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Stimulating more thorough and comprehensive research in dental
history, thereby extending the boundaries of dental knowledge, giving
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Creating an authoritative body to which important questions relating
to dental history could be referred for factual verification.
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A History of Local Anesthesia Armamentarium

—Richard A. Glenner, D.D.S.
Chicago, Illinois
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The instruments which dentists use today to achieve local anesthesia went through a long evolution which began in France three centuries ago. This paper examines the changes which have taken place in the syringes and needles to bring them to their modern state but also delves briefly into new and innovative instrument techniques.

The prototype of the modern hypodermic syringe first appeared in France in the 17th century. Prior to this, subcutaneous injections had seldom been used as a method of administering drugs. It was not until a reliable type of hypodermic syringe was available that the practice was adopted.¹,² (Fig. 1).

Many techniques had been used to induce local anesthesia including chilling with ice (1857), electricity (the 1850's), and an apparatus for dispensing a narcotic spray of ether or “Rhigolene” (introduced in the 1860's). The first individual to achieve any practical success with local anesthesia was the Englishman, Benjamin Ward Richardson, who introduced the ether spray. He stated that the idea of the spray occurred to him when a young woman playfully sprayed some eau-de-cologne on his forehead, producing a numbing effect. The apparatus he designed in 1866 was operated by a hand-held bulb and projected a finely atomized stream of ether which rapidly vaporized and chilled the tissues on which it had been sprayed. This method proved somewhat effective in the extraction of teeth and in minor surgery. (Fig. 2).

In 1827, Von Neuner of Germany had devised a syringe for introducing fluids into the eyes of animals. This syringe had a fine cannula through which a stiletto had to be pushed to force passage of the
solution. Taylor and Washington in 1839 used the Anel syringe for "injecting" a solution of morphine. This forerunner of the modern hypodermic syringe was made of sterling silver with a leather piston and a fine elongated tapering nozzle. A small incision had to be made in the skin to allow the nozzle to be inserted. Zophar Jayne, of Illinois, in 1841 patented a syringe similar to the Anel syringe, except that the nozzle tapered down to a sharp point with an opening on the side near the tip. This was the first syringe used on a human subject. (Fig. 3)

The Jayne syringe was followed by a more elaborate instrument, "Retractable Trocar", devised by Frances Rynd of Dublin. While not a true hypodermic syringe, it did deposit medication under the skin through a cannula with a gravity flow device. It was spring-loaded and the solution was released through a cannula after pressure on the catch had allowed the withdrawal of the trocar. The drug to be used was run in beforehand through a hole at the top of the cannula. This instrument was used in 1844 by Rynd to treat a patient with trigeminal neuralgia, by the subcutaneous administration of fluids. (Gabriel Pravaz of Lyon, France, around 1852 introduced a syringe for injecting sclerosing solutions into the large arteries of animals. The barrel and piston-rod were of silver with a fine trocar and cannula of platinum or gold. An injection was made by rotating the screw piston-rod, and in this way very small doses could be given accurately. Although Pravaz is sometimes credited with inventing the hypodermic syringe, he did not invent the needle or introduce hypodermic medication.)

THE FIRST TRUE HYPODERMIC SYRINGE

Daniel Ferguson, a surgical instrument maker of London, introduced a syringe with a hollow trocar in 1853, with syringe and piston both made of glass. The end of the barrel had a conical metal fitting with a screw to which a thick hollow needle could be attached. Alexander Wood of Edinburgh Scotland, first used the Ferguson syringe for removing a nevus with a solution of iron perchloride. In 1853, it occurred to him that this instrument might also be used for subcutaneous injections. The first trial was on November 28, 1853, by injection of opiates into painful areas. Wood modified the Ferguson syringe by using a finer needle which had a bevelled point and a barrel which was graduated. Where Ferguson's instrument, with its large caliber needle, tore tissue during insertion and caused pain, Wood's modification allowed tissue to be penetrated easier and less painfully. This was truly the first efficient hypodermic syringe and needle, and is preserved in the Museum of the Royal College of Surgeons of Edinburgh, but the needle has long since disappeared. (Fig. 4) Wood wanted to produce an analgesic effect on a localized area and was not aware of the systemic effect of morphine. Nevertheless, he felt that there were advantages
from using this method and therefore advocated it. The term "hypodermic", however, was coined by the Englishman, Charles Hunter. In the late 1850's, Luer, a German instrument maker living in Paris, introduced a glass syringe with a conical nozzle. The Luer syringe substituted this nozzle for the screw type attachment of the needle to the syringe, and this improvement has remained until the present.

DEVELOPMENT OF SYRINGES IN THE U.S.

By the late 1850's, George Tieman & Company of New York manufactured the first syringes that were made in the United States. They were copies of the Ferguson syringe. The first advertisement for a true dental hypodermic syringe appeared in the July, 1870 issue of Dental Cosmos, showing a hypodermic syringe and two needles, and stating that the syringe came with "points" of fine tempered steel. No mention was made of the gauge or length of the needles. (Fig. 5) Ads for the same hypodermic syringe were found in the Johnson and Lund's Dental Catalogues of 1871 and 1876, and in the Hood & Reynolds Dental Catalogue of 1876. The 1876 S.S. White Catalogue also illustrated a "heavy glass office syringe" made of metal and glass with blunt "abscess points and sharp hypodermic syringe points". This particular syringe was not used for injecting a local anesthetic, but was used for washing out cavities and for injecting the various solutions used in the treatment of abscesses.

The first dental needles were seamed and were probably 25 or 26 gauge. The gauge was based on the Birmingham/Stubbs system for solid wire diameter which was introduced in Birmingham, England, in 1840, in the making of steel wire. Seamless needles were introduced in 1890 and used exclusively after 1900. Most early dental needles were made of carbon steel, but these corroded. Some were nickel plated, but these would blacken from constant boiling and lose their polish if they were left slightly damp. Better needles were made of platinum, iridium or gold, but they were expensive.
Other alloys were tried with some success. Nickel alloy needles would bend, but not break. By the late 1920's, stainless steel needles were introduced, replacing the earlier types. By the mid-1940's, most American needle manufacturers were using improved V2A steel.

In the Claudius Ash & Sons dental catalogue (London, 1887), three hypodermic syringes for “injecting cocaine” were offered for sale: one was metal, one a combination of metal and glass, and the other of India rubber. The needles (or points, as they were called) were made of steel and they were either straight, curved or at a right angle. Nothing was mentioned concerning gauge or length of needles. New types of syringes made their appearance late in the 1890's in the United States. In 1897, Consolidated Dental Manufacturing Company offered three syringes for cocaine injection: the all-metal hypodermic syringe, the interchangeable barrel hypodermic syringe, and the expander plunger hypodermic syringe. (Fig. 6) Sterility became important at this time, and the all-metal syringe was advertised as being aseptic to a degree impossible with the other styles of hypodermic syringes. The all-metal syringe was also said to be better because of “difficulties experienced in the use of glass barrel-leather plunger syringes because of their extreme liability to break and become out of order.” And when the advantages of sterility became known in the late 19th century, dentists at first flamed their needles before use, but used boiling water sterilizers early in the 20th century. Autoclaving of needles began in the 1930’s but today’s disposable needles are sterilized at the factory with ethylene oxide gas.

Bectin & Dickinson Co. offered the Luer-Lok syringe for the first time in 1897. This syringe had a locking device, which held the needle firmly in place. The 1897 Consolidated Dental Manufacturing Company catalogue offered needles for hypodermic syringes and two were shown: one straight, one at an obtuse angle. The needles were very short in comparison to the hubs which were long. “These points are made in the most careful manner, of the best quality drawn steel tubing, and nickel plated.” Seamless needles
are here first mentioned. The needles were very short because in the 1890's from four to six injections in the gingiva around the neck of the tooth to be extracted was the recommended technique. In 1901, The Buffalo Dental Manufacturing Company offered hypodermic needles described as being made of seamless carbon steel, but no indication was given of their gauge or length. (Fig. 7) In 1911, the Marshall Dental Manufacturing Company also manufactured similar needles, and sold Dr. R. B. Waite's improved syringe as well as the Hercules dental syringe.

Fig. 7. Needles manufactured by the Buffalo Dental Mfg. Co. in 1901.

THE SEARCH FOR A BETTER ANESTHETIC

Dr. R. B. Waite, founder of Antidolar Manufacturing Company, produced cocaine hydrochloride solutions for the dental profession in 1891. In 1901, E. Mayer suggested the addition of adrenalin to promote vasoconstriction. However, the enthusiasm which followed the introduction of cocaine was short lived because it soon became apparent that this drug was highly likely to produce addiction.

Cocaine was first introduced commercially in solution, powder or tablet form. Stock solutions deteriorated rapidly and preparation was time consuming and inaccurate. And although many dangerous systemic effects were noted from the use of cocaine, it continued as a local anesthetic until 1905, when a synthetic substitute, procaine hydrochloride, was invented in Germany by Alfred Einhorn who had first synthesized it the year before. It was introduced into the United States under the trade name "Novocaine" in 1907. This compound had a low degree of toxicity and was not addictive; unfortunately, it had a vasodilating property which decreased its potency and duration of action. This was overcome by the addition of adrenalin, first synthesized in 1904 by Stolz. The concentration of vasoconstrictor used in those early days was 1:20,000.

TEXTBOOKS ON LOCAL ANESTHESIA MAKE THEIR APPEARANCE

Dr. Guido Fischer of Germany first described modern injection technology in his book *Local Anesthesia in Dentistry* which appeared in Ger-
any in 1911 and in English translation in the U.S. in 1912. He described and illustrated (Fig. 8) his glass and metal injection syringe, which eliminated the leather piston, and recommended needles with five different lengths, from half an inch to 1 1/8 inches, which could be used for various procedures. They were made of iridio-platinum because of the greater degree of safety and longevity. The book immediately became a classic. Although others advocated differing lengths and gauges of needles, standardization was at length beginning. As a result of Fischer's book, dental catalogues in America began to advertise needles of various lengths and gauges. Another important publication in the field of local anesthesia in dentistry was Oral Anesthesia: Local Anesthesia in the Oral Cavity, by Kurt H. Thoma, 1914. Thoma advocated using the Fischer syringe with a 27 gauge platinum needle, but with two needle lengths: one inch and 1 1/4 inches.

With Fischer's and Thoma's work, we begin to have a standardization of technique, as well as a standardization of needle length and gauge. By the 1940's, needle lengths of 1 inch and 1 1/8 inches became the standard, and have remained so till today. In a like fashion, the 25, 27 and 30 gauge needles have become the standard. Herman Prinz, writing in the third edition of A Textbook of Operative Dentistry, (1916) stated that dental hypodermic needles should be 26 to 28 gauge and have a short razor edge point. He stated that thicker needles caused unnecessary pain while thinner needles were liable to break, and preferring iridio-platinum needles, but also recommending nickel steel. To allow the needle to penetrate the tissue easier, he suggested coating it with Vaseline. Today's disposable needles are silicone coated. Prinz also stressed that needles should be sterilized after each use by boiling in plain water, then dried with hot air and immediately transferred to a covered sterile glass dish.

Although needles for the various available syringes were becoming standardized, there were some variations. C. Edmund Kells in his Three Score Years and Nine (1926) advocated the use of a needle 7/8 inches long and 28 gauge. In 1929 and 1930, advertisements appeared in dental journals for dental needles from Ransom & Randolph Co. and Bectin & Dickinson Co. One ad referred to the stainless steel dental needle, which had just been introduced, and which claimed it to be rust resistant, flexible, strong and sharp. Another ad was for carbon steel needles, which were chrome plated, claiming that this needle had no "feather edges" because it was plated after it was sharpened. These ads stated that needles were available for cartridge syringes as well as others. The needles here advertised were available in gauges ranging from 23 to 35 and in lengths from 7/8 inch to two inches.

During World War II, the military dental corps attempted to standardize the lengths and gauges of needles, because there were more than eleven lengths available, but were not successful in doing so. In the 1947 Union Broach Company, Inc. catalogue, we find needles of only two lengths offered: one inch (short), and 1 1/8 inches (long), the standard lengths today. These needles were offered in 23 and 25 gauges — (higher gauge needles came later) — and came in the cartridge type and in the Schimmel type. These stainless steel needles were said to have eliminated the element of risk which the dentist faced in injecting local anesthetics, and claimed that the needles were practically unbreakable, and would resist corrosion not only from air...
and water, but also from acids and salts. These needles were made of seamless stainless steel tubing with a uniform wall thickness to provide additional strength and rigidity, were spearpointed, hand finished to a fine razor edge and considered reusable.

THE DISPOSABLE NEEDLE

The development of the disposable needle began in World War II when the Mizzy Company was asked by the Armed Forces to make 50,000 disposable needles for Squibb, who made a collapsible toothpaste-type tube to which the needle was attached. The tube was filled with morphine and used for self-administration. The first disposable medical needles for injection were put on the market in the mid-1950’s.

The sterile disposable dental cartridge needle was introduced in 1959, both by The Cook-Waite Laboratories and The Roehr Products Company. These needles were manufactured to be used once and discarded. They were simply a modification of the reusable cartridge needle, standardized and mass produced to reduce the cost. In the early 1930’s, the price of dental hypodermic needles was about $1.75 dozen; today they sell for about $6.50 per 100. The Cook-Waite needle was designed for use with a specially adapted syringe, while the Roehr disposable needle would fit any of the cartridge syringes available at the time. The needles were available in the two most popular lengths — 1 inch and 1 3/8 inches and two gauges — 25 and 27. The sterile disposable needle became a necessity once it became known that it was impossible to sterilize the inside of a hypodermic needle. Additionally, since disposable needles were used only once, they were always sharp and caused less pain.

The reusable needle consisted of two parts: a hub or adapter, and the needle with a nickel silver ball. In the disposable needle, the ball on the needle was eliminated and the hub became an integral part of the needle. The needle was enclosed in a plastic container, which also served as a wrench to screw on the needle and remove it after use. Today’s disposable needles are available with plastic or metal hubs. They are still available in 1 and 1 3/8 inch lengths and in 25, 27 and 30 gauges. Disposable needles are also manufactured with a variety of bevels: micro-sharp, unimpaired sharp, long bevel, medium bevel and short bevel. In the 1970’s, the Graham Chemical Corporation introduced the sterile needle and cartridge in an all-in-one sealed unit.12,3

THE PRESSURE SYRINGE

Edward C. Briggs, of Boston, first used pressure anesthesia in dentistry in 1890.4 Several high pressure “obtunding” syringes then became available. They were loaded with 4% cocaine solution and were used for desensitizing teeth for cavity preparation and pulpal anesthesia. A small hole was first drilled into the dentine and the needle was fitted snugly into it. Great pressure was then applied in the syringe in an attempt to force the cocaine solution through the dentinal tubules. The Flaherty pressure syringe was
introduced in 1894; the Wilcox-Jewett in 1905; the Gunthorpe in 1912 and the Meyers in 1921.

DEVELOPMENT OF THE CARTRIDGE SYSTEM

The interchangeable barrel hypodermic syringe became the forerunner of the cartridge system. Prior to the expanding plunger hypodermic syringe, the leather packing of the piston was difficult to repair when it became dry, shrank and did not fit inside of the barrel air-tight. If the dentist was unable to readjust the leather packing of this syringe, so that the piston could be made to fit the barrel as desired, it would have to be sent back to the manufacturer for repair.

During World War I, Harvey S. Cook, a physician and army surgeon, conceived the idea of putting vaccines in glass cartridges, like rifle cartridges, which would be loaded into a syringe like the .30 caliber rifle cartridges were loaded into a breech-loading single-shot rifle. This was a breech-loading syringe. It wasn't until years later that a side loading syringe was developed. Cook was probably influenced by metal syringes with glass barrels, such as the Fischer syringes, which were already on the market in 1915. Prior to World War I, dentists' solutions were either mixed as needed, with the anesthetic supplied in powder or block form and diluted, or were in ampules. The ampule was broken at the tip and the solution drawn into the syringe through the needle, much as is done today with many injectible medicines. Harvey Cook's syringe was made of brass. His cartridge system utilized a double ended needle. He cut the glass tubes from ordinary glass tubing and used rubber stoppers which he made from pencil erasers. He was then able to vaccinate his patients quickly.

Sterile epinephrine/procaine solutions had been introduced in ampule form in 1914. The cartridge and double-ended syringe needle were introduced to the dental profession around 1921 by the Cook Laboratories of Chicago (Fig. 10) Dental cartridges were half the size of the medical ones and contained 2.2ml of solution. The cartridge system was immediately accepted by the dental profession and still is the system used. The metal-capped cartridge was introduced by the Novovol Chemical Mfg. Company, in 1932, with the stated advantage that this metal enclosure could be flame sterilized just before using. Vacuum-packaging of dental cartridges was introduced in 1935 by the Novocol Chemical Company. This innovation prolonged the shelf-
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Fig. 10. The Cook syringe as advertised in the Dental Cosmos for December 1927. This type of cartridge system became widely accepted by the dental profession and has remained so to today, now being used with a sterile disposable needle and cartridge.
life of the prepared anesthetic solution, and insured higher potency with less chance of deterioration. The anesthetic solutions themselves gradually underwent an improvement: Monocaine was introduced in 1937; lidocaine (Xylocaine) in 1949; Primacaine in 1954; mepivacaine (Carbocaine) in 1960, and most recently in 1983, bupivacaine (Marcaine), an extremely long acting local anesthetic.

