discarded the traditional explanation, regarding the ancient beliefs as fanciful legends and interpretations of a very real phenomenon not understood by the medical world today. The Chinese are convinced that they have discovered a method of deactivating the pain-carrying ability of the nervous system. However successful acupuncture may be, there is little doubt that the traditional Chinese explanations for it are myth.

**Status of Acupuncture in Modern Times**

For the most part western physicians know acupuncture through the literature and by observing the technique outside of China before the Communist takeover in 1949. There are more than 2000 physicians and dentists outside of the Orient who practice acupuncture, with 700 of them in France alone, making Paris the Occidental center of acupuncture.

Jesuit missionaries introduced needle therapy into France in the seventeenth century, and although it had some celebrated supporters, such as Dr. L.J. Berlioz, father of the composer, and Dr. C.P. Dabry de Thiersant, consul general to Shanghai in the nineteenth century, its practice was never widespread. The French medical community retained the same belief as that of American medicine today; they were aware of
acupuncture, but skeptical, if not hostile to its claims. But in 1927 a master acuponcteur gave a demonstration of the Chinese technique at the Hospital Bichat in Paris. The chief of staff was impressed, and through his urging a study in depth was published in 1934, causing French physicians to take a long and serious look at the practice. Soon, the thin needles started appearing all over, but the Académie de Médecine soon restricted their use to M.D.'s and arranged for fees to be reimbursed by Securité Sociale. The Institut du Centre d'Acupuncture de France now teaches a three-year course in this treatment. The course emphasizes that the phenomenon is not a panacea or a rejuvenation process for worn-out organs, even though it helps them to work more efficiently. It cannot heal lesions or remove cancerous growths, but it can help to prevent them; it is no longer used to treat infectious diseases now that antibiotics are available, but it is used in order to dissipate their adverse effects. However, the attainment of a 60% cure rate is possible in functional ailments and minor psychiatric problems. It is apparent that in France only M.D.'s are able to use the therapy for dental procedures, since the only references available tend to support this fact. In the course, various demonstrations are given on living human subjects, and in this way students learn the methods and practical applications of acupuncture.

In the ninth century, a Chinese emperor ordered a cast bronze statue of a human figure, with hundreds of holes for needle insertion and covered with wax so that students could utilize this model to insure accuracy of target. Used today for teaching are the once-sacred, now-discarded temple figures of Lord Buddha, marked for insertion of needles.

In actual practice, there is no risk of serum hepatitis, for the needles are not inserted into the bloodstream, but if they should draw blood, cleaning with alcohol is sufficient sterilization. The French are taught that the color and size of the needle, and whether it is made from gold, silver, copper or steel is of minor significance. The school uses stainless steel needles, but they are interested in developing disposable ones. At the school the students are taught the cardinal rule of acupuncture: each patient, whether or not he has a common disease, is unique and must be treated as such. It is for this reason that fine degrees of knowledge are retained in the mind of the acuponcteur for later use which may merit its application.

Advancement of Medicine in China

However, China is the seat of basic knowledge of acupuncture. The Chinese are well versed in all aspects of medicine—they described, many years ago, beriberi, leprosy, and other diseases. They discovered the use of mercury for syphilis, and probably developed vaccinia long before Jenner and his smallpox-cowpox experiments. The goal now in China, where an absence of medical men necessitates the fostering of folk medicine, is to deliver free medical care to all of China's estimated 750 million people. Chairman Mao's policies have directed that not only all doctors must study acupuncture, but also that Western or modern medicine as we know it must be fully integrated with traditional Chinese medicine. It is believed, however, that 90% of the medical cure is dispersed through the traditional systems, even though the medical colleges,
subsequent to the cultural revolution of 1970 began to incorporate the
two schools of thought into one. At present in China there is a great lay
influence in the practice of acupuncture. But Chinese authorities see
acupuncture as simply one part of the integration of traditional and
modern medicine. The rule is that any new therapy must first be used on
the prescriber, himself. This rule seems to act as an adequate control
factor.

In order to illustrate China’s advancement into the medical world, it has
been pointed out that they have apparently eliminated venereal disease,
drug addition and alcoholism, reduced the incidence of infectious and
parasitic disease, and established the use of many paramedical personnel.
An eminent American physician who had first visited there, the cardiologist Dr. Paul Dudley White, stated that he was impressed by the
knowledge of their physicians and felt that their surgeons’ skill was on a
par with that of our own. The cost of medical care in China is not quite
zero, as they had hoped, but it is quickly reaching it. At a recent
exhibition in Peiping, attended by visiting Western doctors, acupuncture
had been used to treat 250 patients at a cost of five Chinese cents apiece,
whereas Western-type treatment would have cost 200 times as much and
taken two to three times as long. Economically, in relation to the salary of
the Chinese people, this averages to less than one-half of 1% of the family
monthly income for each visit.

**The Use of Acupuncture in China**

When Western doctors were first able to get a glimpse of acupuncture
therapy as used behind the Communist China iron curtain in the early
part of the fifties, they were amazed to see it used on such a variety of
diseases and in such a number of procedures. The “success rate” in the
more than 1500 patients per year on whom acupuncture anesthesia is
used is 90%. In cases such as thyroidectomy, this form of anesthesia has
met with 98% success. Dr. Chen, Chief of Anesthesia at Kwangtung
Province People’s Hospital in Canton, outlined the merits of acupuncture
anesthesia as the following: it is completely safe; interruption of
hydration of the patient is non-existent; fluid and foods can still be given;
there is no post-operative nausea or vomiting; the method is convenient
and readily available; the procedure involves no lowering of blood
pressure; it is used effectively for weakened or debilitated patients, and
there are no post-procedural respiratory infections. Dr. Chen also fully
recognizes the role of the spinal block, the local block, and inhalation
anesthesia, for in some cases acupuncture is not satisfactory, for example,
in abdominal surgery, where traction upon the viscera might produce
obvious uneasiness, and also because strong abdominal muscles do not
become sufficiently relaxed.

Another use of acupuncture as witnessed by the western physicians
was in the treatment and prevention of the diseases of the soft and hard
tissues of the oral cavity. For example, at the Third Teaching Hospital,
Peking Medical College, on September 23, 1971, acupuncture was
observed as the total anesthesia for two cases of multiple tooth extractions
by Drs. Paul Dudley White and E. Gray Dimond. They learned that this
particular form of anesthesia was routinely used for dental extractions, as
it was also used for operations in limb surgery, in caesarean section, in craniotomy, and in eye-ear-nose and throat surgery. Constant manipulation of the needle is now employed, generally as an up-and-down motion of approximately 120 "cycles" per minute. There is also electroacupuncture, normally of direct current application of six to nine volts and 0.5 amperes. The discharge rate varies from 120 to 180 cycles per minute, and the wave form is believed to be a sine wave.

**Acupuncture in Chinese Dentistry**

In the writings of the ancient Chinese, toothache was labelled as *Ya Tong*, meaning "penetration into numbness." Obviously the Chinese believed that through the oral orifice entered many of the idiosyncrasies and foolish thoughts of man; no mention is given to beneficial enlightenments. To treat disease in this area, acupuncture has been utilized. Of the various number of points over the body appropriate for acupuncture, 116 of them may be used in the treatment of diseases of the oral cavity. Of this number, 71 are used for treatment of dental pain, in conjunction with the use of 30 in gingivitis, 30 in stomatitis, 12 in glossitis, with 28 general points used in treatment of more than one condition. The charts show some 40 treatment areas on the face, 12 around the auricle, 16 around the lips (3 of which are intraoral), 2 around the orbital region, 6 on the hairy part of the head, 7 on the back, 2 on the neck, 38 on the arms and hands, and 18 on the legs and feet (fig. 1).

*Fig. 1. Some acupuncture points on dorsal and ventral surfaces of the body for treatment of oral disease.*

(From Dental Abstracts, August 1963.)
Its Use in Other Countries

Stomatologists writing in Russian journals have recently indicated that of thirty patients with trigeminal neuralgia treated by acupuncture, the pain totally disappeared in twenty of them and was ameliorated in eight, with two patients not responding to treatment at all. Toothache was treated successfully by insertion of the needle for twenty minutes at one centimeter depth at a point one to 1.2 centimeters in front of and above the angle of the mandible. The toothache had not returned two years after treatment. By inserting the needle in the area of the maxillary cuspid, pulpitis was alleviated. Once the pain had been localized, the total success of the treatment depended upon the correct selection of the point or points to be used. For example, point number 10 is specific for pain in the upper molars, number 11 for pain in cuspids and bicuspids, and numbers 12 and 13 for pain in incisors. For the mandibular teeth, point number 14 is used to treat pain in the molars, number 16 for cuspids and bicuspids, and number 15 for incisors.

To treat trigeminal neuralgia, the nerve branch affected determines the particular point or points of application. Two patients having maxillary trigeminal neuralgia were treated successfully by using points of treatment in the upper and lower extremities. In using remote points away from the localized pain area, puncture is bilateral.

In acupuncture procedures in France, needles of different materials are used, according to one French doctor, in accord with intended purpose: silver for sedation, gold for stimulation, and steel, which seems to be neutral. The French dental practitioner, L. P. Valery of Marseilles, formerly professor of odonto-stomatology at the University of Mexico, has written profusely about acupuncture in dentistry. He has used it in recent years with positive results in cases of tic douloureux, pericoronitis, gingivitis, post-operative pain, and trismus. His patients have favorable comments, saying that his treatments even relieve them of bad breath. Since everyone differs in bodily measurements, this doctor uses the width of the second phalanx of the middle finger of the patient as a reference length of the needle, and as an aid in finding the proper point of insertion. He also uses a punctometre similar to the tobiscope invented by the Russian researchers, in order to save time and insure precision in determining the particular point to be used. For gingivitis and stomatitis, he recommends two areas for placement of the needles, the gold one at a point on the large intestine, and the silver sedative needle at a point near the thumb. For an abscess, two points are recognized, one at the fossa of the chin and the other near the ankle. For other dental aches, he has successfully used three points of insertion, two on the large intestine and one near the lung. All in all, he believes the reaction of the patient is very important.