THE ASPIRATING SYRINGE

One of the first Cook syringes sold to the medical profession in the early 1920's was an aspirating syringe. Dentists at that time felt that it was unnecessary to aspirate, because of the small area into which they were injecting. Therefore from the 1920's until the 1950's, the most popular dental syringe was the breech-loading cartridge syringe. In 1948, the Novocol Chemical Manufacturing Company Inc. introduced the first dental aspirating syringe. It had a screw end on the syringe plunger and a screw hole in the cartridge. With this improvement, the technique of aspiration before injection was feasible, especially when the Mizzy Company introduced an aspiration cartridge which was usable in any cartridge type syringe. Cook-Waite Laboratories introduced the harpoon-type syringe for aspiration in 1957 (Fig. 11).

NEWER INSTRUMENTS AND TECHNIQUES

The self-aspirating syringe was first seen in the United States in 1981, and is becoming increasingly popular. Self-aspiration is caused by creating a negative pressure within the cartridge, which is achieved through the following sequence of events: the syringe has a metallic sleeve at the needle end of the barrel which causes pressure to the diaphragm end of a cartridge when the thumb-disc is squeezed toward the finger-rest. This causes the diaphragm to stretch and when the disc is released, a negative pressure is thus created within the cartridge causing automatic aspiration. While injecting, the diaphragm is also stretched, and when the injection phase stops, once more a negative pressure is created and automatic aspiration takes place. Also available on the market today are several types of plastic dental aspirating syringes. One is a plastic version of the usual metal syringe, while another is autoclavable and half-reusable, with the other half being disposable. The first jet-injection instrument for local anesthesia, The Hypospray, was developed by Robert P. Scherer and his associates in 1947. It forces sterile liquid medication through the skin in the form of a fine column or jet of almost microscopic size. The cross-sectional area of this liquid column is 1/37 of a 26 gauge needle. Oral injectors came into general use.
extra-short, .30 gauge needle, which is inserted about 2-3mm into the tissue adjacent to the periodontal space and releases 0.2 cc of the anesthetic solution under pressure over a 20 second period, which allows for hydrostatic movement of the anesthetic to the periapical region of the root.19 (Fig. 13) Although the technique of intraligamentary anesthesia was reported by Cassamani in 1924, recent techniques produce single tooth anesthesia by pressure injection into the periodontal ligament space. We know that the P.D.L. is about .25 mm wide, and is composed of connective tissue that runs from the osseous tissue to the tooth surface connected at both ends by Sharpey's fibers. These syringes either work by a lever or a pistol grip design. For example, the Ligmaject, by Healthco, Inc. uses a special, extra-short, .30 gauge needle, which is inserted about 2-3mm into the tissue adjacent to the periodontal space and releases 0.2 cc of the anesthetic solution under pressure over a 20 second period, which allows for hydrostatic movement of the anesthetic to the periapical region of the root.19 (Fig. 13)

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Historic Insights on Dental Radiography

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The article presents the development of conventional radiography including its early years, radiation injuries, the development of X-ray equipment as well as the film used and the acceptance of the X-ray by the dental specialties. Unfortunately, the dental profession was slow to recognize the potential of this wonderful new tool while the few pioneers in the field who did suffered needless martyrs' deaths because of ignorance of the need for adequate safeguards.

Wilhelm Conrad Roentgen discovered the X-ray on November 8, 1895 in Wurzburg, Germany. He began his experimental work with the high vacuum tube in the late 19th century by duplicating the experiments of others in an extended manner and hence "... was able to present the world with one of the most finished or practical discoveries made by man."1 News of Roentgen's discovery spread rapidly outside Germany. However, improvements in the X-ray equipment were needed and it is regrettable that many early dental pioneers who worked with the rays suffered from the effects of exposure. Nevertheless, warnings regarding their hazards began as early as 1898.2–3

Within two weeks of Roentgen's discovery, Otto Walkoff in Brunswick, Germany, created the first intra-oral radiograph. Using a glass photographic plate wrapped in black paper and covered with rubber dam, this radiograph was a cross between the present day bitewing and periapical projections, and required an exposure of 25 minutes!4–5 The news media picked up the discovery of X-rays and broadcast it internationally by January 1896. Although a plethora of articles, books, poems, and cartoons about X-rays appeared in 1896, not all were favorable. Oft times, the popular magazines reflected a pessimism, fear and ignorance; the Pall Mall Gazette of that year said:

"We are sick of the Roentgen rays. It is now said, we hope untruly, that Mr. Edison has discovered a substance — tungstate of calcium is its repulsive name — which is potential, whatever that means, to the said rays. The consequence of which appears to be that you can see other peoples bones with the naked eye, and also see through eight inches of solid wood. On the revolting indecency of this, there is no need to dwell. But what we seriously put before the attention of the Government, is that the moment tungstate of calcium comes into anything like general use, it will call for legislative restriction of the severest kind. Perhaps the best thing would be for all civilized nations to combine to burn all works on the Roentgen rays, to execute all the discoverers, and to corner all the tungstate in the world and whelm it into the middle of the ocean. Let the fish contemplate each others bones if they like, but not us."6

Additionally, a bill was introduced into the House of Representatives in New Jersey prohibiting the use of X-rays in opera glasses at the theatre. In London, England, a firm advertised the sale of "X-ray Proof Clothing" for women!

The pioneers, however, continued undaunted. Frank Harrison of Sheffield, England, constructed a special vacuum tube for dental use, as announced to the British Medical Association in January, 18967 while William Rollins of Boston invented the first X-ray tube arm and bracket for dental use by
July. This unit included an adjustable lead diaphragm and protective screen; however, it was never commercially produced. C. Edmund Kells demonstrated his X-ray apparatus and methods for taking “skiagrams” to the Southern Dental Association at Asheville, North Carolina, and established the first Roentgenographic clinic in the United States in July, 1896. Dr. Kells has been considered the first dentist in the world to use dental X-rays chairside.3,9

Dentists first read professionally of the “X-ray and Its Application to Dentistry” in the Dental Cosmos for June, 1896. In this article, William J. Morton stated that X-rays could

“... greatly aid the art of dental surgery. Radiographs open out to you a wondrous field for investigation and study. Each errant fang is distinctly placed; teeth before their eruption stand forth in plain view; an unsuspected exostosis is revealed; a pocket of necrosis, of suppuration, or of TB revealed. Extent and area of metallic filling are sharply delineated. Most interesting is the fact that the pulp chamber is beautifully outlined.”10

This nicely concurred with the work of Julius Albrecht of Frankfurt, who in March, 1896, had stated the following four indications for “X-ray photographs”: 11

1. It is possible to determine the position of an emerging third molar and as required, remove it;
2. It can be determined if there is any damage in the case of persistent milk teeth, and in general to clarify the situation of the permanent teeth and their location at an early point in time;
3. Possible denticles can be detected and root anomalies or fractures can be identified;
4. Possible bone fragments with persistent pus secretions can be detected.

Although he recognized their diagnostic value, Albrecht felt that the use of X-rays would be limited by the major difficulties involved in making the “X-ray photograph”. This is apparent when one considers that the early X-ray systems had separate major components (i.e., the X-ray tube, stand, and high voltage generator).12 In addition, there were inconsistencies with the vacuum of the X-ray tube, as pointed out by Morton:

“. . . Sometimes the vacuum of the Crookes tube is good and sometimes bad. There are times when its force is wondrous and thirty feet away you can detect the X-rays and at other times, you can get nothing out of it.”10

While dentists were discovering and deciding on the diagnostic value of radiographs in this first year of discovery, another profession was to acknowledge their value. The first use of radiographs in a criminal case occurred when the Court of the Queen’s Bench in Montreal, Canada, accepted as evidence a radiograph showing the position of a bullet in a man’s leg in March, 1896.3 In the United States, radiographs were admitted as evidence first in a civil case (alleged medical malpractice: Smith vs Grant) in 1896, and in the first criminal case in 1897, when radiographs revealed “... a foreign body lodged in the victim’s neck” in the Haynes murder trial.13 This legacy of radiographs as legal documentation has haunted the dental profession ever since. As A. Porter Sweet was to say in 1938,

“Only when all dental schools have added to their curriculum a good course in radiodontic jurisprudence will the profession as a whole realize
the importance of this aspect of dentistry. This course should present the subject to the student in such a manner that he will realize not only the value of the Roentgenogram in diagnosis, but also its usefulness in preventing and defending malpractice suits."

RADIATION INJURIES

An unexpected sequela of dental X-rays was announced on July 14, 1896: radiation-induced injuries. Harrison reported that his assistant had several 10 to 14 minute exposures over a four-week period, after which he complained of itching, stinging, and red areas on his face. Several days later, desquamation of the skin occurred, some hair fell out. Radiation injuries continued to be reported in 1897, when cases of skin lesions were documented, and the effect of radiation on deeper tissue became apparent. It is such a case of radiation dermatitis that prompted E.H. Grubbe, an early experimenter with, and manufacturer of, the Geissler and Crookes tubes, to seek medical treatment in January, 1896. Although unable to think of a remedy, his physician felt that “... any physical agent capable of doing so much damage to normal or healthy tissue might offer possibilities if used in a therapeutic measure, in the treatment of pathologic conditions in which pronounced irritative blistering or even destructive effects might be desired, as with cancer, lupus or indolent ulcers.” This led to two patients being entrusted to Grubbe’s care: one for carcinoma of the breast and the other for lupus vulgaris. Thus within 60 days of Roentgen’s discovery, radiotherapy was born in a Chicago factory.

Rollins advised caution with the use of X-rays as early as 1898. He recommended the use of radio-opaque glasses, enclosure of the X-ray tube in a lead housing, and protection of the patient by covering those body areas not being clinically examined. His advice went sorely unheeded. Rollins would have agreed with Dennis’ statement of 1899 that “... this potent energy had come to us with healing on its wings; it should be generated intelligently and cautiously, or not at all.” The British Roentgen Society did indeed appoint a committee to investigate radiation hazards in 1898.

Despite the fact that exposure times for ordinary dental radiographs had been cut down to 60 to 90 seconds, and to 120 seconds for a third molar exposure, medical X-rays still took upwards of two to four hours for an abdominal film, and burns and loss of hair continued to be reported. Kells felt that the rays were carrying infectious matter from the surface, and therefore recommended scrubbing the surface with soap and water prior to exposure. Another probable cause of these injuries was thought to be static electricity, and it was recommended that aluminum shields be positioned between the tube and the patient in order to ground the electricity. This latter suggestion would become a recommendation by the National Committee on Radiation Protection for a 1-2 mm layer of aluminum as filtration for the dental X-ray tube. Although it does not ground electricity when operating at 65 KVP, it does effectively filter out the lower energy X-rays which are too weak to reach the film, but whose energy would be dissipated in the soft tissue.

Meanwhile, Rollins continued his one-man war against radiation injuries. In 1901, he experimented with guinea pigs by exposing them for two hours per day, finding that they died after the eighth day of exposure. He concluded the cause to be radiosensitivity, and warned against exposing pregnant women to radiation. His work was challenged, his detractors claiming that he had used “weak” guinea pigs. He continued his experiments by using “strong” guinea pigs, but to no avail: his results remained the same.
His concern for radiation safety was to be justified, when in 1902, the first malignancy due to radiation exposure was reported. The exact nature of this malignancy, however, was not given.21

Many early roentgenologists refused Rollins' evidence that X-rays were the causative agent for the inflammation of the skin that followed prolonged exposure to X-radiation. They persisted in thinking that the damage to the skin was due to the electricity given off by the operating tube. The experiments of Robert Kienbock of Vienna refuted this thinking when he concluded that it was not the electricity, but rather "... the X-rays themselves which were the cause of all the mischief and that those given off with low-vacuum tubes were more dangerous than those from a high-vacuum tube."22 By 1904, it had been reported that no cases of burns occurred with exposure times of less than 20 minutes.

In 1907, Kells enumerated the various injuries resulting from radiation exposure and their treatment. These included the following:

1. Burns of first and second degree — treatment no problem;
2. Burns of third degree - erythema within 24-48 hours; may need grafting;
3. Delayed burns;
4. Keratosis;
5. Dermatitis — usually yielding to treatment;
6. Ulcerative dermatitis — prognosis poor;
7. Carcinoma

It is ironic that Kells foreshadowed his own bleak future in this article.23 After numerous debridment and grafting operations and amputations, unable to practice his profession, and in excruciating pain, he shot himself on May 28, 1932 in his dental office.24

DEVELOPMENT OF X-RAY EQUIPMENT

What was it that made these early X-ray systems so dangerous that many of those early roentgenologists condemned themselves to such ignoble deaths?

The first X-ray pictures were made with simple ion tubes containing gas evacuated with techniques first discovered in 1839 by Heinrich Geissler. Later improved by William Crookes in 1875, these high-vacuum tubes would offer resistance to the passage of electrical current, and contained a cup-shaped cathode to focus the rays. It was Herbert Jackson's tube design of 1894 that became the pattern for X-ray tubes for many years. He focused the rays with a cup-shaped cathode onto a platinum "anticathode" placed at a 45 degree angle. A selection of these gas tubes was needed by these early operators since none performed consistently because the degree of vacuum would change with use.25-26 Positioned on varying types of stands, these tubes were attached to a high voltage electrical source derived from a DC power line or a battery. Interruptors were used to generate an induction pulse, and the open spark path was used to determine the strength of the radiation. If the vacuum was too high, the current would jump the spark gap instead of passing through the tube. The operator determined the operation of the unit by the hum of the coil and the appearance of the spark passing across the adjustable atmospheric spark gap.27 The ideal spark for dental exposures was considered to be four to seven inches long with a fuzzy, caterpillar-like appearance.8

Once the vacuum of the tube was sufficient, the quality of the X-ray beam could now be "dosed" or set using the Edison fluoroscope. This screen of
calcium tungstate crystals was surrounded by a cardboard tube, and could be brought up to eye level. To calibrate the unit, the left hand of the operator was interposed between the tube and the screen, and the X-ray unit started. The rheostat was adjusted until the bones of the hand were shown clearly. When the X-ray beam was deemed operable, the patient could be position-
ed and the radiograph taken. All these early radiographs were taken with the patient in a prone position. Since this calibrating procedure was required for each exposure, it is clear why hand radiation burns were common. The use of the operator's hand for calibration was fortunately replaced with Carl Beck's osteoscope, which was a skeleton hand attached to a board.

These gas tubes evolved slowly. By 1905, a partially lead-lined tube featur-
ing a collimator for intraoral films was commercially produced. Named the “Record”, it was manufactured by the Reiniger-Gebbert-Schall Company of Erlanger (predecessor of the Siemens Corporation), and was considered to be the first commercially available X-ray unit.

Each new design of the X-ray tube necessitated modifications and im-
provements in the devices to hold the tube, as well as in high voltage and radiation protection. By 1912, a special stand became available for radiographing the jaws, and it had a lead-lined glass hood for additional protection. Other stands even had the ability to take stereoscopic radiographs, using a technique presented in 1905 and used sporadically until the 1950's.

The high voltage protection of these newly evolved stands was considered adequate as long as sufficient distance was maintained. But upright posi-
tioning of the patient decreased this distance, and presented new threats. Shocks from exposed wires were not uncommon, causing severe and even fatal burns. For example, Dr. C.L. Cope had “... an accidental contact with one of the tube terminals. The point of entry of the high tension current was directly over the doctor's heart, causing tonic spasm of that organ and im-
mediate death.” Perhaps it was fortunate that less than a dozen dentists were actively involved in taking radiographs up to 1909. When dentists desired radiographs, their patients were referred to “Roetgen Studios.”

A major improvement in the X-ray tube occurred in 1913, when Coolidge introduced the “hot-cathode tube”. Electrons were generated by an incandes-
cent cathode, which thus eliminated the necessity of a gas tube. It also employed a tungsten target, and had an independent control for both X-ray quality and quantity. Waite's patent of 1919 for an oil-immersed tube and transformer allowed for both electrical insulation and tube cooling, and led to the introduction of a “shock-proof” unit in 1923. Introduced by Victor X-
Ray of Chicago (the predecessor of General Electric), it was known as the Victor CDX. This unit combined all three components, i.e., tube, stand, and high-voltage generator into one system, and minimized hazards by providing insulation for the 60,000 volt electrical wires. This improvement allowed for production of smaller, easily manipulated units, with simplified radiation protection.

Few modifications have been made in X-ray systems from this point on. Coolidge developed the multisection cascading supervoltage roentgen tube in 1931. Fixed voltage and current strength had been introduced in 1930 with the Phillips Metalix to further simplify the technology. The 1950's saw the introduction of electronic timers, better beam collimation, and filtration techniques. As a whole, however, the basic unit remained unchanged until 1982, when S.S. White introduced the Interex. A constant potential supply X-ray generating unit, this improvement has two advantages over previous
X-ray units, decreased exposure time and decreased total amount of lower energy photons.

**FILM DEVELOPMENT AND TECHNIQUE**

Acceptance of X-ray units by the dental profession also depended on the recording media undergoing a series of developmental changes. The early roentologists had three choices of materials: gelatin-based snapshot film, glass photographic plates, and celluloid-based films. Gelatin-based snapshot film was made with two emulsions, and was in use until 1901. Little is known about it except that it was supplied in black envelopes. Few references discuss this film.

Glass photographic plates of this era were designed for photography, and were more sensitive to light than to X-rays. They also lacked sufficient speed, density, and contrast to be very diagnostic. Edison substituted calcium tungsten crystals (of Pall Mall Gazette fame) for the previously used platino-barium crystals to increase sensitivity. However, the grain size of these crystals made details difficult to discern. The plates were protected from light with black rubber dam. These plates remained in use more in medical than in dental radiography, until World War I, since the special glass for them was made in Belgium and became unavailable.