The first American to see acupuncture was Dr. Samuel Rosen, a clinical emeritus professor at the Mount Sinai School of Medicine. He and his wife were guests of the Chinese Medical Association before whom he demonstrated his recently developed surgical procedure to treat deafness. He was amazed at the operational applications of acupuncture as anesthesia in brain operations, removal of thyroid adenomas, in tonsillecto-
tomies, and dental extractions. Pre-operative procedures seemed to be the same as in this country: 50 milligrams of Demerol.

American doctors are understandably skeptical of acupuncture as treatment. Until recently there were only two persons practicing the procedure in the United States, Dr. William Gutman, a New York internist, and Dr. Ching Yuen Ting, a fourth generation acupuncturist whose great grandfather founded the first college of herbal medicine in Shanghai. Dr. Ching uses many expensive herbs in his treatments, and charges $15 a visit. He has no license to treat patients here, only a license from Taiwan to practice acupuncture and herbal medicine. Despite demand, Dr. Ching denies that he treats patients, claiming he only lectures and demonstrates. Some of these demonstrations are held privately in his office. He believes that interest in acupuncture will soon take a strong hold, for even though people don't have confidence in it now they will once they see it work. To prove that acupuncture was painless, he inserted a two inch needle halfway into the left arm of Stuart Auerbach, a Washington Post staff writer and author of a reference article. The needle, according to Auerbach, did not hurt, but a tingling was felt in the left shoulder blade when the needle was manipulated.

The 71-year old Dr. Gutman, a graduate of the University of Vienna Medical School, has applied acupuncture to his practice for the last 15 years, using it to successfully treat bursitis, sciatica, sports injuries, chronic sinus infections, and trigeminal neuralgia, and is planning to use it in the future on pulmonary, cardiovascular and gastrointestinal conditions. He uses a female Chinese assistant, who is a graduate of a mainland China medical college with a four-year course in traditional Chinese medicine. He used the procedure only after careful European study with acupuncturists in Paris, Munich, and Stuttgart, and after he tried it on himself in 1957. He customarily uses it only upon failure of standard therapeutic techniques. He calls for great open-mindedness on the part of the medical profession in order that a full understanding of acupuncture be attained.

**Beginnings of Western Interest**

Since its earliest conceptions before the time of Christ, the theories of acupuncture have spread from China and Japan to Korea and then to Western Europe and Latin America. There are acupuncture associations in France, Switzerland, England, Austria, Belgium, Italy, Brazil, and Argentina. Many international societies have also been established. Only recently the German Society of Electroacupuncture met to suggest more research and study of the area, with recommendations for the establishment of guide lines and restrictions; they want to keep it out of the hands of quacks and charlatans. Possibly the most visible manifestation of increased interest is the formation in June, 1971, of the North American College of Acupuncture in Vancouver, British Columbia. It has an enrollment of 30 students, teaches the traditional theory in Vancouver (or by correspondence), after which the students travel to Hong Kong for practical study.

United States physicians are still skeptical of this practice, but since this is an era of disillusionment with Western ideas, a possible foothold
may be gained for the technique. No one actually knows the inner workings of acupuncture, but possibly some day in the future understanding will come about.

**How Does it Work?**

Some theories on the mechanisms of acupuncture have been presented, but more research is needed in this area. Soviet scientists believe that reflexes between points on the skins and internal organs are connected. They have also found that acupuncture points have higher electrical charges than other parts of the skin, particularly if a diseased organ is involved. The tobiscope, invented by M.K. Geiken, a stomatologist, and I.V. Mikhalevsky, an engineer, precisely determines these points by electrical detection when probed on the body. The two men conjecture a biocybernetic hypothesis explaining the bioinformational nature of the points for acupuncture and the operating principle of the tobiscope. This invention may be used universally in the near future in possible treatment of diseased organs.

Another theory enjoying widespread western popularity is that of suggestion, placebo effect, or psychosomatic medicine. Of course, a psychological factor is always involved with a placebo—that is its nature. But since acupuncture has been successfully used in pediatrics and veterinary medicine, the psychological effect is only a small one. It is true that some patients are readily suggestible and may be impervious to pain under emotional or hysterical influence, but they seem to be the exception, not the rule. The former physician to Hubert H. Humphrey, Dr. Edgar Berman, believes there is no real difference between acupuncture and other "cures" that people believe in, many of which seem to work for certain things. Dr. Bernard Strauss, professor of medicine at Mount Sinai who has visited acupuncturists in China, said the placebo effect may cause just enough success so that both patients and therapists do not lose faith in needle therapy.

Hypnotism also has been suggested, but, as Dr. Chen, of the Kwangtung Province People's Hospital in Canton points out, there are literally thousands of physicians using the techniques on hundreds of patients in every hospital in China. It does not seem possible that every patient had been hypnotized. He did, however, believe that a neural pathway was involved. And to buttress his argument, he also pointed out that the mechanism of aspirin was also still a mystery.

Research is being done at this very moment on the mechanisms of acupuncture at the Peking Medical College along three basic lines:

First—a study was conducted as to possible anatomical explanation of the traditional channels or meridians.

Second—electrophysiological techniques were being used in rabbits. By peripheral pain stimulation, they had produced a standard "induction voltage" in the cerebral cortex of a height of 1 to 2 millimeters. Acupuncture, when appropriately placed, lowered the cerebral induction voltage substantially, concluding that acupuncture did change the quantity of pain stimuli reaching the brain. When humans were used with the standard stimulation of the tooth as pain stimulus, evidence was
Acupuncture for analgesia during root-canal work: Dentists at Downstate Medical Center in Brooklyn, New York, recently used acupuncture anesthesiology when a patient was found to be allergic to local chemical anesthetics. Doctors John Fox and Elizabeth Fox twirl acupuncture needles in the patients’ hands and feet, while Dr. Julius Berger performs a root-canal procedure.

(Courtesy: Dental Explorer, Oct. 1972)

found that the recognized “tooth” acupuncture anesthesia point on the back of the hand near the thumb effectively eliminated this pain.

Third—morphological and histological research.

One study using cadavers and the injection techniques being employed, seemed to indicate that a sharply localized collection of vagal nerve endings, when stimulated, changed the “electrical resistance” over the abdominal area. This would link a possible neural mechanism to acupuncture anesthesia.

A group of Korean specialists working intensely in this research field identified a group of specific staining cells which seemed to be grouped at some of the well-known acupuncture points, possibly increasing the production of antibodies against infection. Others have suggested that the needles stimulate the autonomic nervous system by possibly sending signals to the brain that may somehow reduce or eliminate pain signals.
Whatever the cause, the effect is somehow wondrous and mysterious, producing never before believed mechanisms of analgesia, pain reduction and elimination. With the tremendous amount of research being conducted throughout the world today, the latter half of the 20th century may someday be known as the Golden Age of Acupuncture. If the acceptance of this procedure in dentistry will stimulate further study, as it has in medicine, dental problems of the world may someday be reduced to simple and painless non-surgical techniques.

Dr. Jean-Claude Darras, editor of the multilingual French quarterly *Nouvelle revue internationale d'acuponcture* and acting head of the Institut du Centre d'Acuponcture de France, expressed the thought expertly when he said, "What am now devoting my time to in France, and in other European countries and what I would hope to see in the United States is the marriage of acupuncture to medicine, an alliance that would enrich both partners."

**REFERENCES**


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Oddments in Dental History:  
The Bogus Dental Diploma for Sale

—MALVIN E. RING, D.D.S., M.L.S.

By the last decade of the nineteenth century dental education had progressed to the stage where there were in existence, both in this country and in Europe, many reputable schools where degrees in dentistry were conferred upon students who had legitimately earned them after a prescribed course of study. In addition, however, there were numerous privately owned schools operated by "quick-buck artists" who were more interested in extracting attendance fees from their students than in imparting to them any serious understanding and knowledge of dentistry. Incredible as it seems, these institutions were legally chartered by various state legislatures because they were able to satisfy the most minimal requirements regarding courses of study and faculty; in fact, in one extreme case, a student body of 650 was taught by a single instructor!

Nevertheless, American dentistry enjoyed a very high reputation in Europe and elsewhere because of the great advances in technique and understanding made by such towering dental scientists as Chapin Harris, G.V. Black, W.D. Miller, as well as countless others.

Therefore, the possession by a European dentist of a dental degree from an American college was regarded as a sure key to a lucrative practice. It wasn't long before unscrupulous characters in this country began supplying, for a fee, such degrees for equally unscrupulous dentists on the other side of the Atlantic.

Several of the more blatant instances of this practice were exposed by one of the most prestigious German medical journals of its day, the Deutsche Medizinal Zeitung in an editorial of December 22, 1884. It began by reprinting the following advertisement from the Frankfurter Tageblatt:

Doctor-diplomas of Dentistry, Philosophy, Jurisprudence, etc., are reliably and discreetly procured. Address C.R., 10 Duke Street, Bloomsbury, London, W.C.

The medical journal then had one of its staff answer the ad and received the following astonishing reply:

London, 32 Thornhill Crescent  
Barnsbury, March 10, 1884.

Dear Sir: In answer to your favor, I respectfully inform you that you are dealing with an honest man who will procure you the diploma from a reliable institute: Wisconsin Dental Academy.

You may deposit the fee with any banking firm in Frankfort, and have the deposit certified to by the firm and communicated to me, whereupon I shall at once order the diploma for you. If you do not wish to confide in a banking house of your city, it will be best if you will send to me 200 marks (about $70)
at once, and the remaining $70 on receipt of the diploma. There are no other expenses besides the $140. Please inform me, when ordering the document, of all your Christian names.

Further, I beg you to sign the enclosed printed application for graduation at the place where you read the word “signed”. All the rest I shall fill out. You will see at the back of the application the attest of the President of the Academy that the degree is conferred only if recommended by me. It will take about five weeks ere I can deliver the diploma to you.