Celluloid film seems to have been the most popular medium for dental radiography. Produced in large celluloid sheets which required cutting down to usable size, these sheets had an emulsion which was easily damaged and which peeled off. Additionally, the nitrate base was highly flammable and explosive. This latter problem was eventually solved in 1924 with the introduction of cellulose acetate-based Safety Film by Eastman Kodak.

How did one go about making a radiograph from this celluloid film? Norton addressed this problem:

> The way I devised was to cut a pattern in gutta-percha or cardboard or anything that the patient could wear in the mouth without gagging too much. If they gag too much, I use the cocaine spray. Having cut this pattern, I took it to the dark room and cut the film in the same shape and folded it into three folds of paper, and then ran it into a pocket of gutta-percha tissue and adjusted it to the roof of the mouth.

Kells did essentially the same, except that instead of designing a pattern in the mouth, he took an impression and made a vulcanite plate with a pocket to act as the film holder. Hunstadbraten mentioned the use of “bite-guides”, which were in use in Germany in 1897. These horse-shoe shaped mouth pieces had an inner part of rubber which could be inflated to press the film against the upper jaw when the patient closed. Fortunately, Kodak introduced a hand-made, pre-packed dental film in 1909, which consisted of two single, coated, X-ray films, wrapped first in black paper and then in a moisture-proof, waxed red paper. Martin claimed 1913 for the introduction of commercially-packed films.

Report of malignancies raised some concern about dentists holding the film. Protective gloves were recommended but not considered practical. An alternative to this was offered by Tousey in 1908, who used a horizontal occlusal film which would be retained when the patient closed. Specially designed occlusal film was introduced in 1917, and remains in use today.

Another notable development was “radiatized” dental x-ray film. Introduced in 1926, this double coated film had a very fine-grained emulsion and allowed greater contrast than previous films. Bite-wing film with rounded
corners and attached bite wing was introduced in 1925, but was not radiati-
zed until 1945. Eastman Kodak introduced Ultra-Speed periapical film in 1941,
and Ektaspeed in 1981.37

One of the most significant and important techniques in dental
radiography, the bite-wing radiograph, was also the most controversial when
it was introduced in 1925 by Howard Raper in collaboration with Kodak.
Enabling the early diagnosis of interproximal caries, the bite-wing radiograph
was recommended for preventing the occurrence of pulpless teeth, a critical
and dreaded event in an era when the theory of focal infection was still prop-
ounded. The following reveals the deep concern with which Raper viewed
pulpless teeth:

The disease, dental caries, attacks the hardest structure in the body,
the enamel of the teeth, and destroys it just as a cancer may destroy the
soft tissue of the nose.

Thinking of disease, then, as a local death and the disintegration of
tissue, which if unchecked leads to death of so much tissue that the
organism as a whole dies, let us note the progress of dental disease.

It has an auspicious beginning, attacking and destroying, as I have
said, first the hardest substance in the body, the enamel and then it im-
mediately attacks the next hardest tissue, the dentin.

If unchecked, the destructive activity, this death process, next attacks
the pulp and destroys it.

Then it passes through the tooth out into the bone, and destroys the
bone. Always the same: this disease, this something I have called the
death-process, always the same in that it is progressive death and destruc-
tion of vital tissue.

From the bone, it spreads to any part of the body: to the kidney, caus-
ing nephritis; to the stomach, causing gastric ulcer; to the joints, to the
heart, to the eye, almost everywhere. It seems probable that even the
carrier itself, the blood, may be attacked causing erythrophemia and other
degenerative changes.

What I am saying is, of course, not new. But the way I present it is
perhaps individualistic, and I want you to get the idea of the death-process
as a moving thing, entering the tooth, going through it and so into the
bone and the body.

It is our duty as dentists to keep this death-process out of the body.

How?

Once it has gone as far as to destroy the pulp, or farther, can we always
stop it with certainty, keep it from reaching the vital organs? We cannot.
Not today. Perhaps tomorrow. But not now.

Can we stop it when it is in the stage of dental caries, before pulp
involvement? WE CAN.

Then in the name of common sense, and for the sake of humanity,
why don't we?

I believe we will in the future.38

It is ironic that a severe critic of the bite-wing was C. Edmund Kells, who
first introduced radiographs for use in endodontics, and had earlier recom-
mended their use in other specialties. He challenged Raper in the following
manner:

"The Bite-Wing packet (is) principally designed for the purpose of
detecting cavities in the tooth, but I believe that if an operator cannot
find cavities on the crowns of the teeth without the use of the ray, what
he needs is a competent dental assistant to make his examination for him
and not a roentgen-ray machine."9
The first bite-wing technique called for a five to seven film series, which included the anterior teeth. Raper recommended these radiographs be taken once a year for patients under 30 years of age, and every 18 to 24 months for patients over 30 years.

A little known publication by Bodecker and Bodecker in 1912, unfortunately without illustrations, appears to suggest the bite-wing technique, and precedes Raper who is generally credited with the invention of bite-wings:

"... The diagnosis of caries in its first state on the proximal surfaces of molars and bicuspidis is often difficult and frequently the patient complains of sensations at points where we cannot discover caries either with silk floss or explorer. Separation has to be resorted to in order to definitely locate the trouble. Sometimes the patient is not able to point out any single tooth in which he notices the sensation. To alleviate the useless separation of teeth in locating small carious spots, we have used the Roentgen apparatus. It would, nevertheless, be a useful expenditure of time and work to radiograph two to three teeth in the upper arch, and if no defect has been found, to repeat the same in the lower. We have, therefore, constructed a film holder by the aid of which the crowns of the bicuspidis and molars of one side can be photographed at the same time."

The Bodeckers did not pursue their idea further, and we do not know to what extent Raper was influenced by this article.

ACCEPTANCE BY THE SPECIALTIES

The final acceptance of X-rays by the dental specialists led a foremost dental historian to declare that "... no longer may the dental profession be accused of creating mausoleums of gold over a mass of sepsis."

This early use of the rays occurred within one decade of their discovery, and they were used for therapy as well as for diagnosis. The interpretation of the image on the radiographic film was complicated by the erratic behavior of the vacuum tubes and insensitive film. As stated by Weston A. Price at the International Dental Congress in Paris in 1900:

No part of the work requires truer skill than interpretation of the negative or the positive it produces. A most intimate acquaintance is absolutely necessary, not simply the anatomy but with relative densities.

The lack of training in interpreting dental radiographs in the dental school curriculum also hampered these neophyte radiodontists. Raper, in Elementary and Dental Radiology (1913), the first textbook on dental radiology, commented:

To learn to eat olives, one must eat them, so I am told. To learn to read radiographs, one must read them, and so let us pass to the next chapter wherein we shall study in a practical way, the reading of radiographs.

X-RAYS IN ENDOdontICS

Although Bourdet began the practice of extirpating pulps and obturating the root canals of anterior teeth in 1757 radiographic monitoring of this process did not occur until 140 years later. Kells reported on May 10, 1899:

I was attempting to fill the root canal of an upper central incisor for a little boy. It occurred to me to place a lead wire in the root canal and then take a radiograph to see whether it extended to the end of the root or not. The result was all that was anticipated. The lead wire was shown very plainly in the root canal.
Thus began the use of radiographs in Endodontics. In 1901 radiographs were suggested as a means of checking the adequacy of root canal fillings, and by 1916 Merrit proposed the use of three radiographs: a pre-treatment film, one after the "cleaning and sterilizing" with a wire in place, and a post-operative film. He felt that "... without the aid of the Roentgen Ray, it is impossible in any given case to be certain that the operation has been properly performed."^4

Various techniques were developed in the late 1920's using radiographs to accurately determine the root length to prevent traumatic injury to the apical tissues.\(^{53,54}\) The First District Dental Society of New York, in its Section on Pathodontia, resolved on December 17, 1928 that "... failure to take X-rays as an aid in the diagnosis and during the treatment of pulpless teeth is not in the best interest of the patient and that such a practice is considered questionable."^14

By 1936, Liebman recommended the use of pre-operative and post-operative exposures. He reasoned that the wrong angulation could obscure actual conditions, and suggested periodic radiographs for comparison with previous films. He cautioned that a radiographically negative tooth is no indication of the absence of infection.\(^{45}\)

Hartzell expressed the consensus of the endodontists in 1941: "In the treatment of pulpless teeth, frequent radiograms must be made and always a final radiogram must be made and filed to prove that all foramina are filled. Accurate radiographic records are absolutely essential to judge one's work."^42

**X-RAYS IN PERIODONTICS**

The first use of radiographs in the diagnosis of "pyorrhea alveolaris" was reported by Rollins in December 1896.\(^{46}\) The therapeutic use of X-rays in the treatment of periodontitis was in vogue in 1903. Guy reported a decrease in thermal sensitivity after twenty-one exposures to X-rays. Although a tin mask with appropriate openings had been used to prevent radiation burns to the face, Guy also reported severe hand radiation dermatitis, since he had overlooked their protection.\(^{47}\) Statterlee reported treating "pyorrhea alveolaris" and "facial neuralgia" with X-rays, noting both a marked analgesic effect and a decrease or elimination of pus.

(The) patient had a series of five to six treatments of three minutes each with X-rays and bi-ultra violet. At the end of this time all pus had ceased and the soreness had completely disappeared. After a somewhat protracted series of treatment, the patient was so much benefited that the teeth were held much more firmly in the mouth. Since I stopped the sitting of this patient (almost a year ago) he has no return of pus, but has had an occasional soreness. This is removed with a single treatment of X-ray alone for three minutes.\(^{48}\)

Tousey in 1908 reported treating pyorrhea using one minute X-ray exposures on alternate days, of sufficient amount, but "... not enough to reden the skin or make a moustache fall out." He also used two to three minute applications of ultra-violet radiation in conjunction with these treatments. He claimed that the effectiveness of this combination was due to the elimination of bacterial infection.

The therapeutic use of X-rays in the treatment of periodontitis did not continue much beyond this time. However, the diagnostic value of radiographs in periodontia was challenged in 1920 by Kells. "In Periodontia
alone it (the Roentgen ray) can have but little value. The pyorrhea specialist, who cannot diagnose and sufficiently gauge its extent without the aid of The Ray, had undoubtedly better engage in some other specialty. This statement was refuted by Raper. "The periodontists themselves, as far as I know, seem to think the use of radiographs of great value in their work. The burden of proof that X-rays are of little value then rests with Dr. Kells."49

Fortunately, more dentists agreed with Raper than with Kells. McCormick in 1920 felt that radiographs could reveal the following: widened periodontal ligaments, alteration or obliteration of the periodontal lamella, granuloma, cyst, pyorrhea alveolaris, necrosis, osteosclerosis, and osteitis serratata.50

The "pyorrhea specialist" continued to appreciate the use the radiographs. By 1935, Simpson acknowledged the value of radiographs in showing the predisposing causes and incipient changes in periodontitis, as well as providing a graphic record of the disease process.51,52 Bite-wings were recommended to best reveal calculus on proximal surfaces and the exact level of the alveolar crest in all but advanced cases. He felt that radiographs exaggerated the density of the crestal bone in deep pockets by superimposing buccal and lingual plates, as well as exaggerating the depth of advanced pockets. The modern periodontist may evaluate the validity of this statement made in the 1930's.

X-RAYS IN PROSTHETICS

The value of radiographs in prosthetics was acknowledged early, but increased support did not occur until the 1920's, when Kells stated:

Even in prosthodontia there are times when it is well to be assured in advance that there are no buried root fragments or unerupted teeth to erupt later on and disrupt the value of the prosthetic appliance.49

Simpson felt that in cases requiring fixed partial dentures, a radiographic survey showed not only the length, inclination and bony support of the abutment teeth, but also the root canal system and periapical support. He felt that radiographs could assist in determining the character of the ridges, presence of roots, unerupted teeth or diseased areas, and the need for surgical preparation.52 In addition to these, Brotman suggested the following uses:53

1. Assess the parallelism between abutment teeth.
2. Study the size, shape, and length of the root.
3. Assess periapical pathology.
4. Assess pulpal proximity during tooth preparations.
5. Assess overhangs and seating of crowns before cementation.
6. Check the final restoration.

X-RAYS IN ORTHODONTICS

Anthropologists recognized the value of radiographs of the head taken in profile in 1896.54 Port, lecturing in Munich in 1899, noted the importance of radiographs for prognostic analyses and evaluation of data in orthodontic treatment. In the discussion that followed the lecture, a participant suggested that the dentist should orient himself in advance...of the position and location of the other molars by the systematic extraction of the six year molar.55

In 1900, McDowell proposed using radiographs to alter suggested treatment which had been based merely on clinical observation and models, to assess missing teeth, delayed eruption, supernumerary teeth, and abnormal permanent teeth.55

22
Soft tissue profiles were related to the underlying bony profile by Bergland in 1914 and in 1922. Pacini established a formula of proportion to arrive at the correct measurements of external radiographic landmarks. The year 1931 has been given as the logical starting date of radiographic cephalometry, the scientific measurement of dimensions of the living head. Broadbent, in his paper “A New X-ray Technique and Its Application to Orthodontia,” measured and recorded jaw changes in relation to the rest of the head. He designed a craniostat for positioning the head, and compared lateral and horizontal views of the same child at different ages, and found areas of non-growth which allowed a stable base for relating the tracing. Prior to this time, most orthodontists measured dental and facial deformities by the interrelation of the teeth and jaws prior to and following treatment. In 1937, Broadbent presented statistical data on three planes: The bolton-nasion, the porior-nasion and the sella turcica-nasion.

By the late 1930’s, Korkhaus had developed a systematic diagnostic evaluation of cephalometric films resembling present day analytical tracings, in which he compared the individual to biometric norms. The first Roentgenographic Cephalometric Workshop sponsored by the American Association of Orthodontists met in 1937 to formulate recommendations for using a standardized technique of radiographic analysis and its clinical application. This symposium resulted in the publication of the Syllabus and Manual of Roentgenographic Cephalometry.

**ORAL SURGERY AND ORAL PATHOLOGY**

Viewing “errant fangs” in their pre-eruptive state, i.e., impacted teeth, was one of the earliest uses of dental radiographs. Oral surgeons expanded the use of radiographs to include the diagnosis of temporomandibular joint disorders, salivary gland dysfunction, sinus diseases, and cancer. By 1908, cysts associated with the antrum were being identified by using bismuth gas in contrast radiography. Pfahler used extraoral lateral radiographs in the diagnosis of sarcoma. In a study of primary malignant tumors of bone conducted at the Mayo Clinic between 1909 and 1934, it was concluded that “... Roentgen rays (were) invaluable in the diagnosis, prognosis and treatment of certain types of tumors... and furnished the earliest knowledge of the presence of pulmonary metastases.” Bloodgood in 1932 discussed the use of X-rays in the diagnosis of malignancies:

“... No oral surgery survey is complete without the roentgen ray films of the teeth. Very often we must add to this roentgenograms of the sinuses... and of the jaw with lateral views of the skull and arches.”

The early radiographic studies of the salivary glands using contrast media were performed solely on cadavers. It was not until the 1920’s that sialography was undertaken on living subjects. Barsky is usually credited with the first published case of sialography on a human in 1925. However, Sicard and Forestier had reported a case using iodized oil injected into Stenson’s duct in 1921. Regardless of who was first, sialography remains a valuable tool in the diagnostic evaluation of the major salivary glands.

As early as 3000 BC, surgeons of the Old Kingdom in Egypt diagnosed and treated dislocations of the mandible. The Edwin Smith Papyrus contained the following advice:

If thou examinest a man having a dislocation in his mandible, shouldst thou find his mouth open (and) his mouth cannot close for him, thou shouldst put thy thumb upon the ends of the two rami of the mandible...
in the inside of his mouth and two claws (i.e., two groups of fingers) under his chin (and) thou shouldst cause them to fall back so that they rest in their places.\textsuperscript{64}

The era of radiography made visualization of the temporomandibular joint (TMJ) possible so that its anatomic relationship and pathology could be studied. Numerous studies of the TMJ had been undertaken in the late 1920's. Bishop in 1929 discussed and showed radiographs of "snapping joints" and of joints affected by trauma and infection.\textsuperscript{65}

Radiography of the TMJ has long been recognized as being difficult "... because of the superimposition of intervening structures. Interpretation, therefore, has been complicated by the fact that outlines of the joint parts were often indiscernible and lost in a maze of blacks, greys, and whites that appeared on the film."\textsuperscript{66}

A multitude of simple, satisfactory techniques were promulgated over the years to accurately capture the TMJ on film, including Sproull in 1933,\textsuperscript{67} Maves in 1938,\textsuperscript{68} Kurz in 1943,\textsuperscript{69} Updegrave in 1950 and 1953,\textsuperscript{70} and Williamson in 1976.\textsuperscript{71} Their techniques invariably used an angle board or a cephalostat and required multiple exposures. Other radiographic techniques for study of the TMJ included cinefluorography\textsuperscript{72,73} and direct magnification radiography.\textsuperscript{74}

A disadvantage of conventional radiography in studying the TMJ is the obvious fact that only the hard structures are visualized. The articular disc is not clearly delineated. Arthography was first proposed by Zimmer in 1941 to overcome this difficulty.\textsuperscript{75} However, he reported a limited and somewhat discouraging experience.