Awaiting your reply, and the return of the application signed, I am, etc., etc.,

Prof. Dr. G. Rummier

On the back of the application were written these words:

This statement will be honored from any practicing dentist if endorsed by Prof. Dr. Rummier.

Geo. Morrison, President
Delaven, Wis., U.S.A.

At about the same time the medical journal followed up with this ad in the magazine Kladderdatch, placed there by a competitor of Rummier in this dirty, but profitable, business:


This time the reply came from a “Dr.” Olschowsky in Berlin who claimed that as the sole representative of an American dental college (the same Wisconsin Dental College, by the way) he was authorized to confer an “honorary doctor title”. But, he cautioned, it would be necessary for the recipient to append to it in Germany the phrase “not conferred here” or “conferred in a foreign country.” “To procure you the diploma,” he continued, “I need for the beginning only a short curriculum of your life, and I shall then take care of the rest and send you the diploma all filled out, so that you need neither interrupt your daily occupation, nor do anything whatever.”

Finally O. informs the applicant that the whole expenses amount to $200 and that pre-payment is not needed, only the deposit of the sum with a reliable business firm, but best with W. Marzillier & Co., 25 Morkern St., Berlin, S.W.

Several more exchanges of correspondence followed with O. growing more and more impatient to complete the transaction. It seemed that the “applicant” admitted that he wasn’t really a dentist in Germany. To this O. replied that Prof. Morrison, the President of the Wisconsin Dental College interpreted the title “dentist” to mean “dental technician;” therefore the applicant should rest easy because “... the diploma which I shall obtain for you will not say Doctor of Dentistry but Doctor of Dental Surgery. Besides I have already procured this diploma for applicants of whom the gentleman across the ocean knew they were not dentists, and it is therefore the same with you. I hope to have removed your scruples, and expect immediate conclusion of the affair, which opportunity I use to inform you that $100 will meanwhile suffice.” O. apparently fearful that his quarry was slipping away from him because of “scruples” was now willing to settle for half!

The medical journal ends its expose by pointing out that although “Dr.” O. charged $200 and “Prof.” Rummler in London only $140, the
same bogus diploma could be procured directly from the Wisconsin college itself for the payment of a mere $12!

The American Journal of Dental Science where the entire story was unveiled to its American readers (Vol. 18, February 1885) urged that this insidious practice of selling diplomas "... be thoroughly exterminated at its source; and that all legislatures or Congress should pass the most stringent laws... punishing with penitentiary at solitary confinement and hard labor, for a long period of years, any violation of the law." And the American editor ends his plea for firm and telling punishment of the diploma swindlers with these words:

American dentistry is recognized all over the world as far ahead of that of other countries; but if American physicians and dentists permit the existence of such swindling institutions, and the sale of bogus diplomas, to continue under their very noses, then they must not feel offended if they, on visiting Europe, are looked upon with suspicion, if no special credentials convince their professional brethren across the water that they (the American physicians and dentists) really are graduates of a respectable college.

What a long way we have come, where today, in the profession of dentistry, at least, the day of the diploma seller is long past.
Dental Quotations from Antiquity

—LOUIS B. AMYOT, D.D.S., M.S.D., F.I.C.D.
Schenectady, New York

With the great stress placed today upon "preventive dentistry" we should not lose sight of the fact that this is not a new field of dentistry. Dentists for generations have been preaching and teaching to their patients the need for diligent care and treatment in order to prevent diseases of the oral structures.

Today's writers on preventive dentistry are rather prosaic and pedestrian in their approach to the subject. Not so the writers of earlier ages who were wont to embellish their works with quotations from the ancients in order to lend to them greater substance of authority.

One such writer, Ernest Amyot, brought out in Paris in 1867 a book entitled Odontology or Hygiene of the Mouth. That the earlier Amyot had a good knowledge of dentistry among the ancients is evident from the preface to this work which I have here translated from the French. How much more graphically these ancients portrayed the need for preventive care and the evils of neglect than do so many of the writers of today:

Hippocrates, the divine Hippocrates, dedicates many chapters of his works to the description of teeth and prescribes remedies for treatment of them. In fact, his description of them proves his profound study of the teeth.

In Rome, Queen of the World, were found dental practitioners. Following her conquest of Asia, she placed in her murals treasures from that part of the globe. Elixirs, opiates, various dentrifices, even artificial teeth were luxuries and the mode of the times. According to Horace, Ovid, Catellus, Tibullus, Martial, Perse and Jouvenal, the roman ladies availed themselves of the above named luxuries.

The celebrated Galen wrote on diseases of the teeth. Celsus also bequeathed to us the fruits of his studies.

After the fall of the Roman empire, a cessation of the sciences and the arts occurred momentarily.

In this chaos, we find but a few scattered facts. However, it seems that dental and oral hygiene persisted to a moderate degree. It is said that St. Jerome filed his teeth in order to better enunciate the Hebraic language.

Ovid, justifiably stated that lack of dental cleanliness dulls the natural lustre of teeth and exclaimed "Of what use my precepts, if laziness stains the teeth."

Horace, who appreciated the favorable effect of a beautiful dentition on the heart of man, was indignant of women who neglected their teeth; lack of dental hygiene rendered them discolored, dark and yellow.
Martial in his forty first epigram exclaims "O Maxime, you now have but three teeth and they are pitch and boxwood in color".

Addressing this apostrophe to a person neglectful of his teeth, the poet Conrad exclaimed:

Your mouth when laughing will cause my nose to sulk
Of the black disorder of your teeth,
In addition to their malicious odor
Which may emanate from within.

The ancient authors realized that water alone was insufficient for mouth hygiene; we note that Octavia, sister of Caesar Augustus, used as a dentrifice, sun dried and pulverized turnips and white glass finely powdered, mixed with clay and spikenard of the Indies. Messalina used a preparation composed of burnt stag, porphyre of Chios and sal ammoniac.

Martial in an address to the courtesan Fescenia says, "O Fescenia, in order not to exhale the odor of the wine you drank yesterday, you devour while displaying your luxury, lozenges of Como. Your meals clean your teeth but to no avail, due to the burps emitted from the depth of your stomach."

The complete or partial loss of the teeth enervating and affecting the pronunciation, results in a very uncomfortable infirmity and a lack of harmony of the dental structures. Teeth embellish the facial appearance and constitute one of the fine attributes characteristic of youth.

From time immemorial, historians and poets have stressed the advantages of good dentition, but it is particularly the physician-dentist who appreciated its importance, to whom we owe the best counsels for the care of the teeth.

Solomon, wise king and poet states in his poem Canticle of Canticles: "Your teeth, O my beloved are white and pure, resembling a flock of lambs emerging from the fluvial waters". He compares teeth to pearls of Ophir sparkling on sand and praises them in the belief that the Jews, displaying all the luxury of the Orient, had recourse to dental art as well as the virgins of Zion alluded to by the prophets.

Homer, father of Greek poetry, also refers to teeth as one of the most precious gifts of nature. Aristophanes and Menander in their comedies would mock edentulous women and would praise with great delight those whose teeth were white and well aligned.

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Paleodontics to Forensic Odontology

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Since prehistoric times, the tooth has almost certainly been the most constant and informative anatomical structure of human origin, and such is true for the majority of all vertebrates, living and extinct. The purpose of this paper is to show the enormous wealth of information which may be derived from dental remains, and how this knowledge is used.

An arbitrary division of the ages has been made (of necessity somewhat ill-defined), since the earliest forms of dental evidence till the present year. They are as follows:

(1) Era of Dental Differentiation: Identification and comparison of teeth aids; it is sometimes wholly responsible for the elucidation of different species of animals, the primates and the several known types of 'early Man'.

(2) Era of Dental Awareness: The earliest examples of tooth extraction, modification and ornamentation; artificial teeth and prostheses. Few if any individuals are identifiable, only techniques, rites (some still practiced in certain tribes), and many different ways of life.

(3) Era of Dental Individualisation: Dental remains which can be traced to an individual, usually of some social stature, (who may have died several hundred years earlier), the information which they yield, and how this may be correlated with known historical facts.

(4) Era of Forensic Odontology. Recent times, the conviction of the guilty and the acquittal of the innocent on the basis of dental evidence. The more intriguing aspects of dentistry and the law.

To avoid being needlessly abstruse, an explanation of the title follows. "Paleodontics" does not appear in Webster's or the Shorter Oxford, so it has been coined for this paper; it means "the study of ancient and primitive dental remains". "Forensic odontology" is simply that branch of forensic medicine which deals with dental evidence.

Era of Tooth Differentiation

It is ironic that no structures of the human body are more likely to disintegrate during life than the teeth, yet after death none has greater tenacity in resisting decay. In consequence vast numbers survive from ancient burials to be the objects of envious study by elderly edentulous anthropologists. In most places where climate and geography are not extreme there are areas which yield large numbers of fossilized remains, and teeth are frequently the only criteria by which species may be differentiated. In addition, present dating techniques using radioactive
carbon permit a fairly accurate estimation of the age of a specimen. Some areas have from time to time provided intense excitement, when unknown extinct animals and prehistoric men are discovered from their teeth. During the late 1950's this happened in the Olduvai gorge in Africa, where Professor Leakey unearthed teeth of one of the earliest prehistoric men, unknown until that time. Caves and grottoes inhabited in the past often yield the remains of dozens of different animals, as does the Pin Hole Cave in Derbyshire. Fortunately, in any given animal, each tooth in either arch is distinct from all others, and except for closely related species, such as the bison and the auochs, there are also significant differences between animals. It is interesting that few animals are as prone to tooth disease as is man; even an early example of Rhodesian man shows a mouth ravaged by caries and abscesses. However freedom from caries does not imply an inherent resistance to the disease; only that diet, eating habits and cooking were not conducive to its production. Furthermore, in man, the chewing apparatus is a type of suspended millstone, whereas in many animals, carnivores in particular, the jaws function as a sectorial mechanism, hence their teeth are more self-cleansing and self-preserving.

**Era of Dental Awarness**

Removal of the teeth or their mutilation by filing or inlaying with precious metals and stones is a practice which dates from palaeolithic times. Teeth were usually removed brutally: either by knocking them backwards to break through the alveolar arch or wrenching them forward with the same result. Frequently this was part of a puberty rite, sometimes suffered by only one sex, and sometimes by both. The disfigurement was also recognized as a status symbol: as each king of Cassanga (Angola) succeeds to the throne he receives a box containing a tooth, from each of his ancestors, and may not rule without it. Aesthetic notions (some tribes believe in this to distinguish them from animals such as the zebra!), and even clan discrimination were reasons for the mutilation. Usually an incisor was taken, but some tribes removed canines or premolars.

Teeth were most frequently mutilated by filing the biting edge, but notched edges or a saw edge are known and corner chipping is not uncommon. The inhabitants of Chamorro, Peru, cross-hatch the labial surfaces of their incisors.

Inlays were usually ornamental and placed for viewing to advantage on the anteriors. Gold was sometimes used, but many types of stone were more popular in Mexico and Central America; jadeite, haematite, iron pyrites and rock crystal. Although cementing substances were probably used by many artisans, in some cases it is believed that pressure alone held the restoration in place. Hollow instruments were known, and proof of their use is the convex finish found deep in the cavity preparations.

Operative dentistry and prosthetics, which can only have evolved by trial and error, have been found in many places indicating great dexterity. At La Piedra (Esmeraldas, Ecuador), a skull was found with the enamel so skillfully removed from six anterior teeth, that the dentin was not broached; then the teeth were jacketed in gold. Also from near this region comes an 'implanted' artificial tooth of brown stone, which was so
successful that calculus grew on it.\(^5\) The Etruscans, among others, mounted false teeth with gold bands and wires, and further evidence of early dentistry consists of two molars bound together by gold wire, found near El Gigel, Egypt, and dating from 2,500 B.C.\(^6\)

**Eating habits and diet**

The pre-white Australians living on the Murray River can probably claim the diet most punishing to dentition; they were voracious cockle eaters, and these shells eroded and chipped their molars to the roots. Further erosion led to infections of the socket and adjacent bone.

In North America, the use of the mortar and pestle, especially when made of the crumbly sandstone known to the Santa Barbara Amerindians led to the inclusion of vast amounts of abrasive particles in the foods which were pounded or ground. Other tribes who used tough, fine-grained basalt implements escaped this destruction. When such abrasive particles are common to the foodstuffs of a population they cause an attrition gradient antero-posteriorly.

Caries incidence increases with the cooking and fermenting of food, and with the proportion of carbohydrate in the diet. The Sioux, who lived on buffalo meat, had exceedingly few caries; the Californians, who were omnivorous had a 25% incidence, and the Zuni, whose basic diet was maize, had a 75% cavitation rate. The agriculturist inhabitants of East Texas had twice as much dental decay as the central and northern cave-dwellers, whereas to the west more than 80% of teeth were lost antemortem. Severe attrition, frequent pulpal exposure and a high degree of abscess formation were evident, and scurvy seems to have been commonplace.\(^7\)

On Tristan da Cunha fare consisting mainly of fish and potatoes was conducive to excellent dental health, possibly through ingestion of fluorides, though inbreeding led to the hereditary absence of molars. However, recent immigrants from there to South Africa have shown a marked increase in decay.\(^7\) It is much the same with both Kaffirs and Eskimos whose primitive diet kept their dental decay below 4%; this figure being greatly exceeded on changing to the food of ‘civilized’ man.

**Masticatory Fare Responsible For Other Dental Diseases**

Periodontal disease is prevalent in Guam and other countries of the Far East, where the betel nut is chewed mixed with lime. It is also responsible for heavy tartar accretions. In Peru the habit is to chew a cud of coca leaves, lime and ashes. This has the effect of depositing accretions on the teeth with necrosis occurring. Due to the almost constant local anaesthesia sharp spicules are unnoticed and ingested with the food, and then pierce and embed themselves in the gingiva.

Both of these habits leave characteristic pathological traits postmortem, and this is true of several other diseases, in particular leprosy which was rampant in most countries until one or two centuries ago. Leprosy loosens the anterior teeth in a specific fashion, and this led to the
positive identification of a lepers' graveyard in Denmark by Professor Vilhelm Moller-Christensen of Copenhagen University.*

Thus we can see that through the use of such studies, history can be traced in considerable detail. The migration of tribes; their explorations and invasions, even the fate of a small hunting party or a single adventurer in a distant land may be revealed by such clues and so make clearer the story of Early Man.

**Era of Dental Individualisation**

So little is known of the condition of the teeth of English children during the 15th century, that it is useful to learn the dental state of any child of that period. The field of investigation is limited to the children of aristocracy and royalty, largely, because they were often interred in vaults, which would cause less disintegration of the remains, and because they are the only ones who can be readily identified from diaries, family histories or records of the church.

Such was the case of Lady Anne Mowbray, who died in 1481, aged 8 years and 11 months, and whose lead lined coffin was opened by Professor Martin Rushton in 1965.* It is known that at the time of her death she was married to Richard, Duke of York, who later with his brother, Edward V, was murdered in the Tower of London. Investigation of her dental remains gave an age which agreed closely with that already ascribed to her and showed a congenital absence of $7$ and $71$ and all the third molars (i.e. the tooth 'buds'). The molar teeth had underdeveloped cusps, as a consequence of incomplete tooth formation.

This is a common occurrence where there is a congenital absence of teeth, and similar findings were made when the dental remains of the two Princes were investigated. Their remains had been originally found by workmen in 1674 at the "... stayre foote, metely deep in the grounde...", and deposited in an urn in Westminster Abbey. The late Professor William Wright investigated them in 1935. Their ages according to tooth development were calculated as under 10 (Richard) and about 12 (Edward), which agreed very well with the ages ascribed to them at their deaths. Edward’s dentition showed congenital absence of $5/5$ and $8/8$, and Richard’s, (more uncertain, being based on only one half of the mandible), the absence of $11$. These somewhat similar dental defects are intriguing, since Lady Anne was related to the Princes in several ways. Unfortunately, none of the Princes’ erupted teeth have survived, and a more decisive conclusion cannot be made.*

In addition to the consanguinity and the respective ages of Lady Anne and the Princes, certain deductions can be made regarding the diet, dental care and hygiene available to the wealthy children of their day. The moderate attrition of Lady Anne’s teeth indicates that her food was not gritty, and that the flour which was probably an important ingredient of her diet was wheaten manchet, bolted through fine cloth to remove the coarse particles. This flour may have been the cause of extensive caries of both permanent and deciduous teeth, and also contributed to the soft brown-staining deposits on the gingival third of the teeth. Her diet can have had only a negligible scouring action, and she cannot have chewed her food very vigorously. Cane sugar, at that time only enjoyed by
nobility, may also have contributed to the decay. Tooth cleaning, scraping and filling although known in Europe at that time may not have been employed at the English court, possibly as with other sanitary measures, having been disdained. In short, the best dental care and hygiene in London almost 500 years ago can be found in the mouth of an average London child today.

An interesting contrast to this condition is to be found in the Swedish army some two centuries later. The teeth of soldiers who died of cold in the mountains during the war of 1718-19 were entirely caries free, but whether due to army-enforced hygiene, diet, or some fortuitous fluoridation of their water supply cannot be said.²

The remains of Robert Bruce, King of Scotland, were investigated by Robert Liston who made casts of his dentition and dental arches, which subsequently gave reason to believe that he had suffered from leprosy.¹

Many other crypts could be opened, the remains inside studied, and dental evidence secured which would help prove or disprove the mysteries surrounding so many historical figures. However, the laws governing exhumation being what they are, plus the fact that the majority of such investigations might be made simply to satisfy curiosity, indicates that most enigmas of this type are destined to remain unsolved.

**The Era of Forensic Odontology**

Forensic odontology is a relatively new investigative science which has achieved significance only in the last one-half to one-quarter century. In recent years techniques have become available to give it phenomenal significance; an almost indestructible method of identification which can be applied systematically the world over. It is far superior to fingerprinting because fingers often undergo mutilation, especially in accidents, and with the passage of time. The only drawback lies in the rather complex implementation of such a system.

In its simplest form it has been used for a head-count, and by this means the first estimates of major disaster (e.g. during war), have been made and with surprising accuracy. This method served to count the inhabitants of an Iron Age fort on Bredon Hill (England), when it was stormed and they were slaughtered.³ The same method served to tally the number of victims of a mass murderer in Scandinavia recently.¹⁰ In both cases the tooth count was made in about one hour; in the former case the total greed closely with a far more laborious bone count, in the latter it served to correct a bone count of 9 to 31, the number 31 being later borne out by entries in a notebook kept by the murderer. Usually one of the so called ‘constant’ teeth such as a lower cuspid is used for the count.

From such simple investigations progress has been made to the point where a single tooth, or a single restoration has served to identify a person. It is understood of course, that the person is known to be one of a limited number, nevertheless if no other remains are extant, this is an achievement.
Age, Sex, Race, Diet, Habits and Some Occupations
As Recorded by the Teeth

Age determination from teeth is a poorly refined technique and not at all reliable beyond the teenage years. However, if longitudinal histological sections of the whole tooth are made, they can, in the hands of experts, give an accurate age estimation even for persons well past middle age. In broad outline, six prescribed points of reference are registered, and measurements are made which when correlated give the age to within two or three years. Such was the case when a shed housing two pigs was burned down: among the debris and remains of the pigs were some other remains and teeth subsequently ascertained as human. One tooth, an upper molar, was sectioned and studied and gave an age of somewhat under 65 years. In fact, the tooth was traced to a man of 63 years 9 months, who had escaped from a mental institution in that district a short time before, had probably started the blaze and then perished in it.

The identification of sex from teeth alone is rather unreliable but becomes more conclusive if the supporting bone structure is also present, especially the angle between the hemi-mandibles. Man usually have larger crowns and often more prominent cuspids.