It was not until 1944 that a standard workable technique was proposed by Norgaard.\textsuperscript{76} Another disadvantage of the conventional transcranial radiographs of the TMJ is that they reveal only laterally located pathoses.\textsuperscript{77} Tomography, introduced in 1939, helped in overcoming this disadvantage.\textsuperscript{78} Arthrotopography was introduced in 1965.\textsuperscript{79}

From the forensic standpoint, Rollins in 1903 recommended the use of X-rays to identify decomposed or burned bodies.\textsuperscript{80} Dental radiography now plays a major role in the identification of human remains, as demonstrated by the identification of large numbers of victims of transportation accidents, natural disasters, fires, industrial accidents, mass suicides, and war time hostilities.

Dental radiography has come a long way from the early years, but new technology is appearing daily which will render our current methods obsolete. Future dentists may note our present radiology methods as quaintly as we have noted what has preceded us in the early years.

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Hans Sachs: Pioneer Periodontologist and Dental Historian

—Steven I. Gold, D.D.S.
Fishkill, New York

Hans Sachs, third generation in a family of European dentists, came to this country as a refugee from Hitler's tyranny. Although he had made notable contributions to both periodontology and dental history in his native land, his innovative treatments had a marked impact upon the profession in this country and his dental historical contribution received world-wide notice.

In a conversation with A.R. Henderson in 1973, Hans Sachs, then ninety-two years of age, stated: "... I became the very first specialist in one disease, pyorrhea alveolaris." The complete story of Hans Sachs was actually told by the pioneer in periodontics in 1967 in an article he wrote for Zahnarztliche Mitteilungen in which he recounted the beginnings of his distinguished dental family and their professional careers which spanned three generations. Sachs (Fig. 1) was associated with the leaders in German dentistry at the turn of the century in both Breslau and Berlin. Like his father before him, his dental education was completed in the U.S.A. Hans J. Sachs' professional life was an eclectic one. He practiced on two continents, and wrote a book detailing the cultural history of the toothpick that has become a sought-after collectors item. He collaborated with Oskar Weski in the development of modern periodontics and was a well known collector of 19th and 20th century poster art.

The end of the nineteenth and the early part of the twentieth century was a period that witnessed the development of most modern specialties
in medicine. These rapid changes, particularly in the surgical specialties, were the direct result of the development of reliable anesthetics, advances in pathology, improvements in microscopy, the acceptance of the germ theory of disease, the clinical use of x-rays in medical diagnosis and the early development of pharmaco-therapeutics.

HANS SACHS’ EARLY LIFE

Dentistry was no exception to this explosion of knowledge and young, ambitious dentists like Sachs expanded the horizons of dentistry more rapidly than ever before. The first dental schools emerged during the early part of the nineteenth century and it was only during the period under discussion, that the majority of these institutions became affiliated with universities.

Hans Josef Sachs (b. 1881-d. 1974) was born in Breslau, Germany where his father was a respected dentist. The father, Wilhelm Sachs, had in fact entered dental practice with his own father Josef Wilhelm who had come to Breslau from Mecklenburg where he had begun the study of dentistry at the age of thirty-eight.

Wilhelm entered his father’s practice in 1873 after returning from his dental studies in Philadelphia, Pennsylvania (Fig. 2). In 1876, shortly before earning his D.D.S. degree at the Philadelphia Dental College, Wilhelm had been employed at the S.S. White factory, fabricating dental instruments and prosthetic porcelain teeth.

His son Hans began his studies in the natural sciences in Berlin, eventually concentrating in chemistry at the University of Freiburg where he began studies in the chemistry of dyes. In 1904 in Berlin, he worked with the Dutch Nobel Laureate Van der Hoff.

Following these academic beginnings, Sachs, on the advice of his father, spent four semesters studying general medicine and physics before beginning his dental studies. The dental course was pursued in Berlin and Breslau where, beginning in 1908, Hans Sachs assisted in his father’s office. The completion of his dental studies took place in the U.S.A. where he had the opportunity to study orthodontics with Angle, crown and bridge with Peeso and, of greatest significance to Sachs, he began his studies of “Alveolarpyorrhea” with Dr. Robert Good of Chicago. Sachs described Good as the “master-student” of the famous W.J. Younger. The fledgling dentist considered Good his “getreuer Lehrer und guter Freund…” (trusted teacher and good friend) and remarked that what he saw in Good’s office in Chicago excited his interest in the treatment of a disease which “we in Europe were powerless to combat.”

Fig. 2. Calling card used by Hans Sachs’ father and grandfather in Breslau, Germany in 1873.
Sachs was anxious to return to Germany and begin treating patients in his father's office. He spent the next thirty years (1908-1938) engaged in research, teaching and writing about the clinical treatment of the disease which he had seen successfully treated in Dr. Good's office in Chicago. Sachs estimated that he treated more than two thousand patients during these years, authored six textbooks (Fig. 3) and wrote twenty-five articles for professional journals.

He was particularly proud of his association with Dr. Oskar Weski, a major figure in European periodontal research during the first quarter of the twentieth century. Weski's most important contribution was his conception of the periodontium as a functional organ composed of a group of dental hard and soft tissues he called the "paradentium". Weski invited Sachs and others including Robert Neumann (also of Berlin) to form the "Gesellschaft fur Paradontoseforschung" (Association for Periodontal Research) which lasted for fifty years but is now no longer in existence.

SACHS IMMIGRATES TO AMERICA

In 1937 political events in Germany resulted in Sachs, a Jew, being expelled from the German Dental Association and in 1938 he emigrated to the U.S.A. Upon arrival in the U.S. he was required, despite his international reputation and European credentials, to complete two years as an undergraduate dental student before being permitted to take his State Board examinations. He took the required courses at Harvard University and was awarded the D.M.D. degree in 1941. Sachs engaged in private practice in New York City for the next twenty-one years. His involvement in organized dentistry and teaching during these years was greatly diminished although he did publish the history of the three generations of Sachs dentists in 1966 in Zahnarztliche Mitteilungen. Sachs also edited a new edition of his historical monograph on the history of the toothpick which originally had been produced as part of a series of historical works under the editorship of his good friend Dr. Kurt Proskauer.

It is somewhat less well known that Sachs assembled one of the most extensive collections of art posters (plaqat) in the world. They numbered over...
SACHS’ INFLUENCE ON PERIODONTAL TREATMENT

The so-called “Sachs’ curettage method” was an empirical modification of the treatment method of W.J. Younger first described in 1897 and learned by Sachs from Good. The treatment was based upon the assumption of the local etiology of periodontitis. Calculus was considered the primary cause and its removal was the main focus of therapy. The Younger method used a series of curettes designed by him, and later modified by his followers (Fig. 4), to carefully remove calculus deposits from the root surfaces of two or three teeth per session using a 10% solution of cocaine as an anesthetic. Patients were taught oral hygiene using tooth brushes and various antiseptic rinses. Sachs, as one of the strong supporters of the Younger philosophy in Europe, also advocated the use of medicaments in the pockets after completion of mechanical therapy. The most frequently used solvent was 50% lactic acid, originally described by Younger. Other solvents included both organic

Fig. 4. The Younger-Good periodontal curettes first used by Sachs in Chicago in 1908.

Fig. 5. Sachs’ modification of Younger’s periodontal curettes.
and inorganic acids to flush out loose debris and granulation tissue, to dis-
infect the pocket and to open cemental channels for the insertion of connec-
tive tissue fibres.\(^9\) (Fig 5)

Sachs was a strong believer in meticulous oral hygiene and stressed the
significance of careful follow up treatment to preserve the health of the perio-
dontal tissues. In one paper he mentions a particular tooth paste “Solvolith”,
a preparation of a Dr. Hermann of Karlsbad. He apologized for the com-
mmercial promotion but again stressed the need for patient cooperation in
maintaining a good result. He also noted that “Solvolith” was acid free, safe
and thus felt justified in recommending it to his colleagues.\(^10\)

Other features of this treatment regimen included correction of system-
ic problems, fixation of loose teeth and removal of granulations. The follow
up period varied from patient to patient but these visits were scheduled at
least two or three times per year.

During the early years of this century, disagreement about both the etiol-
ogy and therapy of periodontal disease was even more vocal and conten-
tious than it is now. There were advocates of occlusal causes and therapy
like Arkovy. Others held that the disease process arose as a systemic problem
and still others pointed to a bacterial etiology requiring treatment by vaccine.\(^11\)

The major opponent of Sachs’ therapeutic methods in Germany was
Robert Neumann, who was also a student of the renowned Dr. Karl Partsch
of Breslau. Neumann was an advocate of the so called “Radical Surgical Treat-
ment” which relied heavily on surgical debridement and the elimination of
pockets.\(^12\)

SACHS AND DENTAL HISTORY

In 1913 Sachs’ colleague and close friend, Dr. Kurt Proskauer, conceived
of a unique series of monographs on dental history entitled \textit{Kulturgeschichte
der Zahnheilkunde in Einzeldarstellungen} and prevailed upon Sachs to write
the first volume in the series. This monograph was titled \textit{Der Zahnstocher
und seine Geschichte} (The Toothpick and its History) and was the first of several
volumes, all of which have become collectors items. The fourth in the series
was written by Proskauer himself. Titled \textit{Iconographia Odontologica}, it was pro-
bably the most famous.

The Sachs volume was based on his personal collection of toothpicks of
historical interest. This collection was broadened at the time of original
publication by the generous donation of the toothpick collection of Dr. Marc
Rosenberg of Karlsruhe whose extensive collection of antique toilet articles
contained more than eighty toothpicks dating back to the early Chinese
dynasties. These objects were displayed in a wall cabinet in Sachs’ private
office in Berlin from 1910 until 1938. They were then given to the “Deutschen
Zahnarztehause” in Berlin where they were thought to have been destroyed
by a bomb during World War II. Astonishingly, Sachs received word that
the entire collection survived and was on display at the “Deutschen Forschungs-
institut fur Zahnheilkunde” in Cologne.

\textit{Der Zahnstocher} was reprinted in 1967 with a new introduction by Sachs
which he wrote at the age of eighty-seven after retirement from active dental
practice. In the introduction to the reprint Sachs stressed the cultural,
hygienic and religious significance of these artifacts.

The other major contribution to dental history made by Sachs appeared
in 1966 and was the previously mentioned biographical sketch of the three
generations of the Sachs dentists: grandfather, father and son.
CONCLUSION

Whether or not a single person can ever be designated as the sole progenitor of the specialty of Periodontics, is in the final analysis a moot question. Certainly a good case can be made for both John Riggs and John Younger whose names were closely associated with the successful treatment of periodontal disease in an era when true specialization was unknown. Another case might be made for delaying this recognition until the creation of the American Board of Periodontology, which defined the specialty in North America in 1947.

After reviewing the life and contributions of Hans Sachs one is certainly impressed with his contributions to a then-emerging specialty. One which has now achieved a degree of status and recognition he hardly would have imagined in the years before World War I, when he went to Chicago to study with Dr. Robert Good. The contribution of Sachs is now largely forgotten by the current generation of dental practitioners who have little exposure, and less interest in the heritage of our profession.

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President Harry S. Truman's Dental Health

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Dental care of the famous has always intrigued us. Unfortunately, too little is known of the dental health of most American Presidents. Here, however, a bit of digging and personal communication affords us a glimpse of how one of our Chief Executives fared dentally.

Harry Truman, the 33rd president of the United States, served from 1945 until 1953. There are references that the dentist in charge at the White House during those years was Dr. Bruce Forsyth, but he may have served only in the capacity of being an administrative consultant for dental health affairs.1,2

The dentist most often associated with Mr. Truman during his younger years and while he was Senator from Missouri was Dr. George Arrowsmith. However, this association cannot be confirmed by local Kansas City dentists who were contemporaries of Dr. Arrowsmith.3 Soon after taking the oath of office, President Truman informally appointed Major Arrowsmith as his "personal dentist." During Dr. Arrowsmith's visit to the White House, the President said, "George, you've been taking care of these teeth of mine for a long time — about twenty-five years, I guess. How about continuing the job?"4

The dentist primarily responsible for the care of President Truman when he was President was Dr. George Moulton who had been assigned to the post by Dr. Wallace Graham, Truman's personal physician.5 Following his retirement in 1953, and after returning to Independence, Missouri, Mr. Truman frequently visited Dr. Lon Uhls, a general practitioner, and Dr. Farrell Webb, an oral surgeon.

The initial assignment for Dr. Moulton, who was a staff dentist from the Walter Reed Army Hospital and Dental Clinic, was to organize and equip a new dental office in the White House for the special use of the President. This office still exists, and news reports indicate that former President Gerald Ford made an emergency visit to the White House dentist in 1982.6

The first presidential dental visit by Mr. Truman was in the early part of 1950. He was examined, radiographed, and given a series of appointments. Dr. Moulton also was responsible for the dental health of Mrs. Truman, and
their daughter, Margaret, but he treated them only at Walter Reed Army Hospital.

According to Dr. Moulton, the President had, in general, good dental health, but there were some teeth that needed repair including a maxillary bridge and an upper crown. Several of the silver amalgam restorations had fractured, and others were overextended involving all surfaces giving evidence of many years of service. The bridge replacing the maxillary right second premolar and a crown on the upper right lateral incisor were removed and renewed. Noted on the patient's record was slight to severe gingival erosion on the labial portion of the mandibular incisor teeth. However, no treatment was indicated other than cleaning the teeth. In addition, the President was provided routine preventive care.

PRESIDENT TRUMAN AS A PATIENT

Dr. Moulton has many fond memories of Mr. Truman both as a human being, and as a special patient during his professional career. He was an ideal patient, and liked to talk about his historical experiences and his knowledge of history. He also had a great sense of humor, loved children and had great consideration for his fellow man. He truly appreciated having the dental work performed, and seemed at ease in the newly established White House dental office.

One of the tricks Mr. Truman played on visiting newsmen was to invite them to accompany him to the dental office. When he was seated, and someone would pose a question, he would remove the temporary crown from his upper lateral with his tongue and demonstrate the crown-less tooth to his audience, then laugh at their shocked reaction.

On another occasion, President Truman invited Dr. Moulton's son Bob to go out to the Senators' baseball stadium for "Opening Day" ceremonies. Life magazine of April 20, 1951 shows young Bob Moulton, standing in the presidential box as the President threw out the first ball. Bob still owns the autographed baseball that Mr. Truman gave him on that day.

When Truman left Washington, D.C. and returned to his home town in retirement, he resumed his dental appointments with Dr. Lon Uhls, who has an office in the Country Club Plaza. There are no available records on the care provided Mr. Truman from this point on until his death, except that he had some teeth removed by Dr. Farrell Webb.

An anecdote told by a contemporary of Dr. Uhls, Dr. Lester Gates, involves an emergency visit by Mr. Truman when he was Vice-President. It seems that a former classmate of Dr. Uhls' was passing through Kansas City, and called Dr. Uhls requesting an emergency appointment for his boss, President Franklin Roosevelt. Soon the caller gave his true name, and revealed he was not really associated with the President. However, a day or so later, Vice-President Truman, calling for himself, asked to talk to Dr. Uhls, and indicated an imminent trip to Kansas City, and asked for an emergency dental appointment. Dr. Uhls, thinking his old classmate was on the line, told the caller that he was too busy because he already had "President Roosevelt" in his chair and couldn't be bothered with a Vice-President. It took some pleading before Dr. Uhls learned the truth and set up a real appointment for Mr. Truman.

When he had to have teeth removed, Mr. Truman preferred the services of Dr. Farrell Webb, a friend of his who also had an office on the Plaza. Dr. Webb was one of the first oral surgeons to be trained at the Mayo Clinic,
and also one of the first to use I.V. Pentothal for patients requiring extraction or other oral surgical care. In a recent newspaper article, the widow of Dr. Webb tells of the trips by President Truman to her husband’s dental office. The doctor would summarily dismiss all the Secret Service agents, and see the President with only his nurse-anesthetist present. When the operation was completed, and Mr. Truman was able to leave, both enjoyed a snifter of bourbon, before his release.8

President Truman was deeply interested in good dental health for the citizens of this country. This is evidenced by his signing the first proclamation of a National Dental Health Week;9 he later signed a bill creating the National Institute of Dental Research.10

It will be for some future historian to obtain the final records of other Presidents as well, and secure a record of their dental health during their lifetimes. Perhaps the living Presidents, Nixon, Ford, Carter, and Reagan, will allow us to learn more about their current dental health so that the record will be complete.

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DR. CARTER is currently Editor of the Midwestern Dentist, organ of the Greater Kansas City Dental Society and the Explorer, official bulletin of the University of Missouri at Kansas City Alumni Association. DR. RAGSDALE is a dental historian who practices in Canton, Illinois. Requests for reprints should be directed to Dr. Carter. His address is 9804 West 103 Terrace, Overland Park, KS 66212.

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The Coming of Age of Dental Biological Research and Those Who Led the Way

—Charles B. Millstein, D.M.D., M.P.H.
Cambridge, Massachusetts

For most of its history, dentistry was concerned primarily with the mechanics of restoring decayed or missing dental structures. However, in the early years of the 20th century some far-seeing pioneers realized the necessity of approaching dental problems from a biologic standpoint. From this evolved modern dental research based on sound medical and biological foundations.

Early American physicians and surgeons thought that tooth loss was unavoidable and tooth decay unpreventable. Because of the high degree of digital skill needed for reparative and reconstructive treatment, and the indifference of the medical profession, this area of expertise was left to tradesmen with mechanical proclivities. The dental profession developed with only an incidental relationship to the art of healing.

In the early 19th century a few physicians who had been concentrating their efforts on dental disorders cooperated with a number of progressive dentists to try to improve the quality of dentistry by associating it with medicine. A true union never occurred and the first dental school in the world opened in Baltimore in 1840 as an autonomous college of dental surgery.