Teeth of the various human races exhibit no definite racial differences in shape, but size may differ considerably. Some are larger than average (Melanesians, Amerinds and Eskimos), while others are smaller (Lapps and Bushmen).

Diet has been touched upon earlier, and the problem of dental decay which it causes usually reverts to the percentage of carbohydrates, and more specifically sugars, which is ingested. Water may also affect the teeth in regions where it is excessively brackish and brownish staining, or has excess fluoridation which results in mottling. Metals ingested with the diet, such as lead, iron, phosphorus, arsenic and iodine, all result in characteristic discolorations.

Betel nut and cocoa leaves are not the only substances chewed or clenched between the teeth which leave characteristic traces. Compulsive candy and pastille chewers show predominantly occlusal decay, whereas chewing-gum habituates are more prone to cervical decay. Occasionally an extraordinary case arises as well: a certain woman ate a large piece of lemon daily, which she held for long periods against the buccal surfaces of the posterior teeth, causing tooth structure to dissolve away in acid over the years.

Smokers usually have nicotine-stained teeth, but with variation: cigarette smokers stain mainly on the labial of the incisors; pipe smokers do so mainly on the lingual. The latter often have oval-shaped notches on the anteriors, from clenching the stem of the pipe. These facts have many applications: a bandit was convicted of murder when his teeth were found to match the marks on a cigar holder dropped beside a murdered banker.

Abrasions and chips on the teeth are hazards found in many occupations. Upholsterers and tailors may show small rounded notches from drawing threads between clenched anteriors; cobblers, small triangular notches from holding tacks in the same way. Musicians often cause chips and notches characteristic of the mouthpieces of wind
instruments; glass-blowers: areas of anterior teeth dissolved away by hydrofluoric acid, used in etching. Mine workers often hold their lamps by their premolars to leave both hands free, causing notching. Bakers often develop extensive cervical caries because of flour dust while stonemasons wear down their incisors from getting stone dust in the mouth.

Since occupation and social status are often related, the calibre of dental work seen in a person's mouth may reveal his financial state, hence the probable area of residence. The following anecdote illustrates such a case. In May 1935 three unidentified skeletons were recognized as being a woman of about 40, a boy of about 13 and a boy of 11. Their remains showed the following: The woman had an early gold foil of high calibre indicating that as a girl her family was well off; later, amalgams of poorer quality indicated some degree of insolvency following marriage; and most recently gold inlay work done by an improved indirect technique: financial solvency, residence in a large city. This last fact was corroborated by the high degree of technical skill in the orthodontic work done on the elder child.15

Implementation of a System of Identification
On the Basis of Dental Characteristics

Whether such a system of identification could ever become established on a world-wide basis is doubtful; it is hoped that many nations will see the significance of such documentation. These ideas are not new, dating back to the time when Godon proposed a system of this type to the Societe d'Odontologie de Paris, and which was accepted on June 7, 1887. In Cuba, Castroverde and Cabrera did a lot of the groundwork toward establishing a system of dental identification. More recently, in Sweden, Johanson and Lindestam have gone even further with ideas of photoradiographic identification. Their system is based on a color photograph of head and neck, incorporating serial numbers and other statistics, plus photographs of both dental arches, using mirrors to give in one picture the facial, lingual, occlusal and partially the proximal surfaces of all the teeth, plus their restorations. (Black and white film would not reveal the difference between gold and silver restorations, nor the hue of the teeth.)

In countries unused to systematic citizen identification, there is always much hue and cry when someone suggests fingerprinting the population. Hence it is quite likely that a dental identification plan would receive much opposition.

However, the fact remains that no two people have identical dentition, which probably includes identical twins whose fingerprints are identical. This fact has been systematically put to use countless times to identify the victims in mass catastrophes. To illustrate this experimentally, 775 children aged 10 to 16 were identified as follows: 611 had a complex of restorations not found in any other child of the same sex; (164 had the same chart as one or more than one child of the same sex); sex, number of teeth, restorative material all included on one chart gave positive identification for 79 per cent of them. Position and extent of fillings identified all but 67; a special moulage system of identifying fillings left only 39 unknown; color and nature of deposits on teeth reduced this to
18; spots due to fluorosis left two groups of two and one of four children; unerupted teeth left only two children not positively identified, and radiographs distinguished them from one another.\textsuperscript{10}

Another instance of these skills being applied, this time to a real-life tragedy, was the identification of the victims of the sinking of the S.S. Noronic, many of whom were Canadian. Twenty persons were identified solely on the basis of dental remains, for another twenty the first clue to identity came from this source, and for a further nineteen, dental evidence aided in the general identification. In only six cases was fingerprinting of any assistance.

The landslide tragedy in Aberfan, Wales (October, 1966) and a vicious fire which swept through a large sector of Hobart, Tasmania in February 1967 are two recent examples of the never-ending likelihood of mass tragedy. They lend weight to the argument that at least for certain sectors of any population a central register of dental charts is desirable. In some countries this was already extant by World War II; some young Norwegians who died in concentration camps were later identified from their dental school records. The Norwegians have also established catastrophe committees, so that since 1945 in all cases where several victims were found at the same spot, the local prefect of police appointed an identification committee consisting of three members: a police officer, a physician and a dentist. There are moves afoot to expand the committee to include two forensic dental experts, so that one may examine and dictate, and the other record since the average dental examination is more intricate than the average doctor or policemen is capable of interpreting correctly.

In some cases such documentation has long been resorted to for those who risk sudden and violent death in their average working day, e.g. flying and shipping personnel. In these cases there is a central register with the details of their dentition on record. In 1929, Argentina became the first country to insist on such compulsory registration for flying personnel. Two cases of interest deserve mention. The search for Amelia Earhart and her co-pilot, who disappeared just previous to World War II, has so far yielded, among other things a number of teeth from the depths of Saipan harbor, subsequently identified as late Micronesian! There is also the case of a young man in Ontario who was suspected of having murdered his wealthy mother, and whose remains when found were identified mainly by dental evidence.\textsuperscript{12}

\textbf{Dental Evidence from Sources Other Than Natural Teeth}

What happens when there are no teeth among the remains of a person whose identification is being attempted? In some cases this may spell defeat if all other remains are of no assistance, but in many cases dentures are found, which if they fit the victim, may be very helpful for identification purposes. Plans have even been proposed that all prosthodontists should specifically personalize the prostheses they make for each patient. A tiny photograph plus a tiny metallic strip bearing name and address, or a specific serial number should be cured into the acrylic. This would have the added advantage of assisting in the finding
and returning of lost dentures. If radio-opaque tracers were also incorporated in the acrylic it would make much safer the lot of unfortunate persons who swallow pieces of broken dentures.

Sometimes the bearer of a certain dentition is identified from bitemarks or from the impression made visually due to some peculiarity. An observant police director had a man arrested following an accurate description of his gold restorations. Bitemarks are often found on the bodies of persons who have been sexually abused, on food left-overs and on personal belongings, such as the aforementioned cigar holder. Bitemarks as evidence once absolved a Scandinavian soldier and convicted the true culprit, while all other evidence was leading to precisely the opposite conclusion.

Summary

Means of identification in several different scientific and legal disciplines are based on dental remains, and, from a theoretical point of view, it would be possible to document vast sectors of a population using such systems, which are extremely reliable. An outline is given, dating from palaeolithic times to the present, which cites a number of examples, to show the development and transcendence of systems of dental identification. Difficulties arise in that certain populations are opposed to being so documented, while certain other nations are too poor to administer such a system. There is a shortage of dental experts in this field and often there is unwillingness from juridico-legal bodies to recognize such systems. What is more, few schools have courses dealing with forensic odontology.

The field of dental identification is a vast one. For historical, archaeological and anthropological purposes present methods are well developed, but with regard to the most recent aspects, much can still be done. This relates not so much to the techniques themselves, as to the training of experts to use them, and convincing the law and the public to accept them.
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3. Humphreys, H. Dental Evidence in Archaeology. Type-written, University of Birmingham, n.d. (19507).

I wish to express my gratitude to Professor Martin A. Rushton, C.B.E., L.L.D., M.D., Odont. D., F.R.C.S., F.D.S., Department of Dental Medicine, Guy's Hospital, London, for making available to me his article on the teeth of Anne Mowbray, which provided the cornerstone of this paper.

DR. HERTEN-GREAVEN is staff pedodontist at Montreal Children's Hospital, as well as in private practice. His address is 1414 Drummond St., Montreal, 107, Quebec.
A Soft Sell of Dental Hardware

—JOHN W. HOWARD, A.M.
Morgantown, West Virginia

The man in the old bar-room story who ate the glass but threw the stem away and so wasted the best part must have been a librarian. For librarians, in order to save shelf space, often retain only the substantive portion of technical and scientific journals. The advertising pages are thrown away, and they, for the historian of the trivial, are often the best part.

A case in point came to hand recently with the finding of a few numbers of *Items of Interest* for 1889 with the original covers and advertising pages. One of the longer-lived journals of American dentistry, *Items* was at that time the property of the Wilmington Dental Manufacturing Company, who used the final pages as a medium for their advertisements. There one finds cuts of archaic dental instruments, and of those scarcely altered in more than eighty years. One also finds a series of rhyming advertisements of unknown authorship, but charmingly illustrated by Palmer Cox. No. 8 of the series, from November, pictures a mouse in residence speaking to a group of immigrant mice. No. 9, December, depicts a porcupine, two foxes, and a bear on their way to town.

**No. 8**

A word of counsel in your ear
Before you come to tarry here:
I tell you ere you climb the stairs
You'd better undergo repairs,
For food about this house you'll find
Is all too hard for gums to grind.
Make haste and seek a Dentist's aid
And have a set of grinders made
Be sure the teeth he gives you though
Are from The Manufacturing Co.,
Of Wilmington, who keep a rare
And large supply of Dental ware,
For not alone in Teeth they deal:
They keep the Reamer, Bur, and Wheel,
The syringe, Scraper, Lathe, and File,
And Plugger Points in every style.
The Scissors, Tweezer, Bib, and Scaler,
The Steam Gauge, and the Gas Inhaler,
All that a Dentist's hand requires
May there be found awaiting buyers.
No. 9

The people in the town below
Are much in need of aid, we know:
The pork is lean, the beef is tough,
The cake and bread are dry and rough.
And those will to their graves descend
Who must on gums alone depend.
Tonight about the town we'll go,
And hang an artificial row
Of Teeth at every door we find
Where people lack the natural kind.
The Dental Manufacturing Co.,
Of Wilmington, some miles below,
Supplies the Teeth now most in use
When dentists finest work produce.
There too, Air Cups and Blowers new,
The Wedge and Regulating Screw.
The Forceps, Pliers, Shears and Drill,
The Points to excavate and fill,
The Wheels of Felt, square-edge and round,
And fine Drop Bottles may be found,
While Denists cannot fail to please
Their patients with such Teeth as these.

PROFESSOR HOWARD, whose contributions have appeared before in the Bulletin of the History of Dentistry, is Associate Professor of Dental Literature, School of Dentistry, West Virginia University, Morgantown, West Virginia, 26506. He is also the proud possessor of an antiquated printing press and this gave rise to the Plectopteran Press whose address is the basement of his home. It is charming bits of dental history, lore and nostalgia, such as the advertisement reproduced above, which are the products of Plectopteran.
Notes & Queries

This section of the Bulletin is designed as a clearing house of information open to all readers. Comments, suggestions, questions and individual points of view are especially solicited, the only limitation being that it be related to the history or bibliography of dentistry. Address all questions and comments to the Editor; hopefully, this section will grow in importance as you, the reader, makes use of it.

Among the most valuable contributors to the preservation of dental knowledge have been the collectors. These knowledgeable persons have gathered a wide variety of material in their private collections. Some of these gatherers have been selective in their subjects; others have been inclusive. Usually the best collections have eventually come into the possession of dental schools, to be carefully maintained in their museums and libraries.

There is one kind of collection that is of special interest to me—dental autographs. Does there exist, for example, a complete collection of the autographs of ADA presidents; does any state association possess a complete file of the autographs of its presidents?


Of particular interest and value are handwritten letters from Thomas B. Hitchcock and Norman W. Kingsley. Also in my collection are autographs of many other prominent members of the dental profession. Perhaps among the Bulletin's readers there are some collectors of dental autographs. Perhaps there are some dental schools that maintain such collections. I believe strongly that such an interesting and valuable hobby should be fostered both privately and officially.

GARDNER P. H. FOLEY

(PROFESSOR FOLEY, a Past-president of the American Academy of the History of Dentistry, is the author of the newly released book "Foley's Footnotes" which is reviewed in this issue of the Bulletin.)

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To the Editor:

Many thanks for your letter of June 11 and for sending me three copies of the Bulletin, which I received today.

My brother and I are very grateful to you for your beautifully written obituary for our father, Dr. Curt Proskauer. If your Academy would like to keep the photo of my father, I would be glad to give it to you, since I can get other copies from the Smithsonian Institution, which did the enlargements for me.

With many thanks again for your great effort, I am, with best regards,

Sincerely,

Henry G. Proskauer

To the Editor:

I wish you to know that I thoroughly enjoy the Bulletin, and note with each issue that it is improving in content and quality. You are doing a most excellent job.

All best wishes,

Cordially,

Robert J. Nelsen, D.D.S.

(Dr. Nelsen, the inventor of the high-speed turbine handpiece, is the Executive Director of the American College of Dentists.)

To the Editor:

Please accept my thanks for your generous review of my history of the University of Pittsburgh School of Dental Medicine. I am fortunate to have had so perceptive a man review it.

Your June issue of the Bulletin is full of interesting articles. I enjoyed it, as always.

Sincerely,

Isaac Sissman, D.D.S.
To the Editor:

Thank you very much for sending me the last issue of the Bulletin of the History of Dentistry. The review of my book was very kind and I certainly appreciate the treatment given to my little work. I also take the opportunity to congratulate you on your bulletin. It made very enjoyable reading and it is certainly beautifully turned out.

With kind regards,
Sincerely yours,
Louis Bakay, M.D.

(Dr. Bakay is Professor and Head, Division of Neurosurgery, School of Medicine, State University of New York at Buffalo.)

To the Editor:

I am a professor of the History of Medicine in the University of Rome, Italy, where for the last 21 years I have been teaching the History of Dentistry. I should be very grateful to the American Academy of the History of Dentistry if I could receive some issues of your Bulletin, possibly of the past years.

I thank you very much and ask your pardon for the trouble I cause you. Please be so kind as to accept my best greetings.

Yours sincerely,
Prof. Dott. Placido Micheloni.

(Dr. Micheloni, who has since become an active member of our Academy, is a specialist in prosthetic dentistry as well as oto-rhino-laryngology.)

To the Editor:

For some time, we have been considering the preparation of a bibliography of our 'special collection' of dental materials. We have one of Parmly's books, for example. However, most of the collection is simply old rather than old and valuable.

Do you think you would be interested in publishing such a bibliography? Do you have any suggestions to make that might help us in such a project?

Sincerely,
Ann Marie Corry, Librarian
School of Dentistry Library
University of Missouri-Missouri-Kansas City
Kansas City, Missouri

To the Editor:

Another very interesting Bulletin. I congratulate you. I hope that the Bulletin is getting in the Libraries of all the Dental Schools. The availability of the publication for student readership will help in creating the demand for the continuation of the teaching of dental history.

Sincerely,
Henry A. Swanson

(Dr. Swanson is a past-president of the American Academy of the History of Dentistry.)
Seldom in one's professional lifetime does a book on dentistry come along which can give hour after hour of uninterrupted pleasure; this book is one of those rare ones.

Aptly termed "a treasury", the book is a collection of stories, anecdotes, folk tales and selections from the classics and other writings, all dealing with the art of dentistry, gathered over a lifetime of intellectual sleuthing by someone who is not himself a dentist but is closer to dentistry than many a possessor of the D.D.S.

The author, Professor Gardner P.H. Foley, a founder and past-president of the American Academy of the History of Dentistry first came into contact with the dental profession when he was invited in 1942 by Dean J. Ben Robinson to join the dental faculty at the University of Maryland. There he taught a course in dental history and literature, an association that was to last until his retirement in 1969.

During all of his professional life he was engaged in tracking down references in the literature to dentists and dentistry, dental patients and their recounting of their experiences as well as the sufferings of those unfortunates to whom the services of a dentist were unavailable and who were the victims of what Galen described as "... the worst pain that killeth not the patient."

In 1961 the Journal of Dental Education began the regular publication of Professor Foley's collection, and in 1965 it first appeared as a regular feature in the Journal of the American Dental Association under the still current title "Foley's Footnotes."

The book is arranged into general categories such as "Extractions—Its Pains and Pleasures," "The Folklore of Dentistry," "Dentistry and the Law," "Famous Dental Truants," (dealing with dentists who have become famous in other fields, especially sports and the arts), "Dentists and Dentistry in Fiction," and so on.
It is truly amazing when one finds that concern with the teeth or with
the services of the dentist was such a prominent part of the writings of
such varied literary figures as Robert Burns, Cotton Mather, William
Lyon Phelps, Franklin P. Adams, Ogden Nash and Lord Byron. However,
the gems of the book come from all those little known authors whose
writings are truly delightful and it is a seeming miracle that Professor
Foley has succeeded in tracking them down and rescuing them from
obsccurity for our delectation.

One of the best sections in the book, "Dentistry and the Nineteenth
Century American Humorists" first appeared in the Bulletin of the
History of Dentistry and contains such hilarious episodes that one gets
renewed enjoyment each time he rereads it. In fact the description of
"Tushmaker's Toothpuller" (circa 1855) by an army officer named
George Horatio Derby is a classic:

The 'toothpuller' was invented by Tushmaker especially for a tooth he had
failed to extract with forceps and turn screw. It was a combination of 'lever,
pulley, wheel and axle, inclined plane, wedge and screw.' This machine was
placed over an iron chair rendered stationary by iron rods going down into the
foundation of the granite building. In its first trial the patient's head was
pulled clean and clear from his shoulders. The postmortem showed that the
roots of the tooth extended down the right side, through the right leg, and
turned up in two prongs under the sole of the right foot. Tushmaker was a
little shy of that instrument for some time afterward.

However, he tried again on 'an old lady, feeble and flaccid.' The machine
'drew the old lady's skeleton completely from her body, leaving her a mass of
quivering jelly in the chair.'

Lest we forget that many lawsuits had as the center of litigation dental
services, Professor Foley reprints accounts of some old and some new
cases. There is a fascinating discussion of the Webster-Parkman murder
case, a classic in American criminology, in which Dr. Nathan Cooley
Keep, later Dean of Harvard University dental school interpreted
evidence which led to the conviction of Webster and which established
the case as an outstanding chapter in the history of forensic dentistry. In a
lighter vein there is this story taken from the autobiography of a Nevada
lawyer:

There was a case where a dentist sued for an unpaid bill of $75.00. The
defendant admitted the amount was due, but claimed malpractice as a
consequence of which he claimed he suffered pains and aches of all sorts, the
most serious pain, however, being the attachment of his wages to pay the
long-due dentist bill. Strange as it may seem, the jury decided in favor of the
defendant and assessed damages against the dentist.

It is inconceivable that there is a dentist today, active or otherwise, who
would not enjoy owning this book. It will provide him, and his family,
with many hours of pleasure and enjoyment. In addition it will instill in
all who read it a better and deeper understanding of the heritage of this
great profession of ours, touching as it does on the fads, foibles and follies
as well as the heroic accomplishments of our earlier dental forbears.

For Christmas or any other occasion of giving, this book would be a
delightful choice.
Without the X-ray the practice of dentistry as we know it today would be virtually impossible. It is therefore hard to believe that this tremendous diagnostic aid has been available to the healing professions for but little more than seventy-five years!