A CHANGE IN DENTAL ATTITUDE

Both professions continued in their failure to recognize the fact that keeping people healthy was their primary objective. There would remain little practical cooperation between the representatives of each profession.

By the beginning of the twentieth century advances in bacteriology, pathology and radiology greatly extended the knowledge of the relationship between oral and systemic pathological conditions. The question arose as to whether dentistry should become an accredited specialty of medicine or remain an autonomous health science. Becoming a physician-dentist meant a lengthier curriculum and a change in the medical practice laws. It was an impractical idea and the concept of a well-trained dentist with some medical background became the focus of dental educators.

By 1925 the health profession had mastered the reparative phase of caries control, but it could not keep up with the unmet need. One of its outstanding failures was its inability to discover methods for prevention of tooth decay and other oral disorders. The answers lay hidden in the biological secrets of the pathoses of the dentition as they related to the biology of the entire organism. Only when medical science could be used effectively on dental problems could these causes be discovered. However, the dental instructor often had little appreciation for a biology he did not know. The focus of his teaching skills was demonstrating the perfection of mechanical technique. Biologic research was almost non-existent and poorly funded in most dental schools. Even when the medical and dental schools used the same building, the medical researcher looked with disdain at the inadequate biological orientation of the research minded dental student and did little to help foster his inquiry. Therefore, if dentistry were to remain a true learned profession and not regress into a trade, it had to become a separate but equal partner in medical research.
THOSE WHO LAID THE GROUNDWORK

William Gies.

William Gies received his Ph.D. from Yale in 1897. At Columbia University he served as Professor and Chairman of the Biological Chemistry Department. During the years 1910-1918, he applied his skills as a biochemist to dental research which initially met with considerable success. This led him to realize the great need for biological dental research. He was instrumental in creating Columbia University's dental school in 1916. It was the first university affiliated dental school in New York and its entrance requirements of two years of college among the highest in the nation. In 1919 he established the Journal of Dental Research and drew up plans for the International Association of Dental Research, whose first official meeting was at the Columbia University Club in December, 1920.

In 1926 Gies completed an exhaustive study on "Dental Education in the United States and Canada." The study, Bulletin Number Nineteen, was prepared for the Carnegie Foundation for the Advancement of Teaching. It was prompted by the casual disregard for excellence in the teaching of basic biological sciences by proprietary dental schools that were founded in the late 19th century. It was similar to Flexner's Bulletin Number Four, concerning medical education, that was published fifteen years earlier. Gies concluded that dental education should be a separate but equal partner of general medicine. To achieve this it should remain closely allied with general medical education under the aegis of university affiliation.

Gies realized the need to restructure dental education by requiring at least two years of specified undergraduate education prior to entry into dental school, as well as a need to upgrade the medical courses given at the dental schools. He felt a pressing need to attract gifted students who would become gifted teachers of the future, pursuing full time careers in dental biological research. There was also a need to create specialized post-graduate training for clinical dentistry.

Boston, Massachusetts was the home of Tufts Dental School (founded in 1867), Harvard Dental School (1867), and the Forsyth Dental Infirmary for Children (founded in 1914). Gies visited Harvard in 1924 and found that even though it was closely affiliated with the medical school, it had not achieved intimate coordination between clinical dentistry and clinical medicine. The dental school was completely subordinated to the medical school, and even though it was endowed, it depended mainly on patient fees. A minimum of research was being done, and only on the undergraduate level. There were only two full time teachers; the other 116 were part-time instructors who were poorly paid, dedicated alumni. Nearby Tufts Dental School shared the same facilities as Tufts Medical School. The medical students received no dental training. Some research was conducted but received little financial support.

The Forsyth Dental Infirmary was one of the few places in this country where dental research was being actively done under the aegis of Dr. Percy Howe. The infirmary was endowed and accepted one year interns who came under the director's influence. Gies' report would have far reaching consequences for all three institutions.

Percy Howe.

Percy Howe began his professional career with both an undergraduate and a dental degree. In addition to a successful clinical practice, he had developed his own dental laboratory to study biological problems affecting the teeth. This avocation readied him for his leadership role in research at
the Forsyth Dental Infirmary for Children, funded through the beneficence of the four childless Forsyth brothers. The theme of children's health and the healthy future of this nation would play an important part in the development of dental research.

Howe saw the awakening in medicine brought about by the Flexner report. He realized, as did Dr. Gies, that dentistry must be one of the fundamental constructive forces in the pursuit of general health since all health is one health and dentistry must not remain isolated.

The theory of focal infection was raised in the late 1880's by W. D. Miller as well as others who brought scientific concepts to dental thought. Biologically-oriented dentists like Percy Howe refuted the poorly done medical research that incorrectly implicated teeth and their surrounding tissue as potential foci of infection. ³

His special expertise involved collaboration on a series of classical papers with Dr. Wolback of Harvard Medical School. They studied the relation of vitamins to growth of the entire skeletal system. Dr. Howe even refuted W. D. Miller's specific model for the etiology of caries which resulted from test tube research while Howe's less specific but more environmental model was tested on laboratory animals. It depended on basic biological problems dealing with nutrition and vitamins during pre-and-post-natal periods in the child's development. They did environmental surveys of the thousands of children who visited Forsyth and returned yearly for reparative work and preventive instruction. His interns were chosen from among the best dental school graduates world wide. They would become imbued with his love and dedication in solving the biological mysteries involving the oral cavity.

Howe was chosen president of the American Dental Association and his inaugural speech in 1929 foretold the need to keep dental research paramount in the complex structure of clinical dentistry.

In 1930 he was invited to serve on the White House Conference on Child Health and Protection at the behest of President Hoover and Secretary of the Interior Wilbur, and became chairman of the Subcommittee on Dental and Oral Hygiene. The essence of the conference was the health of the whole child, and there was a shift from treating disease to the promotion of health and prevention.

If Dr. Howe's research were to be effective, there would have to be a place where the importance of research could be made more evident to the students of dentistry. This was the germ that would lead to the re-creation of Harvard's dental school as the Harvard School of Dental Medicine.

Dr. Frederick McKay and Dr. Margaret Smith.

After graduation from the University of Pennsylvania Dental School in 1901, Frederick McKay set up practice in Colorado Springs, Colorado. As a lone pioneering dentist rather than a trained scientist, he spent thirty years tracking and outlining the geographical locations where mottled dental enamel was found. He secured the assistance of the famous, self-taught, dental scientist of his time, G. V. Black, who co-authored a classical paper on dental mottling with McKay. In the 1916 Dental Cosmos, Black described the histological aspects and McKay the epidemiological results of their findings. "Colorado Stain" disregarded nationality, social status and, with the exception of mottled teeth, every other condition of physical health. McKay proved that the distribution of mottling was limited to well defined geographical areas and affected only those who were born and lived in these areas during the years of tooth formation.⁴
Repeated water analysis could not identify the mysterious element that caused the enamel imperfection. At the request of a local dentist in Arkansas, the United States Public Health Service sent a medical officer, accompanied by McKay as a part time consultant, to investigate the mottling of teeth of children of Bauxite, Arkansas. Their report on the change to deep water wells as the bauxite mining town grew was published in the Public Health Report of 1930.

The chief chemist of the Aluminum Company of America (Alcoa) read their paper. At this time there were unfounded reports of aluminum poisoning from cookware. If the story of the tooth staining could be attached to that of overall aluminum poisoning, Alcoa's sales would suffer. Alcoa's chemist, Dr. Churchill, had samples of the Bauxite water analyzed using the most sophisticated techniques. In his spectroscopic study he found that Bauxite's water had a relatively high amount of fluorine, 13.7 parts per million.

Margaret Smith and her husband were nutritional chemists at the University of Arizona in 1930. They initiated a series of experiments that resulted in mottling the teeth of their experimental rat population. By searching the literature, they found an article published in 1924 that related mottling to an excess of fluorine.

The Arizona group tried high concentrations of fluorine in the diet they fed their rats, and thus working with an experimental animal model were able in a few months to solve a riddle which took McKay thirty years. In both cases dentists had initiated the research that was completed by specialists in different disciplines. On May 18, 1931 Churchill appeared before the Pittsburgh section of the International Association for Dental Research to report his discovery and was followed by Dean Friesell of the University of Pittsburgh Dental School, who read Margaret Smith's important findings. The need for scientifically trained dentists in dental research was most evident.

H. Trendley Dean

It was the diligent, epidemiologic "shoe leather surveys" of Dean, that became the classical work that related mottling of dental enamel to a decrease in dental decay. He found that one part per million of sodium fluoride in drinking water gave minimal mottling and maximum caries prevention.

Dr. Bard, the dentist who initiated Margaret Smith's project, had been affiliated with the University of Pittsburgh Dental School. Dean Friesell finally motivated the U.S.P.H.S. to assign a dentist to follow up the discovery of fluorine's role with further studies. By 1931 H. Trendley Dean was hard at work trying to verify the Churchill and Smith discoveries.

By sending questionnaires to every state dental society and to specific dentists in the areas where mottling occurred, Dean began to equate geographical location with the type of drinking water used. His group examined and interviewed people in specific areas. Only children with continuous residence in the area were used in the study.

He next sought the minimal threshold of fluorine necessary to blemish the teeth. He tried to accomplish this by examining the extent of mottled enamel in various areas of known fluorine content. By 1936 he had found that water containing over one part per million of fluorine caused mottling. He could now establish a mottled-enamel index. This development of quantitative methods was an important step towards solving the vital question: what was the relationship between fluorine mottling and dental decay? Dean's position with the U.S.P.H.S. gave him the time and funds to carry on this study. He used proven epidemiological studies of individuals in
numerous communities throughout the U.S. and kept good records that recorded the amount of decay in each child's mouth. These statistics proved invaluable in the later investigation which correlated decay with the fluorine content of the water. He also reviewed a great mass of statistics compiled by the U.S.P.H.S. survey on tooth decay during 1933-1934. He chose the information that pertained to selected towns and cities, some with mottling experience, others with none. He was able to confirm his hypothesis that children in areas with over 1 p.p.m. of fluorine in their drinking water had less tooth decay than those in fluorine free areas.

The next step was to add fluorine to the drinking water in areas that were fluorine deficient. While the National Institute of Health set out to study the toxic effects of fluorine, the U.S.P.H.S. conducted a far reaching experiment with humans, and with the cooperation of the Michigan State Health Department, artificially fluoridated the water supply of Grand Rapids and used the sister city of Muskegon as the control. All children were continuous residents of both cities. A similar study was started at Newburg and Kingston, New York. These large scale experimental laboratories set the stage for the future.

A. LeRoy Johnson

As a 1904 graduate of Tufts Dental School, he learned early that a dental degree without a college education held little value or respect in the academic world. He realized that dentistry alone could not answer the multitude of biological problems encountered in clinical treatment. His first contact with psychologists interested in cranio-facial growth and tooth eruption proved that his dental education was lacking in these important areas. After trying unsuccessfully to teach biological orthodontics at both the University of Michigan and the University of Pennsylvania he settled into private orthodontic practice in New York City.

The Gies report had recently been published and he called on Dr. Embree of the General Education Board of the Rockefeller Foundation to see if it would be interested in funding dental research. Because Dr. Pierce, the director of the medical division, had little respect for dental education, Johnson suggested funding a medical school program to study oral problems. Pierce invited Johnson to try his ideas on the deans of a few medical schools at universities where there were no dental schools. Dean Winternitz of Yale was interested and agreed to try the program if the Rockefeller Foundation would finance it. Two programs were funded. The first, at Yale, admitted a limited number of dental graduates to the first year in the medical school, allowing them to progress to an M.D. degree according to their interest and ability. The second, at the University of Rochester Medical School, accepted a small number of dental graduates as Ph.D. candidates in order "to conduct research and to train prospective teachers, investigators and practitioners in the fundamental biological sciences underlying the problems of dentistry."

By 1930 dental biologic research had finally reached a position where it was being carried out in a manner not unlike that of medical research.

THE PIONEERS' EFFORTS BEAR FRUIT

By 1931 the stage was set for the beginning of serious biological dental research. It would be done on an equal footing with medical investigation. These new, well-trained dental scientists would make discoveries of value to both dentistry and medicine.
The reports of the Committee on Costs of Medical Care (1927-1932) that dealt with dentistry showed both a great unmet dental need and a lack of access to affordable quality care. These were among some of the deficiencies of our nation's health system that were brought to the forefront at the White House Conference on Child Health and Protection of 1929. It also included a section on dental care and oral hygiene to which Percy Howe contributed.

The Social Security Act of the early thirties authorized federal grants for maternal and child health service to be administered through the Children's Bureau. The National Institute of Health, created in 1930, included facilities for dental research with H. Trendley Dean as the first dental officer. Dental health needs were now included under the umbrella of total child health in a nation at least committed on paper to helping alleviate the sufferings of its people. But the coming of the great Depression slowed the fulfillment of this commitment.

Private endowment, however, set the research apparatus in motion. Far-sighted individuals, dedicated to the establishment of biological dentistry as the basis for solving the problems of prevention, began to be heard.

Gies' *Bulletin Nineteen* made problems of dental research and education known to an interested public. A. LeRoy Johnson acted as a catalyst to set in motion the Rockefeller funding of the novel Yale and Rochester projects. The Yale group produced such luminaries as Dean Lester Burket of the University of Pennsylvania. He furthered the acceptance of oral medicine as a concept of dentistry. Burket also stimulated the research interests of his younger contemporary, Dr. Seymour Kreshover, who became a Carnegie Fellow in Oral Pathology at Yale and eventually became the head of the National Institute of Dental Research (1966-1975).

The Rochester program educated such dental luminaries as Dr. Basil Bibby and Dr. Harold Hodge. As Dean, Bibby brought dental research to Tufts in 1941. In 1947 he returned to Rochester as Director of Eastman Dental Center until his retirement in 1970. Hodge, a non-dentist, became chief of the Division of Pathology and Toxicology of the Manhattan Project during World War II and the Atomic Energy Project in 1947. Both would influence such men as Dr. John Hein, Director of Forsyth Dental Center, and Dr. Joseph Volker, former Dean and Chancellor of the University of Alabama at Birmingham.

Bibby was the first of five research oriented deans who would preside over Tufts. All were trained in post-graduate biologic science at Rochester. Drs. Bibby, Hodge and Volker became presidents of the I.A.D.R. as did Drs. Dean and Kreshover. The I.A.D.R. had become the largest, most respected dental research organization in the world.

Percy Howe's research continued and his bonds to Harvard Dental School were strengthened by his collaboration with Dean Burwell of the medical school and President Conant, known for his research in chemistry. They were part of a forward looking group that brought definitive changes to a dental school that Gies described as deficient in both dental research and teaching. The school took on the name Harvard School of Dental Medicine in 1942 and A. LeRoy Johnson became administrative head. This small school with select students and a small full time staff started its students off on an equal footing in the medical sciences with their medical contemporaries. Percy Howe felt his work towards this goal was one of his greatest achievements.

H. Trendley Dean's classical epidemiologic studies based on McKay's earlier work laid the scientific epidemiologic foundation for the massive public water fluoridation projects that have helped children worldwide.
Although other research oriented dentists such as Dean Owre of Minnesota and Columbia, Dr. Eugene Talbot of Chicago and Dr. Thayer of Johns Hopkins contributed, the great success lay in the funded post-graduate programs for dentists interested in basic research. The multidisciplinary focus on scientific problems replaced the solo inventor of past years.

REFERENCES


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POETRY AND THE DENTIST

THE BILL AS ITEMIZED.

Patient:
It seems to me the bill should be
Proportionate to the work.
A dollar and a half seems rather high
For giving the tooth a jerk.

Dentist:
When you see the bill is itemized
'Tis none too large, I vow.
There is fifty cents for the jerking
And a dollar for knowing how!

—St. Paul Pioneer Press, circa 1892.
From the collection of Professor Gardner P.H. Foley
Baltimore, MD
Speakers at the annual session: (left to right) Dr. Stanley Gelbier, London, England; Dr. Rahele Rezai, Howard University; Dr. Malvin E. Ring, editor of the Bulletin of the History of Dentistry; Dr. Yiming Li, Peoples Republic of China; Dr. Hannelore T. Loewy, University of Illinois; Dr. Norinaga Moriyama, Tokyo, Japan; Dr. Kuninori Homma, Niigata, Japan; Dr. Kazuhiro Nagata, Matsuzaka, Japan.

Dr. Norinaga Moriyama (right) of Tokyo, Japan presents books of Japanese woodcuts depicting dental scenes to outgoing president, Dr. Beerstecher.

Dr. Jack Gottschalk (left) presenting a special commemorative plate of the John Harris Dental Museum of Bainbridge, Ohio to Academy president Dr. Ernest Beerstecher.
Dr. William J. Carter (right) congratulates Dr. Maynard K. Hine, recipient of the Academy's coveted Hayden-Harris Award.

**Scenes at the 34th Annual Meeting of the American Academy of the History of Dentistry, San Francisco, CA, November 1, 1985**

Dr. Arden G. Christen (left), the new president-elect and Dr. Yiming Li of the People's Republic of China.

Members and guests in attendance at the 34th annual meeting of the Academy.
In addition to being the inventor of the porcelain jacket crown, as well as numerous other innovations in porcelain dental restorations, (see this issue's "Classics in Dental History"), Dr. Charles H. Land of Detroit lent his talents to restoring lost portions of the face with remarkable fidelity.