The uncovering of these mysterious rays, the discovery of which shares with the discovery of anesthesia a place as one of the greatest boons to mankind, was the work of a plodding and methodical research physicist who had originally been denied entrance to the university because he’d failed the entrance examination.

Born in Prussia and educated in Switzerland, Röntgen received his early training in mechanical engineering. He turned shortly after graduation to the field of physics and progressed from his first position as a laboratory assistant at the University of Zurich to that twenty-five years later as rector of the University of Wurzburg where he made his famous discovery. His alert mind and persevering nature led to numerous remarkable scientific achievements and he published a total of fifty-eight scientific papers.

Though his contributions are well known, Röntgen the man has been virtually neglected. In this book in a meticulous recounting Nitske tells the story of this great scientist, dealing with every aspect of his life, from his laboratory experiments to his personal relationships.

The author, who is a professional writer with many books about automobiles to his credit, has unfortunately loaded this book with such a bewildering array of detail that after a while the tedium of struggling through it all overwhelms one. When he describes Röntgen’s annual excursions to the mountains in Switzerland we are told the height of every peak; when the professor picked wildflowers we are dutifully advised of their Latin names! The author has undoubtedly uncovered a wealth of information in his research and it is as though he can’t bear to see any of it not appear in print. A small example suffices:

On his regular daily walks Röntgen often crossed the Alte Mainbrucke, turned right, and ascended to the left by the Erste Schlossgasse toward the Festung Marienburg which overlooked the whole city. This former fortress stood 426 feet above the river in a nearly impregnable position, on the site of a fort once occupied by the Romans. It later became an episcopal castle. In 1325 the insurgent folk groups lost valuable time and broke their own strength in a vain attempt to capture the fort, after which the episcopal troops entered the city and mercilessly executed sixty of the people’s leaders. In 1631 the castle was captured by the marauding troops of the Swedish conqueror, King Gustavus Adolphus.

Yet it is possible that this very plethora of facts may be exactly what is wanted by those who wish to know all there is to know about Röntgen. In addition, the author has reprinted in full translations of the two monumental papers which announced to the world Röntgen’s “new kind of rays.” It is ironic that when Röntgen submitted the first paper to the editor of the Physical-Medical Society of Wurzburg, the latter saw fit to print it on pages 132 to 141, the last ten pages of the volume!
A very helpful chronology of Röntgen’s varied life, a complete listing of all of his writings, an excellent bibliography of additional writings about Röntgen and a good index make this book very handy for further study. The many fascinating photographs which Röntgen himself made are also of great interest.


The author of this book is an associate professor of the History of Medicine at Duke University. He has also taught at the Johns Hopkins University School of Medicine and is a frequent contributor to the Bulletin of the History of Medicine. He holds an M.D. degree from the University of California, a Master of Public Health from Harvard and a doctorate in the history of medicine from Johns Hopkins. These fine qualifications notwithstanding, he has produced a book which is a hodgepodge of nineteenth century American medical writings, decidedly uneven in quality as well as interest.

It is a collection of thirty papers originally published in medical journals as well as in lay periodicals which, in the publisher’s words, “...present an illuminating panorama of the medical profession in nineteenth century America.” However, in many ways it fails of its purpose.

The section dealing with medical education is a good one, treating as it does with attitudes towards early medical schools and their courses of instruction, as well as with the arguments which raged over increasing and deepening the courses of study. In most schools standards of admission were very low. Charles W. Eliot remarked that when he became president of Harvard in 1869 anyone who chose could come off the street and enter Harvard School of Medicine. Eliot proposed a number of reforms, among them lengthening the school year from four to nine months and that each candidate pass a written examination for the degree. The dean of the medical school thought that these innovations would destroy the school. “I had to tell him,” the Dean is reputed to have said, “that he knew nothing about the quality of Harvard medical students. More than half of them can barely write.”

A further discussion of this problem by contemporary physicians occurs in the section entitled “The Medical Profession”, and casts light on the attitudes of the more properly trained practitioners toward their less reputable colleagues.

Of much less value is the section titled “Medical Practice” and one wonders why the author chose to reprint these papers of a century ago, unless it was to show how benighted some “eminent” medical practitioners were. However, he does not properly perform his editor’s task since he neglects to comment sufficiently on the medically unsound reasoning which permeates these papers. The collection is comprised in the main of papers which either added little to medicine’s understanding of the problems which plagued it or else contained elaborations of irrational thinking, such as a paper of 1836 by the eminent founder of the
Philadelphia Journal of the Medical and Physical Sciences, Dr. Nathaniel Chapman, entitled "Remarks on the Chronic Fluxes of the Bowels." It is interesting in this connection to note that the writings of dentists contemporary with this Dr. Chapman are of a much more advanced nature with far more scientific thinking behind them. By the end of the first third of the last century American dentistry had succeeded in putting its practice on a sound scientific and rational basis, consistent with the knowledge of the times, while medical practice, illustrated by this article was still seeking relief for whatever ailed the patient in blood letting and still more blood letting!

Of particular interest to the dental historian is the section "Surgery". In it there is a paper which was read before the Boston Society of Medical Improvement on November 9, 1846 by Henry J. Bigelow dealing with the discovery of anesthesia. Bigelow as a junior associate of the Dr. Warren who performed the first public operation under ether anesthesia, the latter being administered by the dentist, Dr. W.T.G. Morton. Bigelow states that during this first operation "... the patient muttered as in a semi-conscious state, and afterwards stated that the pain was considerable."

This is hard to reconcile with the widely quoted contemporary report of the scene: "It was all over in half an hour, and during all that time not a cry or a groan had come from the patient. Morton aroused him and said, "Did you feel any pain?" "No," replied the man." (McClures Magazine, Sept. 1896.) Nevertheless, Bigelow apparently frequently observed Morton administering ether in his dental practice for the extraction of teeth, and he describes these occasions in colorful detail. The most successful portion of the book in achieving the author's goal is that entitled "Hygiene" and this is not surprising considering Dr. Brieger's special training in public health. There is a fascinating history of the registration of vital statistics by the noted physician-librarian John Shaw Billings; an interesting paper "Why We Get Sick" which reflects simplistic nineteenth century views of hygiene; and a sickeningly realistic account of the squalor and filth of a major city, "New York the Unclean," a report of a sanitary survey carried out in 1864.

The prefacing of each chapter with a good bibliography of up-to-date writings which supplement the author's selections, as well as an index enhance the book's value.


The late C. D. O'Malley (1907-1970) has edited a rather unique volume of the history of medical education covering the periods from classical antiquity to the present time. This collection of essays is the result of an international symposium held February 5-9, 1968 sponsored by the Department of Medical History, School of Medicine, University of California at Los Angeles.

The nineteen essayists were experts in the field from such countries as Italy, France, England, India, Sweden, Germany, Austria, The Netherlands and of course, the United States. The total body of
information presented represents a formidable contribution to the knowledge of medical education throughout the ages and contains much material not readily available. It is interesting to note that the problems of change which face medical education today can be historically traced back to the time of medicine’s origin.

There are many references to dentistry contained in the above essays although they are peripherally treated. Many items of interest to dentistry are pointed out: the beginning of specialization in practice leading to dentistry; Sami Hamarneh’s description of a treatise by Abu Zayd Hunayn (Johannitius 809-873) entitled *Fi Hifz al-Asnan wal-Laththah* on medically protecting the teeth and gums; thus the first to give special emphasis to oral hygiene and the function of the teeth in relation to the entire digestive system. Mention is also made of the dental art found in *al-Tasrif* by Al-Zahrawix (Abulcasis, d. c. 1013) with a beautiful photograph of a page of this text showing forceps for root extraction and an elevator for tooth extractions; a description of the founding of the Department of Stomatology in 1964 at the State University of Saigon in South Vietnam; a report from 16th century Japan in which teeth were extracted “with pincers, tooth forceps, pliers, . . . with chisel and mallet, or with a bow and arrow tied to a tooth, or with blacksmith’s tongs.” Other customs are described, such as that in Spain in the middle of the 16th century where surgeons were called upon for “dental interventions.”

South American dentistry is briefly dealt with, noting that Brazil established dental studies in 1884 whereas dentistry was established in Chile since 1854.

A particular distinction of this volume is that it brings into focus for the first time the educational views of the great physicians. It is hoped that the same will be done for dentistry.

(Reviewed by Dr. Milton B. Asbell, Secretary-Treasurer of the American Academy of the History of Dentistry.)


An exceedingly handsome book dealing with many aspects of the primary dentition, this will be of great interest to dental historians who have a reading knowledge of German.

In the early years of the dental profession in the United States an inordinate amount of attention was given to the so-called “disorders of teething.” The most dire consequences were ascribed to improper dentition and it came to appear that the sole responsibility of the dentist to the child was to assist his teeth to erupt. Robert Arthur, one of this country’s great figures in dentistry in the mid-1800’s inveighed against the pernicious superstition of his day which held that if the deciduous teeth were to fall out naturally, the permanent set would be irregular. He castigated those who urged that children be taken to the dentist
“... before the first teeth were even loosened, and have them dragged out, regardless of the pain inflicted.”

The author of this book, in a similar manner, treats of the superstitions and beliefs surrounding the first dentition, beginning his account with the writings of Hippocrates. His chapter headings are illustrative of the contents.

“Superstitious customs and practices concerning the teething child.”
(This section deals with such customs as Zahngeld-money for the shed teeth; teething amulets; and “magical” incantations to ease teething difficulties.)

“Therapeutic handling of gingival disorders in cases of difficult dentition: then and now.”

The book is lavishly illustrated with many old prints, both monochrome and color, concerning early dental practices in Europe as well as title pages and broadsheets of leaflets which reflected these early practices. The bibliography is surely the most complete of any dealing with this subject, running to fifteen pages. However, its usefulness is somewhat limited, since except for an occasional entry in French, all of the books and articles cited are in German. In addition the lack of an index is an inconvenience in the book’s use in additional study.

Nevertheless, this book is on the whole an unusual work which is a welcome addition to the literature of the history of dentistry.


The question “To whom is due the honor for the discovery of anesthesia?” has exercised man’s mind ever since the advent of this tremendous boon more than a century and a quarter ago. The Congress of the United States, in behalf of a grateful people, authorized the payment of a substantial honorarium to the discoverer, but withdrew the offer when so many stepped forward, each claiming that to him, and him alone, belonged the honor and credit.

Principal among these were Horace Wells, the dentist who first conceived of the idea of anesthesia for surgical purposes and was first to demonstrate it, with apparently less than full success to a hostile audience; W.T.G. Morton, also a dentist, who first successfully demonstrated ether anesthesia; Charles Jackson, a prominent chemist, who claimed to have suggested the use of ether to Morton; and Crawford Long, a physician, who claimed to have used ether anesthesia in minor surgery two years before Wells’ demonstration, but who didn’t think it important enough at the time to make it known.

It has long been an established principle that credit for a discovery belongs to him who fulfills three criteria: 1) conceptualization of a procedure which had not been generally known theretofore; 2) carrying out of this procedure, even though the success of the discovery may not be immediately apparent to those observing; and 3) making the procedure and discovery known to the world.
In a similar fashion the mere change of agent employed in a procedure does not constitute a new discovery and in no way nullifies the primacy of the original discoverer. Thus Morton is no more entitled to the honor as discoverer of anesthesia because of his use of ether than is Simpson entitled to the same honor because of his use of chloroform some years later, or are all of the many workers in the field of anesthesia entitled to the honor for their introduction in later periods of still more and better agents to produce insensibility.

It is the original conception of that which is new, and an awareness of its worth, which is the discovery, regardless of how many changes in procedure or agents employed in the furthering of this discovery takes place in subsequent years.

Using this reasoning, the world scientific community in 1944 on the hundredth anniversary of his initial demonstration, conferred upon Dr. Horace Wells, the dentist from Hartford, Connecticut, the honor and distinction as the true discoverer of anesthesia. At that time a Horace Wells Centenary was held, and every major medical and dental organization in the world passed resolutions that to Dr. Wells belonged the honor.

Miss MacQuitty seems to be unaware of this momentous world-wide movement and in her otherwise excellently written work gives all of the credit to Morton. She dismisses Wells' contribution in a few paragraphs, saying that he was "...an ebullient character, always eager to take up new ideas, but without the necessary patience and application to see them through."

Miss MacQuitty blames Wells for what was obviously a lack of understanding on the part of Wells' medical audience of the significance of what they were witnessing. They were the ones who were short-sighted, unable to look beyond the patient's moans (normal as we know now for the excitement stage of anesthesia) to the wonderful world of painless surgery that had been opened to them. And in spite of the author's statements to the contrary, Wells did use nitrous oxide successfully at least a score of times in his dental practice before he appeared before his medical audience at the Massachusetts General Hospital.

In an even more unfair fashion she castigates Senator Truman Smith, from Wells' home state of Connecticut, as a cheap conniving politician when he rose on the Senate floor seeking justice. "I demand," he thundered, "in the name of justice and right, to have an opportunity to come before the Senate and tell the story of the wrongs to the poor widow and defenseless children of Dr. Horace Wells," wrongs which the scientific world belatedly admitted. Yet Miss MacQuitty ascribes only a greed for money as the motive behind Sen. Smith's crusade, money he would supposedly have gotten had Mrs. Wells collected the honorarium.

Nevertheless, Miss MacQuitty's error, large as it is, is in no way as grotesque and unfair as that perpetrated by the United States Post Office, who also apparently never knew of the Wells Centenary. For in 1944 it issued a postage stamp commemorating the discoverer of anesthesia, and contrary to all justice and reason it bore the likeness of Crawford Long!

Therefore, if we judge Miss MacQuitty's work as one dealing with Morton's discovery of ether anesthesia and its successful demonstration,
it is a very readable and informative book. And aside from the open and obvious bias, earlier alluded to which is apparent all the way through the book, the description of the struggle among the various claimants to the honor is fascinating.

Miss MacQuitty is an economist, journalist and the director of television in Ulster, Ireland. Her account of the discovery of anesthesia is the result of five years of research in England and America, and this is evident in the meticulous detail with which she presents her facts. The photographs which she chose to accompany the story serve well to enlighten and maintain one's interest.

There is a good index and an outstanding bibliography of other writings on this question. Not surprisingly, most of these would dispute Miss MacQuitty's conclusion as to who was the true discoverer of anesthesia.


When your editor was pursuing the course of study which led to his acquiring the degree of Master of Library Science, he never failed to marvel at the tremendous wealth of resources available to the scholar, did he but know where to find them. The bewildering array of material was there, and all one needed were the guides and keys so that one would know what to look for and where to find it. He learned that every scholarly discipline had its own guides and it was the province of the librarian to use these guides to make all of this accumulated knowledge of the ages available to the scholar.

Most of us who are interested in the history of dentistry consider ourselves scholars in the field, some to a greater, some to a lesser extent. Some of us have engaged in research into our profession's past and have published our findings, while others of us have contemplated getting involved in such research. To both of these groups this book will be of immeasurable assistance.

The basic technique of historical research is the same regardless of the field in which one works; the difference is in the sources consulted. Thus one interested in the history of medicine would consult different primary source material than one researching the civil war. However, the methods by which one uncovers the source material and retrieves it is the same in both cases: through the use of guides which point the way.

This pioneering handbook presents a comprehensive listing and discussion of the finding aids available to historians. Designed for use by students or scholars, it will enable them to become acquainted with the basic reference tools and guides to more specialized references. It will also help them to acquire the necessary techniques to use efficiently the library's resources and services. A partial listing of the topics includes: Guides, Manuals and Bibliographies of History; Chronologies of History and the Social Sciences; Almanacs, Yearbooks, Statistical Handbooks and Current Surveys; Primary Sources and Dissertations, including Manuscripts, Archives, Oral History, Diaries, etc.; Biographical
Materials; and many other valuable resources.

Of specific concern to the dental historian is the development of background material—a skeleton on which to hang the flesh of his project. Through the use of the guide such accompanying source material as period newspapers, archival material and contemporary pamphlets are made available to him. To this end the various Indexes, such as the Social Sciences and Humanities Index are discussed. Union Lists are explained, and this alone makes the book a valuable tool.

We in the field of dental history have a task which is different from that of our co-workers in pure dental research. They can satisfy all of their research needs through the use of the scientific indexes, such as the Index to Dental Literature or the Index Medicus, etc. History, on the other hand, is a study of human and social movements. It is therefore necessary to use the research aids which allow us to understand the social environment so that we may clothe our dental historical research with meaning. To this end The Historian's Handbook is of incalculable assistance.


One of the greatest bargains available to the researcher in dental history, as well as one delving into the background of any of the life sciences is now available in this book.

The National Library of Medicine using the vast resources which allow it to produce the Index to Dental Literature, the Index Medicus as well as other specialized indexes and reviews also periodically issues bibliographies in various special fields of interest to the health scientist. In line with this policy the first bibliography of recent literature on the history of medicine and related sciences and professions was issued in 1965, and this covered writings issued in 1964. Subsequent bibliographies were released in the succeeding five years.

Here in this massive volume of almost 1500 pages we have the first cumulation, covering the years 1964-1969 and containing citations of almost everything published in the field of medical history. In addition it contains citations to several thousand additional articles and monographs which have been indexed since the 1968 bibliography was published.

The bibliography focuses on the history of medicine and related sciences, and all chronologic periods and geographic areas are covered, and all types of articles are listed ranging from those in regularly appearing periodicals to specialized material issued for symposia and congresses.

The bibliography is divided into three parts: biographies; subjects; and authors. The subject index lists almost all the sub-divisions in the health fields one can think of, and it is this listing which serves as the index.

The section on dentistry occupies seventeen pages and is replete with citations of articles and books written by many of the members of our Academy as well as by other knowledgeable scholars. This volume is a must for every health sciences library serving as it does to bring together
between covers so much of the material we who are interested in dental history are always looking for. In addition, it makes for fascinating browsing and will lead to the acquiring of an enviable collection of reprints.


Dentistry among the ancient Romans was carried out as a regular part of medical practice, generally in fact, being the province of particular specialists. Therefore a better understanding of medicine in this earlier civilization will help us to better know the origins of our own profession.

This book is an admirable work by a scholar exceedingly knowledgeable in the field of Roman life, and is minutely documented. Its one major flaw is that it makes no mention whatever of dentistry as practiced by the Romans, even though a great deal of evidence points up the fact that there was indeed sophisticated dentistry being carried on. The epigrammatists Martial and Juvenal alone have painted incisive pictures of the dental care rendered to the upper class Romans, and many of the outstanding physicians and teachers among the ancients, such as Pliny, Celsus and Galen discuss dental treatment in their writings.

Nevertheless, the book is otherwise so complete and well researched that it is a positive contribution to our knowledge of the times. Numerous illustrations similarly augment its value.

The author, who received his doctorate in Roman history from the University, and is not himself a physician, is an assistant professor of ancient history at the University of Kentucky. In this book he traces the origins of Roman medicine from the days when it was practiced by Greek slaves (being an unfit occupation as befitting the dignity of a freeborn Roman), to the later emergence of eclectic medical practices among the Romans, with their making use of the beliefs, traditions and practices of all those peoples and lands they had conquered. The social aspects of Roman medicine are extensively covered, ranging from public health practices, water supply, public baths, etc. to the attitudes of the public to the medical profession. That this was far from trusting and complimentary is shown by just two of the several epigrams the author quotes:

The physician Marcus laid his hand yesterday on the stone Zeus, and though he is of stone and Zeus, he is to be buried today.

Socles, promising to set Diodorus' crooked back straight, piled three solid stones, each four feet square, on the hunchback's spine. He was crushed and died, but he became straighter than a ruler.

A very worthwhile addendum to the book is an extensive listing of biographical sketches of many notable physicians and others important to Roman medicine, as well as an eminently suitable bibliography of works to be consulted for background material or for further study, as well as several bibliographical guides. A useful index is also included.