In October, 1898, he read a paper before the Wayne County (Michigan) Medical Society in which he described his treatment for a patient who had lost all his lower teeth as well as a large portion of his lower lip to surgery necessitated by malignancy of the mandible. The report was carried in the Dental Cosmos, Vol. 40 for May 1899.
Land constructed a full lower denture carrying a full complement of fourteen teeth and attached to this was a lower lip. It was all made as a single unit using the technique known, as he put it, "... as continuous-gum work." The teeth and gingivae were thus of one piece of porcelain, with the gingivae appropriately colored. The lip portion which also was attached to the remainder, was also of porcelain, but colored to resemble the patient's upper lip. To quote Land further:

From the edge of the lip, extending close to the symphysis and laterally to the joint of the natural tissues a countersink was formed in the porcelain body of the denture; into this space an inlay of flesh-colored gutta percha was impressed, using hot irons to make it plastic and to cause it to adhere. This formed an artificial skin as a base in which to secure the hair which was taken from the patient's own beard . . . the hair of the beard is adjusted close to the brink of the pink enamel, thus providing a very efficient means of obscuring artificiality.

In these modern times latex and plastics are used to construct replacements for parts lost to the ravages of disease. How fortunate that patient was 88 years ago to have Charles Land use his ingenuity in the absence of these remarkable materials, to restore him to normal form.

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TOOTH EXTRACTION PELICAN, PROBABLY CONTINENTAL C. 1700
Throughout the history of civilization, man has been concerned not only with restoring badly damaged teeth to function but with their appearance. The horrendous materials that were used and the damage produced by their incorporation into various prosthetic devices led to dentistry's experimentation with porcelain.

Pierre Fauchard, the author of *Le Chirugien Dentiste*, is acknowledged by some as first proposing the use of porcelain in 1728. Artificial teeth were reproduced in hard porcelain by Alexis Duchateau in 1774 in an attempt to eliminate the fetid odor from artificial ivory teeth, the material of choice at that time. Che mant's "incorruptible teeth of mineral paste" achieved a good measure of success in the 1790's as the answer to clean and hygienic dentures. The Italian dentist, Guisepangelo Fonzi was the first to successfully produce individual teeth and small blocks of teeth in porcelain. These "French beans", as they were called, were round in front, flat in back and enameled on the outside. They were attached to various denture bases by platinum pins that protruded from the back. (Fig. 1).

The Industrial Revolution brought with it the acceleration of technological development of porcelain in dentistry. In 1822 Charles W. Peale
of Philadelphia, began manufacturing porcelain teeth with platinum pins. Samuel Stockton, in 1830, was the first in the United States to produce porcelain teeth in quantity. Elias Wildman, a Philadelphia dentist, manufactured porcelain teeth with a much more life like appearance.

The widespread use of crowns and bridges began and porcelain was used in a variety of techniques. (Fig. 2). In 1873 B.B. Beers "rediscovered" the gold crown mentioned by Mouton in 1746. A Pennsylvania dentist M.L. Logan devised a full porcelain crown, although it provided no protection for the root upon which it was placed. Modifications were made by Richmond (1880), Logan (1885), Davis (1885) and others. The esthetic climax of crown technique was achieved by Charles Henry Land, who introduced the porcelain jacket crown in 1886.

Land was born in Canada in 1847. He received his early education in the New York public schools and began the study of dentistry in 1864 under Dr. J.B. Meacham of Brantford, Canada. In 1866 he moved to Chicago and entered the offices of Drs. M.B. Sherwood, L.P. Haskell and W.W. Allport. In 1871 he relocated to Detroit where he set up practice.

He entered the practice of dentistry at a time when mechanical skill and ingenuity were very conspicuous. He became very interested in the adaptation of porcelain to dental restorations and in 1886 introduced to the profession the porcelain jacket crown, patenting it in 1889. His technique involved the fusing of porcelain powder to the labial surface of a swaged platinum sheath over a model of a wedge-shaped tooth preparation. His crown differed from conventional crowns in that it rested on a prepared shoulder placed under the edge of the gingiva. His technique permitted the restoration of the tooth crown without the destruction of the pulp. Although considered by some as a dangerous procedure because "it robbed all that part of the tooth which was left about the gum of its bath in the sea of air which surrounds it," Land's technique for the construction of a porcelain jacket crown was the acme of operative procedures at that time. Further tribute to the importance of Land's work is the fact that the technique for construction of a porcelain jacket crown today is almost the same as it was when he first developed it.

Charles H. Land belonged to that class of pioneers who helped put the dental profession on the high plane it occupies today. His artistic skill and inventive genius contributed immeasurably to the advancement of the profession. H.D. Grubb, speaking at the Dental Centenary Celebration in Baltimore in 1940 said:

Fig. 2. A European porcelain furnace of about 1890. It was heated by a gas flame through two openings in the back wall of the furnace. On top is a porcelain-fused-to-metal full upper denture.
No small amount of credit is due the dental profession for its part in creating attractiveness and confidence for countless people. Especially can it be said of our porcelain workers that by their ability to reproduce accurately in form, color and arrangement, the natural tooth structure, they have probably created as great a reserve fund of happiness and contentment as any other modern development in science. It is one thing to say that we have made it possible for a handicapped mouth to perform in accordance with the principles of health and comfort, and quite another to be able to say by the use of artistry, as well as wisdom and manual dexterity, we have been able to make our patient handsome as well as comfortable. Few such complete victories are possible of attainment in any medical science.

Reprinted here, in considerably abbreviated form, is Land’s paper “Porcelain Dental Art” which appeared in the Dental Cosmos, Vol. XLV for June and August, 1903. In the original paper the author went into great detail as to the method of forming the matrix, applying the porcelain powder, fusing it and all the associated steps in the construction of a porcelain restoration, all of which would be tedious to the modern reader. Instead, we have chosen to reprint only a small portion illustrating one case history. However, from Land’s description of his handling of this case can be gleaned an appreciation of his revolutionary contributions.

PORCELAIN DENTAL ART
by Dr. Charles H. Land, Detroit, Michigan

Porcelain as applied in dentistry prior to the year 1885 was exclusively confined to the manufacture of artificial teeth and a few cavity-stoppers. The dawn of the new era, which revealed a field of greater scope and increased value, was first made known to the profession by the publication of an article in the Independent Practitioner of August 1886, entitled “A New System of Restoring Badly Decayed Teeth.” Following this was another article, appearing in the February 1887 number of the same journal, entitled “Metallic Enamel Sections: A New System for Filling Teeth.” In addition to this, an original paper, read before the Central Dental Association of Northern New Jersey, entitled “Metallic Enamel Coatings and Fillings,” appeared in the August 1887 issue of the same journal.

All three articles were profusely illustrated, and, combined, they gave a very elaborate description, showing various forms of porcelain contours, fillings, crowns, and enamel caps — or the jacket crown. Special attention was called to the metallic matrix as a means that would enable one to practice a great variety of operations. This matrix was to be formed of any suitable metal, specifying either gold or platinum foil as being the most appropriate. Also the restored portions of the teeth, consisting of fillings, contours, or crowns, were to be composed of glass, porcelain, gold, silver, or rubber — in fact, of any suitable substance. Citing from my patents of 1887 and 1888, a part of the specification declared that the object of the invention included “means for molding indestructible substances into sections corresponding in form to decayed portions of the teeth . . .”

PORCELAIN INLAYS
With the advent of the metallic matrix, numerous other operations were rapidly developed. Some of them I consider of far more importance than the simple inlay. However, the mass of the profession seem inclined to concentrate the major portion of their attention upon this particular operation, granting but little time or consideration for the more important and wider field of opportunities found in contours, crowns, caps, and bridge work, all of which may be manipulated in porcelain with great satisfaction and be completely successful. Eighteen years of practice in all classes of porcelain work has demonstrated that when an
inlay if appropriate no other class of work will be as suitable in the same place; but where one opportunity of this nature is presented, fifty per cent more is demanded in the other classes known as crowns, caps, contours, and bridge work.

Illustration E is a suitable example strongly indicating characteristic places for inlays, and yet when physiologically considered, and whether they are filled with gold, amalgam, gutta-percha, or inlays, the results are generally only very temporary. This class of cases is almost always due to erosion, and all who have practiced dentistry for many years know from experience that decay will rapidly extend, attacking all the remaining parts of sound tooth-structure left exposed; consequently I have found it more satisfactory to cover such examples entirely with enamel metallic caps, or to form a complete hood of porcelain. One other serious objection or weak point in the inlay system is the superficial washing out of the cement. No matter how perfect the work, in many instances stains will gradually collect between the inlay and the wall of the cavity, and before many months your patient will return and request you to remove the dirt from the joint. To overcome this trouble, it has been my practice to first line the cavity with gold foil and then fit my inlay, whereby the gold exposed would be reduced to a mere threadlike line, which is far less objectionable than the stained joint. Do not infer from this that I decry inlays altogether. Far from it, for there are many instances where the secretions of the mouth are favorable, and such objections are not apparent even after twelve and fourteen years of use . . .

During the past eighteen years of especial practice, I find that the only way in which my patients have lost any tooth-structure has been by the receding of the gums and not by decay intervening between the sections of porcelain and the wall of the cavity in the tooth. In some instances I have had my patients return with the section or contour that had been forced out of the cavity, sometimes within a week or two, and again not for several years, but in such cases the cavity would invariably be protected by the thin coating of cement that remained intact, and in the majority of instances the section or inlay was re-cemented in place or the section reconstructed and a better retaining form provided . . .

ENAMELED METALLIC CAPS
Illustration H represents a case in practice that involved thirty-one teeth. After the brown color was polished off the surface, enameled metallic caps were cemented to them, and when completed they appeared as seen in Illustration I.

The operation not only provided thorough protection from future decay, but also the natural color and perfect form of the original design of nature was so complete that the art was concealed. Also the pulps were held in their normal state.
It is now about ten years since the operation was completed, and not any sign of decay has intervened, nor has any discomfort whatever been experienced. The patient was a young miss of about nineteen, whose teeth were entirely denuded of their enamel. The etiology of this case might be very interesting to those who make this feature a scientific study, as the same defects were inherited from the father by both the son and the daughter. I have in my possession a specimen of the son's teeth, consisting of one central incisor, canine, bicuspid, and molar. These were what I could procure of twenty-seven that were extracted from the young man's mouth in order to give in return a miserable substitute. All the pulps in his teeth were sound. The father had gone through the same experiences; but how different the results in the daughter's case!

Illustration I represents the comparative difference in their appearance.

The restoration was accomplished by covering the molars, including the third molars, with gold caps, and all the remaining anterior teeth, twenty in number, were restored with enameled metallic caps...

One of the first cases that I brought before the Michigan Dental Association in 1886 is still preserving the incisor teeth that at that time were adjusted for a girl fourteen years of age. This has now been in use seventeen years. In connection with such long periods of time the cases in which young teeth are covered, especially the class that will generally present from three to four extensive cavities on each of the four incisors, are just the kind that the ambitious dentist desires to fill with gold, and to the sensitive patient it seems like a discouraging proposition. And it is the more so when we realize that this is the beginning of the most important period of the life of young people. They dislike to acknowledge the permanent disfigurement, knowing that a row of gold fillings would help to illuminate the defects of decay. In such cases it has been my practice to cover such teeth with enamel. This is generally accomplished without the necessity of pulp-devitalization. In numerous cases where the six anterior teeth have been so treated, after a number of years I have found it necessary to readjust the cap. Some had served their purpose eight, ten, and twelve years, and the necessity for renewal was due to the continued development and extension from natural growth, which after so many years gradually exposes the joint that was originally obscured by the festoon of the gums. It is important to realize that young teeth may be so well protected, during periods so favorable for their development and with the normal functions of the tooth's vitality continuing under the cap, that when the time comes for readjustment you have the great satisfaction of providing another lease of ten or twelve years on sound and healthy foundations.

Referring again to the thirty-one teeth that were capped, where all the pulps were preserved, I could add another instance where twenty-eight individual caps have been standing the test for about seven years, and in smaller proportions a much larger number that have been serving their purpose fifteen years. All these, and many more, have proved that when enamel caps are properly constructed they are among the most durable and satisfactory methods of preserving and restoring defective teeth. In reality, this is a system or method of artificially clothing teeth, and is equivalent to, if not safer than nature's own enamel. I have enjoyed the extreme pleasure of examining these cases every six months to see that no decay starts beneath the caps, and after eighteen years, in these particular instances, all that my patients have found it necessary to do was to keep their teeth properly cleaned.

I may ask, under the circumstances, providing no other provision was available, What would you do if confined to the use of older methods of tooth-crowning? Or, What other way could be suggested without the necessity of the destruction of at least fourteen pulps?
Pulp-destruction should always be the last resort. Following this principle we keep in view opportunities that favor the highest possible skill. I will offer in evidence illustration K. This represents a group of teeth showing a deficiency of enamel, the patient being a girl sixteen years of age. All these teeth were brought back to their normal appearance, proper contour, and usefulness, relying exclusively on porcelain-veneered cement fillings, contours, and entire enamel hoods. Illustration L is an example demonstrating the method of procedure. I select the canine, 1 in the illustration. The first step is to form, by means of a small carborundum disk followed by small enamel burs, a circumscribed ledge or shoulder just in line with the gum. (See the figures 1 and 2, illustration L). This should consist of a sufficient quantity of the natural enamel left intact as a guard against any foreign body coming in contact with gum tissue, thus establishing the artificial joint where it is possible to finish it parallel to nature's outline. In this way no overlapping shoulder is present as would be in the case of caps of metal or bands. To remove what is left of the balance of the natural enamel a series of grooves are cut across the surface at wide intervals. It then becomes comparatively easy and less painful to remove the enamel in small sections by means of a sharp chisel. (See 1 and 2, as the teeth would appear with all enamel chipped off).

The figure 3 is the platinum foil matrix that has been fitted to 1, while 4 is the hollow veneer or shell that has been formed over the matrix. After this stage the matrix is removed. The hollow veneer then consists purely of block body as a first foundation, and an intermediate, slightly lower-fusing body, and the very thin facing or tooth form, all fused together, and when completed it represents in reality the equivalent to nature's own enamel. And when cemented over the prepared tooth, as shown in 5, it will be seen that the defective tooth has been provided with a complete coat of artificial enamel which to all intents and purposes restores the defective parts to their normal appearance in form and color, as well as their utility; and I feel sure, from long experience gathered from the evidences of analogous applications of porcelain, that this new process is likely to prove the most efficient method of tooth-restoration and preservation that has ever been devised.

Porcelain as an aid to operative dentistry is gradually developing into one of the most important and valuable branches of the art. It not only broadens the field of opportunities along the esthetic line, but as well increases the scope for many new devices of practical utility. However, it must not be assumed, as some will claim, that it will supersede all the older methods; yet to a very great extent it will take the place of many of the latter, and in numerous instances will prove to be far superior.

That porcelain dental art has come to stay we can be assured, and we may reasonably expect that porcelain will prove to be the real substance from which the dental profession can reach their highest ideals of true art...
SOME SALIENT POINTS
Commenting on this new art, the salient points that I wish to bring prominently to view are those relating to the naturalness, durability, ease of adaptation, especially for the patient; it is less affected by thermal changes, greatly reduces the necessity of using the rubber dam, saliva ejectors, etc. It is in line with the most perfect ideals of sanitation, reducing bacterial opportunities.
For the past two years I have been making it a regular practice to remove a great many metal caps, such as gold, platinum, etc., also large amalgam fillings, and substituting therefor porcelain sections, crowns, facings, and veneers. In every instance there has been a change for the better in the tissues about the teeth, especially where the metal had been in contact with the gums; and in the same mouth where on one side the metal caps were allowed to remain the irritation continued, while on the substituted side where all porcelain had been placed there was a remarkable improvement shown — and this well established within three or four days.
It is too soon to formulate definite reasons for all the causes that bring about this healthier condition. I will therefore advance but one theory at present, feeling sure it is pretty nearly correct: advocating the removal of metal caps to get rid of the overplus edge, which I recognize as the home for bacteria no matter how perfect the adaptation. One more important feature is that the patient is enabled to pass thread between the teeth, and with much greater facility remove collections of fermenting food; in fact, the space between the teeth is far more accessible for the application of lotions, tooth-paste, and the complete utility of the brush. This of itself is of distinct value.

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POETRY AND THE DENTIST

SCYLLA TOOTHLESSE

Scylla is toothless; yet when she was young,
She had tooth enough, and too much tongue:
What should I now of toothlesse Scylla say?
But that her tongue hath worn her teeth away.

From Wit Restor'd in severall select Poems not formerly publish't. London, Printed for R. Pollard, N. Brooks and T. Dring and are to be sold at the Old Exchange in Fleet Street, 1658.

From the collection of
Professor Gardner P.H. Foley
Baltimore, MD

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In addition to the usual sources available to the dental historian are those publications directed at lay people. In them can be found the attitudes and practices of the population as concerns the care of the teeth.

Before there was a true dental literature there were many medical books which carried descriptions of how physicians dealt with dental problems, and these are invaluable sources for an understanding of early dental treatment practices. In addition to these, however, are the books directed at the lay person, and these offer a fine insight not only into treatment methods but into attitudes towards that treatment.

I wish to discuss the American “Ladies’ Books” as a source for the study of the history of dentistry in the United States in the Nineteenth Century. The condition of women in our society was such that they had to struggle for a century to break out of their almost enslaved position. There developed a literature for this female half of the population, the “shut-ins” by virtue of their sex. This literature was heavy on religion and morality, generally written by male clergymen. Other works were of the polite, literary type, suitable for “ladies”; or they were self-help and how-to books, such as cookbooks, care-of-self books, how-to-converse-with-the-opposite-sex books, how-to-sew-and-embroider books, how-to-paint-or-play-the-piano-forte books, etc.

One such book in my collection is The Lady’s Guide to Perfect Gentility in manners, dress, and conversation, in the Family, in company, at the Piano Forte, the table, in the street, and in Gentlemen’s Society. — also a — Useful Instructor — in Letter Writing, Toilet preparation, Fancy Needlework, Millinery, Dressmaking, care of wardrobe, The Hair, Teeth, Hands, Lips, Complexion, etc. By Emily Thornwell. Author of “Home care made easy, etc.” New York Derby, & Jackson, 119 Nassau St. Cincinnati: H.W. Derby, 1856.

On the lengthy title page describing the book’s contents the teeth are near the very end, a statement which indicates the relative importance placed on oral care then. The section on the teeth begins on page 43 with a discussion “How to preserve the teeth sound and white.” There follows a description of the structure of the teeth as:

“... bones thinly covered with a fine enamel.” (The author then warns against damaging the enamel by wear from harsh brushing.) A butcher’s skewer, or the wood with which one is made, must be bruised and bitten at the end, till with a little use it will become the softest and best brush for this purpose, and, in general, needs only to be dipped in pure water, without any powder whatever; and once in a fortnight, or oftener, the skewer-brush may be dipped in a few grains of fine gunpowder; this will remove every spot and blemish, and give your teeth an inconceivable whiteness. It is almost needless to say that the mouth must be well washed after this operation, for, besides the necessity of so doing, the saltpeter, &c., used in the composition of gunpowder, would, if suffered to remain, be injurious to the gums and teeth; but has not, nor can have, any bad effect in so short a time.”
The use of cold water for rinsing the mouth is then recommended after every meal. "To keep the teeth in good order, in the morning, before the looking-glass, remove gently, with a very fine tooth-pick made of a crow-quill, any matter that may appear in the interstices between the teeth. Then, with a brush dipped in water, scrub them well inside and out, rubbing them horizontally, vertically, and in every direction. The teeth, being thus well scoured with the water, rinse the mouth with lukewarm water, and clean the tongue. As soon as convenient, after each meal, brush the teeth slightly and rinse the mouth; repeat this always just before retiring."

There follows a dissertation on, "Effects of food on the teeth," stating that "Eating animal food seems to be cause of the "teeth breaking down." Also, "... it is supposed by some that sugar is injurious to the teeth, but there is no satisfactory evidence of this being so." The author then goes on to warn against, "excessive friction," in brushing and "injury to the gums by the abuse of the tooth pick." She recommends a tooth powder mixture of "2 parts cuttlefish bone, and one of Peruvian bark, both finely powdered." There follow two paragraphs entitled, "Ornamental effect of a good set of teeth" and "Disgust occasioned by bad breath." At the end she describes several dentifrices, tooth-powders and mouth washes with almost all of the recipes containing quinine or Peruvian bark. The following chapter deals with the care of the lips. Many recipes follow for what we might today call lip-sticks, under the names of lip salve, lip tint, lip honey, Balsam for lips, emollient for lips, etc.

These pages give us a good idea of attitudes of the lay public to its dental health. Most unfortunate is that there is only one mention of the dentist, and here only to suggest that the teeth should be attended by a "thoroughly competent dentist."

In the cookbooks of that time and even earlier, we encounter remedies for toothache and recipes for tooth powders and mouth washes. I intend to deal with this in a future paper.

(This column is planned as a continuing series which should prove of interest to the bibliophile, the antiquarian book collector as well as those with just a general interest in the history of dentistry.

DR. GESCHWIND was engaged in the private practice of dentistry in New York City from 1947 until his retirement in 1982. In 1967 he wrote the historical introduction to the facsimile edition of A Treatise on the Human Teeth by R.C. Skinner, the first book on dentistry to be published in this country. His lifelong hobby of collecting antique books as well as dental memorabilia has afforded him an unusual opportunity to research and write on the history and bibliography of dentistry. His address is 184-14 Midland Parkway, Jamaica, NY 11432. Requests for reprints should be made directly to the author.
What Is It?

—Alex Peck, Antique Scientifica
Charleston, Illinois

This fascinating item looks like a pair of pliers and is made of plated steel. The handles are covered with ivory and the inner surfaces of the jaws are grooved. When closed the instrument fits into the accompanying leather purse. What do you think it is, and what was it used for? The answer will appear in the next issue.

In the last issue (October 1985) we featured an intriguing wooden screw and asked who knew its functions. We received a quick response from one of our Academy members, Dr. Norman G. Schaaf, Chief of the Department of Dentistry and Maxillofacial Prosthetics, Roswell Park Memorial Institute, Buffalo, New York. Dr. Schaaf writes:

78. DENTAL MOUTH SCREW, 19th century. Made of hardwood, 5” overall, the mouth screw had a tapered spiral thread used to open, and maintain open, the reluctant patient’s mouth. Fine condition . . . . $110.
The "What Is It?" is most interesting. The tapered screw has been used as a mouth prop, mouth opener in cases of trismus and as a trismus exerciser. The item is also pictured in the most recent issue of the antique medical catalog *Tesseract*. (See the attached cut).

In present day practice we use similar tapered acrylic screws in some patients who have trismus after surgery or radiation therapy. I enclose a photo of one of these.
Artist: Annibale Caracci, Bolognese, 1560-1609.
Size: 10¾ x 6 inches.
Copper-plate engraving, designed after a drawing by Caracci.
This is one of a series entitled "Street Cries", completed by Simone Guilini around 1740. The engraving depicts a typical 16th century mountebank, easily recognized by his long necklace of extracted teeth. The implements of his trade are carried in the box which he has tucked under his arm, and the little sack attached to his waist apparently contains his money. He is elegantly dressed for his profession, but his demeanor seems a bit sad. Caracci was one of the earliest artists to employ caricature in his work and is considered by some art historians to be the father of modern day caricature.

— From the collection of, and with comments by Bernard S. Moskow, D.D.S., Ridgewood, New Jersey, author of Art and the Dentist
NOTES & QUERIES

ANTIQUE DENTAL OFFICE OPENS AT CHICAGO MUSEUM

A 1910 dental office will be part of the "Yesterday's Main Street" exhibit at the Museum of Science and Industry in Chicago, it was announced by Dr. Samuel X. Wexler of Glenwood, Illinois, a prime donor in the establishment of this unusual attraction. Dr. Wexler, an avid collector of dental antiques and a member of the American Academy of the History of Dentistry described the exhibit, which will be housed in a free-standing building on the vintage "street" of early downtown Chicago, as demonstrating the evolution of the dental office to what it was at the turn of the century. Equipment showing the advent of electricity and running water will be displayed. Some of the major pieces of equipment included in the display are: an 1882 Case High-low dental chair; a 1910 Harvard dental cabinet; a 1912 Electro-Dent free-standing switch board; a 1905 Dunn spotlight; a 1911 Rhein light with unusual blue cluster-lights; an 1899 Ritter ball-engine; a 1905 S.S. White foot-engine; a 1907 Taggart casting machine; a 1910 American Cabinet laboratory bench; a 1912 Fisher x-ray; a 1900 Weber chair-mounted ruby glass bowl cuspidor and a 1905 wall-mounted Allan bracket.

The display was opened officially on March 1, 1986. Four million visitors a year come to the museum and "Yesterday's Main Street" is one of the highlights visited. The Museum is at 57th Street and Lake Shore Drive in Chicago and the phone number is 312-684-1414.

INTRIGUING MYSTERY SURROUNDS HORACE WELLS MONUMENT

Dr. Jacques Fouré of Paris, France, author of the article "Daniel Hally-Smith, The Last American Dentist in Paris" which appeared in the last issue of the Bulletin of the History of Dentistry, (Vol. 33, No. 2, October 1985) has been doing some investigation into a puzzling aspect of a monument in Paris erected to the memory of Horace Wells, the American dentist who discovered anesthesia. Dr. Fouré writes:

In the article on Hally I mention that Hally had spoken on the occasion of the restoration of the Wells monument in Paris after its disappearance during the German occupation. Rummaging through some papers recently I found the enclosed photo which was taken at the time. I have since returned to see the monument and was intrigued by a medallion which is inserted in the stone base (the bust of Wells is bronze) which you can see in the picture on the left. It is a medallion of Paul Bert (1833-1886). But what does Bert have to do with Wells? I had a place in the country some years ago, about a hundred miles from Paris, near Auxerre, and often crossed the large Yonne River there on the "Paul Bert Bridge". I knew that he was a local celebrity, having represented Auxerre in Parliament, and had been Minister of Education in the 1880's. But Bert would have been a boy when Wells made his discovery. So how could he be associated with Wells' memory? Paul Bert had been a physiologist by profession and among his scientific works had studied respiratory activities. In 1866, Paul Bert recommended the use of a mixture of oxygen, one fourth with nitrous oxide to obtain a smooth induction period as well as a longer anesthesia. He had experimented with dogs and had persuaded two of the outstanding surgeons, Labbe and Pean, to use the mixture on patients, which they did with success.

The Paris monument was inaugurated in 1910 with the proper
ceremonial and the presence of representatives of the French government and U.S. Embassy, but I have, as yet, not been able to find who paid for the monument and was responsible for its erection. I hope to delve into this further.

Of interest is the newspaper article published at the time describing the unveiling. It appeared in the Paris edition of the New York Herald, March 28, 1910:

PARIS UNVEILS MONUMENT ERECTED TO HORACE WELLS
American Inventor of Anaesthesia Now Has
His Statue in French Capital

The square des Etats-Unis yesterday morning saw the unveiling of a monument to Horace Wells, the American dentist, who, though almost forgotten by posterity, first proved the practical possibility of anesthesia as applied to surgical operations in general.

The American Ambassador was represented by Mr. Bailly Blanchard, the First Secretary of the Embassy. M. Dastre, a member of the Institute and of the Academy of Medicine, presided at the ceremony. The Prime Minister was represented by M. Cotte and the Minister of Foreign Affairs by M. Le Mailler.

It was in 1844 that Horace Wells, then practising as a dentist in Hartford, Conn. first began experiments, basing his work on the suggestion of Sir Humphrey Davy that "nitrogen monoxide appeared to have the power of killing pain and that it could probably be advantageously employed in surgical operations not involving too great loss of blood."

Horace Wells' methodical experiments had varying results for a while but eventually they were crowned with success and he was able to affirm to the world that anesthesia was a possibility. His day of success, however, was also that of his death. Two of his pupils, Jackson and Morton, understanding the art of self-advertising better than he did, succeeded in taking the credit of his invention for themselves and Wells, soured by his failure to make the world believe his claims, committed suicide by opening his veins while taking a
bath (sic). Posterity has since repaired the injustice done to the great American.

The monument erected yesterday is due to the sculptor Bertrand Boutee. The pedestal of the bust is ornamented with a medallion portrait of Paul Bert, who first applied Wells' invention in France.

DR. HOFFMANN-AXTHELM AWARDED HONORARY MEMBERSHIP

At the annual meeting of the American Academy of the History of Dentistry on November 1, 1985, Honorary Membership in the Academy was bestowed upon Dr. Walter Hoffmann-Axthelm of Freiburg, West Germany, world-renowned dental historian and author of the acclaimed textbook Geschichte der Zahnheilkunde as well as the Lexicon of Dentistry, the 8th edition of which was brought out in 1983.

Dr. Hoffmann-Axthelm, who was born in 1908, received his dental degree in Freiburg in Breisgau and his degree in medicine in Berlin. From 1933 to 1939 he was in dental practice in Perleberg, a small town midway between Berlin and Hamburg. From 1939 to 1948 he was the assistant to Professor Schuchardt, head of the Departments of Maxillo-facial Surgery in hospitals in Berlin and Hamburg. In 1958 he was named head of the Maxillo-facial Surgery Department of the Charité Hospital in East Berlin.

When the wall was erected separating East and West Berlin, Dr. Hoffmann-Axthelm decided it was time to relocate to the West. And in addition to beginning a new residence, he began a new chapter in his professional life as a medical historian at the Institute of the History of Medicine of the Free University of Berlin, ultimately being named Director of the Institute. Retiring from this position at the age of 70, he relocated to Freiburg, scene of his student years from 1929-1930, and where he resides today with his wife, Irmtraut.

The author of over 100 professional papers in both clinical oral surgery as well as dental history, Dr. Hoffmann-Axthelm's career was capped with the publication of his dental history book in 1973. It was brought out in an English translation in 1981 and in Japanese in 1985. The second German edition, with many new sections, was published in September of 1985.

Dr. Hoffmann-Axthelm has been feted many times. In 1971 he was honored by a German medical historical society with the Leopold Pagel medal and in 1982 another society conferred on him the coveted Paul Diepgen medal, bestowed only every third year. The American Academy of the History of Dentistry is proud to have this distinguished scholar join its list of outstanding dental historians who have been named Honorary Members.
DENTAL EXHIBIT AT LOYOLA UNIVERSITY

A special exhibit has been set up in the patients' waiting room at the Dental School, Loyola University in Maywood, Illinois. With Academy member Dr. Max Chubin of Chicago as the moving force behind the project, the early dental equipment was secured on loan from the Chicago Historical Society. Enclosed completely in Plexi-glass, the exhibit gives dental patients a glimpse of what a dental office at the turn of the century looked like and shows what strides have been made in bringing greater comfort and security in dental treatment to the patient of today.

A young lady from Deatsville, Kentucky went to Louisville one day last week to have a tooth drawn, and when the dentist asked if she would take gas, she pulled out a bottle of whiskey and remarked, "This is the kind of gas we take!" The tooth was extracted without pain.

—Johnston's Dental Miscellany
Vol. 3, No. 30, June 1876.
To the Editor:

I have recently reviewed with interest your fine book on dental history. It was most enjoyable to a non-dentist.

I have a silver spoon which I bought for its beauty a few years ago. I am unable to find the benchmarks but believe it to be 18th century Dutch. The relief in the concavity is a replica of Jan Steen's "The Toothmaster" which you use as your cover illustration. The handle has several busts which have no meaning to me, but also has crossed keys. I noticed crossed keys on the pedestal of the table.

I would be most grateful for any help I can get with identification. I would also wonder if it would be of interest to a dental museum, and if so what it would be appraised for. Thank you for any help you can give.

Your very truly,

H.W. Burnette, M.D.
401 North Boone Street
Johnson City, TN 37601

To the Editor:

I am the new museum technician at the National Museum of American History in charge of the medical, dental and optical collections. In researching some information on toothbrushes, I came across the article published in Vol. 30, p. 24 (1982) on the history of the toothpicks. Unfortunately since Mr. Everett Jackson's death, many issues of the Bulletin of the History of Dentistry have not been located, including the one cited above. May I receive a photocopy of that article? It will take some time before our library can recover or order new issues of those missing and I would like to finish this research quickly.

Sincerely,

Mark Dreyfuss, Museum Technician
Medical Sciences Division
National Museum of American History
Smithsonian Institution
Washington, DC 20560
To the Editor:

Many thanks for the copy of the Bulletin of the History of Dentistry which I had requested. I found it extremely interesting to read. I did not believe so many people were interested in the dental past. You seem to have a thriving society.

With kind regards,
H.R. Benson, B.D.S., V.U. (Manc.)
Cheadle Hulme, Cheshire
England

To the Editor:

Thank you very much for publishing my article about Dr. J.W. Noble in the Bulletin. (Vol. 33, No. 1, April 1985).

I have detected an error in Figure 4 of the article. The gentleman with the handsome sideburns is Sir Paul Chater, whilst the gentleman at the far right of the first row is Sir Reginald Stubbs.

I shall now try to find another interesting character to research!

Yours sincerely,
Dr. R.T. Walker
Department of Conservative Dentistry
The Prince Philip Dental Hospital
Hong Kong

To the Editor:

As public relations counsel, we believe an article on George Washington’s dental problems would be well received by Scholastic Publications’ Science World, a magazine distributed to thousands of high school students; possibly also by a syndicated columnist.

Do you know or, if not, can you suggest someone who might know whether there is knowledge that he lost his teeth to caries or to periodontal disease or a combination?

We would, of course, be most grateful for your help.

Roger Kafka, Senior vice-president
The Siesel Co., Public Relations Div.
845 Third Ave., New York, NY 10022

To the Editor:

I am hoping to get your book Dentistry — An Illustrated History for Christmas. In the meantime I have been reading some fine reviews of it.

I am writing to you because I own an old, old painting, probably 17th century. I am enclosing a photo I took of it with my Polaroid (admittedly not a very good photo) but perhaps you can discern that it is of a blacksmith attempting to pull a tooth while a worried wife looks on, her hand resting on an anvil. The oil painting is roughly 12 by 15 in size.

I understand that blacksmiths were often called upon to yank an aching tooth in the olden days. I remember what Orson Welles said when someone commented upon the “good old days.” He said he wouldn’t have wanted a toothache in the “good old days!”

I remember when I was 10 years old in England — 50 years ago — I was given real cocaine at the dentist’s, and it cost my mother a shilling (about 50¢ then).

Perhaps you can tell me if you have seen this painting before. Mine is an original oil, not a print, but it could have been copied from another. An appraiser in New York City estimated that it was painted in the 17th century.

Yours sincerely,
Mrs. Cynthia Hascup
Maywood, NJ 07607
To the Editor:

I was thrilled to find, upon my return to Chicago at the end of November, the article published in your *Bulletin* about my great-grandfather, Dr. W.C. Eastlake. (Vol. 33, No. 1, April 1985).

May I suggest the following corrections:

a) page 28 under “Mrs. Eastlake’s troubled journey back to America.” “There she was invited by King Mongkut of Siam . . .” Carl Crow wrote a book entitled, “He opened the door of Japan.” The “he” refers to Townsend Harris. In this book Prince George Washington of Siam is mentioned.

b) page 28 Eastlake, Father and Son, return to Hong Kong. In 1879 Dr. W.C. Eastlake returned to Hong Kong. Frank Warrington Eastlake did not receive a dental degree. He continued his studies in Berlin and in 1881 received the degree of Doctor of Philosophy. He is known to have written an Assyrian dictionary, the Webster's English-Japanese dictionary, and the book “Heroic Japan” which is about the Sino-Japanese war. His biography is given in the Modern Literature Study Series, Volume 8, pages 19-70, published in 1957, by the Showa Girl's College in Tokyo.

The printing of Dr. Eastlake’s life means a lot to me, because I have at last brought his memory home to the United States. I am glad that I have been instrumental in calling to your attention the fact that Dr. Eastlake is greatly honored in Japan.

I wish to add that the Association of Dentists of Kanagawa Prefecture unveiled a monument in the city of Yokohama, on November 14, 1985. The monument is to the memory of Dr. W.C. Eastlake as part of the history of Yokohama.

Yours gratefully,

Dorothy Eastlake
Chicago, IL

To the Editor:

I particularly wanted to express my very positive feelings on the article which you published in the October issue of the *Bulletin* — “Daniel Halley-Smith, the Last American Dentist in Paris.” With evident admiration for his subject, Dr. Jacques Fourné has produced a well written and touching biography. Such pieces are the soul of history, since I believe that “history is biography.”

The French gave us Fauchard and we gave them, for over a century, many American dentists who practiced there. For the most part, they were men of charm and grandeur who attracted royal patrons. Daniel Halley-Smith was the last of this era and hence should be remembered.

Sincerely yours,

H. Martin Deranian, D.D.S.
Worcester, MA

From all evidence available, humans have been plagued with every variety of dental problem, and have used all means available to reduce the related agonies. The earliest forms of dental treatment were by specialists and down through the centuries dentistry has become an acknowledged healing art. Its history is long, fascinating and most distinguished. Oral hygiene laws were part of many of the earliest religions. Dental repairs and devices were recorded in the early history of civilization.

However, it has been years since a complete history of dentistry has been recorded in an illustrated manner, or even in good narrative. Well, the wait is now over! Dr. Malvin E. Ring has brought dental history up-to-date in both narrative and illustrated fashion. This six pound, 10"x13" masterpiece, is profusely illustrated with the best selection of material ever presented in one book. The text is superbly presented and literally flows through history and brings to focus all the monumental developments of dentistry over the ages. Everything is here — documents, drawings, prints, paintings, illuminated manuscripts, sculptural reliefs, cartoons, caricatures, portraits and photographs of instruments and equipment — and it is available to everyone. In the final chapter the reader is brought up-to-date with the latest techniques and developments that are unbelievable, yet are being used in dentistry today.

Dr. Ring has brought dental writing and publishing to its highest level yet with this superb presentation. It has earned for him a position in dental writing and publication held by very few in the dental profession. Every dentist should have a copy of this book. It is a pleasure to read. It can be recom-
mended to everyone whether his or her interest is in dentistry, medicine, social history, or any other branch of the healing arts.

— Reviewed by Lloyd E. Church, D.D.S., Ph.D.
Associate Clinical Professor of Surgery
The George Washington University Medical Center
Washington, D.C.


In 1840 the first dental journal in the world came on the scene and had an initial subscription list of slightly over 100. Now, a century and a half later, one would be hard put to list all the dental periodicals published in the United States alone, let alone the rest of the world. This seemingly impossible task has been accomplished, however, by a former president of the American Academy of the History of Dentistry who is also the Director of the Bureau of Library Services of the American Dental Association.

Miss Kowitz has searched out all of the periodicals in the U.S. as well as most of the Western world and some of the more distant lands such as Jordan, Nigeria, Sierra Leone and Singapore. Each periodical then is listed in the body of the book, giving all of the salient facts about it: frequency of issue; address; editor; price; where it is indexed or abstracted; whether or not it accepts advertising; and many other valuable informative items. Then this is followed in each entry by a succinct annotation which gives such information as the intended audience, the aim of the periodical, method of selection of articles, requirements for submission of articles and a host of other necessary data.

What is remarkable about this work is the inclusion of the smallest and most specialized periodicals (The Newsletter of the Idaho Dental Hygienists' Association has a circulation of only 75) as well as the largest and most well known such as the _Journal of the American Dental Association_ (with a circulation of 137,000).

Most important is the fact that there are several indexes which allow one to find any publication easily. One can look under subject matter, or publisher, or title, or even by state and country if the other facts aren't known. It is an invaluable guide to anyone researching any field of dental literature and is a MUST for every health science library.

— Reviewed by Malvin E. Ring, D.D.S.
Batavia, New York


Ellis Reynolds Shipp was a Mormon pioneer, a nurse, a physician, and a lecturer, as well as an instructor of nurses and midwives. This biography, written by Susan Evans McCloud, makes it possible for us to appreciate this outstanding woman and her accomplishments.

Ellis Shipp was born on January 20, 1847 in Iowa. Her family converted to the Mormon faith and left Iowa to settle ultimately in Utah when she was about 4 years old. Ellis grew up in Battle Creek and Pleasant Grove, Utah where her family farmed with modest results. In 1865 Ellis moved to Salt
Lake City as a protege of Brigham Young. This allowed her to continue her studies and to marry Milford Bard Shipp in 1866.

After the birth of several children and the death of two of them, Ellis enrolled in 1875 at the Women's Medical College of Philadelphia. Her family stayed in Utah, and her children were cared for by one of the other wives of Milford Shipp. Her studies were interrupted once because of health problems but were completed in 1878 and the now Dr. Shipp returned to Utah and to her professional responsibilities which were primarily in obstetrics, child care, and public health. She was the second woman to receive an M.D. in the State of Utah. Some years later, her husband and another of her husband's wives also obtained M.D. degrees.

Dr. Shipp died on January 31, 1939. Her's was a long and very useful life, and her contributions to the health of her community many. At the time of her death she had three living children, 38 grandchildren, 25 great-grandchildren and 4 great-great-grandchildren.

The biography by McCloud is an excellent tribute to the life and work of Dr. Shipp, as well as an interesting review of the life of the pioneer Mormons and their early difficulties in their new home in Utah. It is not always easy reading. Things are always superb and superlative. Many poems of Dr. Shipp are reproduced and some are rather repetitious and uninteresting. The problems faced by the Mormon pioneers are described as are the advantages and problems of the plural marriage system of the time. Since this is a rather short book, it is sometimes difficult to understand. For example, McCloud goes into detail about the statement that there were no Mormons at all present at the graduation of Dr. Shipp. However just before this statement reference is made to the arrival in Philadelphia of one of the other wives of Milford Shipp who came to study medicine and help in the care of one of the daughters born to Dr. Shipp shortly before her graduation.

The biography is based primarily on the diary that Dr. Shipp published in 1930 and a few family documents. It is recommended to all of those interested in the problems of medical education in the late 1800s, the efforts of some women pioneers to obtain this education, and how these efforts were translated into work for their communities and family. The book is particularly useful in dispelling the notion that advanced studies were reserved for single women and women without children. Dr. Shipp's biography is important since it points out the sacrifices of a married woman, mother of three living children, expecting a fourth one, who continued her married life, and had several more children after graduation and also a professional career as a clinician and teacher.

— Reviewed by Hannelore T. Loery, C.D., M.S., Ph.D., FACD
Professor of Clinical Pediatric Dentistry
College of Dentistry
University of Illinois
Chicago, Illinois


Prior to 1850, the author notes that a random patient receiving medical care could expect more than a 50-50 chance of being harmed. By 1912 the odds had shifted in favor of the patient. The assignment of credit for these
statistical improvements usually goes to the improvement in medical care resulting from the work of Pasteur, Lister and Roentgen. The author further acknowledges that all rational individuals will accept the statement that "... modern medical practices have done vastly more good than harm." This brief recognition of the positive contributions of modern medicine to human well-being is made in the preface to Medical Overkill. They are among the few laudatory statements one finds in this book.

The author, a practicing pathologist has read widely and is familiar with the history of medicine. Many of his historical references are however distinctly negative. Oliver Wendell Holmes' classic remark, "If all the materia medica as used today were thrown to the bottom of the sea it would be all the better for mankind and worse for the fishes.", is but one example. With this type of selective historical background, Dr. Greene pronounces early in the first chapter of his work that "The United States is in the midst of an unacknowledged iatrogenic epidemic little suspected by the public."

References to dentistry in this work are few, far between and undeniably negative. The first reference is in relation to Medicaid fraud and is brief "Dentists charge for work that is not done." Dr. Greene provides support for his charge with two examples; the first about the dentist who billed for 14 fillings in the same tooth and another who removed 92 "wisdom teeth" for 23 patients in one day. Another mention of dentistry states that "... medical and dental radiation is the largest block of radiation subject to human control."

Chapter titles are decidedly perjorative as a few examples will demonstrate: Chapter 2. Medical Rip-offs: Pain in Your Pocketbook; Chapter 5. Cures Causing Cancer; Chapter 7. Hospitalitis — The Inhuman Routine; Chapter 11. The Uncertain Scalpel — Drama in the Operating Room; and finally, Chapter 13. Vaccines Iatrogenesis of Immunization. Although the author states the purpose of his book is to promote the good in medicine and diminish that which is harmful, he finds little to recommend American medical practice. Even the well informed lay person will not find much in this book that is reassuring about the medical establishment.

The book reads well and will give the interested professional or lay reader a clear exposition of the case against too much medicine. Dr. Greene is particularly lucid in the message that hospitals are to be avoided unless the alternative is death or serious disability. In the chapter dealing with nosocomial infections we are reminded that even at the prestigious Johns Hopkins Hospital, 1 in 1500 entering patients acquired a fatal infection. Other chapters detail the over-use of antibiotics, pap smears and highly sophisticated invasive diagnostic procedures.

Dr. Greene is witty and well organized. The book will provide the medical consumer with good information about the dangers he faces with modern, complex medical care. Chapters on how to choose a well trained physician and the rights of hospital patients are clearly written and informative. There are sixteen chapters in all, supplemented by a bibliography which is arranged by chapter and a comprehensive index. There are no illustrations. The author's admonition that patients need to assume responsibility for their own health, by adopting better exercise and nutrition standards, is rational.

It is unfortunate that the author was not as clear or forthcoming about what is good in modern medicine. The American public, is by and large, well served by the medical community. The only countries where mortality or morbidity statistics are better are generally those with small, homogenous populations, Sweden, Japan and West Germany for example. A more balanc-
ed view may have better served the public's need for information about personal health and the medical establishment.

— Reviewed by Steven I. Gold, D.D.S.
Associate Clinical Professor of Dentistry
Division of Periodontics
Columbia University, School of Dental & Oral Surgery
New York, N.Y.


In the last few years the Federal government has begun to limit our exposure to lead by regulating its use in such things as paint and gasoline. Through the publicity accompanying these decisions, the public has become aware of some of the dangers of lead poisoning. The theme of Dr. Wedeen's book is that these well-publicized areas of lead contamination are only the tip of the iceberg. Our focus on the more blatant forms of industrial lead contamination has lulled us into a false sense of security since the more subtle forms of long term cumulative exposure to lead in the environment continues at an alarming rate.

Dr. Wedeen does not make his point with the typical "Chicken Little" melodramatic rhetoric of many purveyors of gloom-and-doom warnings of environmental pollution. He chooses, like lead poisoning itself, to be more subtle. Beginning in antiquity and continuing to the present, he traces our exposure to lead in everyday life. As the story unfolds, the irony of our relationship with lead poisoning is shown to be always present. On the one hand there is a realization of the danger posed by lead, and on the other hand, there is an abysmal ignorance of the widespread exposure to it that we continue to experience. The ancients were perfectly aware of the hazards of mining and smelting metals. Vitruvius and Galen warned of the danger of drinking water carried in lead pipes.

The subordination of consumer safety to corporate profits is nothing new. Laws against the adulteration of wine with lead compounds go back to the Middle Ages, yet the practice has continued as merchants found that by doing so they could make poor wine taste better and last longer. The symptoms of plumbism-colic, paralysis, encephalopathy, and gout — have been observed for centuries but their connection with lead was seldom recognized. The eighteenth century upper-class Englishman with his legs wrapped in flannel and racked by the pain of gout is a common figure in our histories of the time. Dr. Wedeen suggests that gout, long attributed to over indulgence in wine, was due to its lead contaminates. Modern physicians have studied the physical and mental peculiarities of George III and diagnosed porphyria, but plumbism could account for the same symptoms. The recurrent epidemics of colic throughout the centuries often were caused by lead toxicity. Starting with the eighteenth century the cause was recognized by some but with little effect. Even when the danger of certain kinds of lead poisoning was recognized, the medical community as a whole generally was not convinced and the same holds true today.

In addition to the makers and sellers of wine, cooks, cosmeticians, and physicians have poisoned us with lead. Several of the so-called therapeutic uses of lead are described, including a treatment for cancer as recently as 1925 in which lead was given intravenously.
One chapter gives a history of the medical concepts of urinary secretion. This leads to our understanding, (or lack of it), of the role of lead toxicity in renal function. While Dr. Wedeen is justifiably hard on the medical community for its history of failure to recognize the problems of plumbism or even admit of such a possibility, he fully appreciates that part of the problem has been the need for accurate methods of measuring lead accumulation in the body. Such techniques are now available, however, but are not used often enough.

Dr. Wedeen's book is a thought-provoking history of the contamination of man and his environment by the medical and industrial uses of lead. Laymen might find some of the discussion of renal physiology a little confusing but there are few such areas. Dentists will feel left out because the author never mentions the many earlier uses of lead in dentistry. They can rest assured that they too have been a part of the problem. As early as the first century, A.D., Celsus advised filling hollow teeth with lead before extracting them in order not to fracture off the tooth crown. This would imply that lead was used for filling carious teeth not requiring extraction. Certainly throughout the eighteenth and early in the nineteenth centuries, lead was commonly used as a filling material and dental advertisements routinely offered the service of "filling teeth with lead or gold." But the author's approach, in only 221 pages of text is not encyclopedic. Dentists as well as laymen will enjoy this book. Their attitude about the environment in general and lead in particular will never again be the same.

— Reviewed by Clay W. Stuckey, D.D.S.
Bedford, Indiana


These 20 profiles were originally published as part of a series in Science84 magazine. They have been updated and edited for currency. The profiles are not biographies; rather they are a distillation of the thoughts and ideas as well as a simplified reporting of the most important discoveries made by the scientist. Most are fascinating and easy to read, and this reviewer found it difficult to put the book down once started. Some knowledge of science is needed in order to fully appreciate some of the profiles, but even an interested layperson would both enjoy and profit from reading it.

The persons profiled and their fields are: Subramanyan Chandrasekhar, astrophysics; Sheldon Glashow, particle physics; Carlton Gajdusek, medical researcher; Margaret Mead, anthropologist; Gerald Wasserburg, geophysicist; Robert Trivers, behavioral biologist; Kurt Godel, logician; Bernd Heinrich, behavioral biologist; Frank Oppenheimer, nuclear physicist; Michael McElroy, planetary chemist; Barbara McClintock, geneticist; Charles Darwin, geneticist; Robert Wilson, high-energy physicist; Herbert Simon, economist and behavioral scientist; James Levolock, physician, chemist, biophysicist; Birgit Zipser, brain biologist; John Wheeler, nuclear physicist; John Tuzo Wilson, geophysicist; Mark Ptashne, molecular biologist; and Albert Einstein, physicist. Some are Nobel Prize winners, some are still in the wings; some are alive; some are not; some are young by comparison with others. All are brilliant in their own field and in many other fields. There are recluses among them, but there are also very outgoing individuals among them.
For a person who wants to know about the thoughts of scientists, instead of where they were born, or whom they married, this is an excellent book. For the person who wants more conventional biographical information this is the wrong book since it provides very few of these facts. It is for the person who wants to know a little more about science than he or she presently knows, and who wants a point of take-off in order to learn more. The book is recommended for readers of high school age and beyond who want “a pleasant read” which is also thought provoking.

— Reviewed by Aletha Kowitz, Director
Bureau of Library Services
American Dental Association
Chicago, Illinois


Books on occlusion immediately bring to mind orthodontics, full mouth rehabilitation, or occlusal equilibration to correct T.M.J. or periodontal conditions. It is because the subject has been so treated in the dental literature of the past that the authors chose to write this book. Written for the undergraduate dental student as well as the general practitioner in dentistry, it presents the basics of occlusion theory and the techniques for achieving a good occlusion in restorations; conversely it deals with ways to avoid occlusal problems brought on by improperly made restorations.

The text is copiously illustrated with line drawings. Grey shading and black markings are effectively used for contrast to make the illustrations clear and easy to understand. There are excellent chapters on articulators and mandibular dysfunction as well as the obvious subject of occlusion. The first two chapters “Physiological Principles of Occlusion” and “Examinations of the Occlusion” cover the basics. There are also chapters on “Ideal Occlusal Requirements of Restorations”, “Occlusal Considerations in Restoring Individual Teeth and in Multiple Restoration” and also one on “Periodontal Aspects of Occlusion”.

The main thrust of this work is to supply a basic text on occlusion for the student of operative dentistry. At the end of each chapter is a book list of suggested further reading.

Occlusion is discussed as it relates to the restoration of teeth with fillings, inlays, crowns and bridges. Although partial dentures and full denture occlusion are briefly discussed, the authors do not cover this area in depth. Instead, they refer one to more advanced texts for subjects such as full mouth rehabilitation, partial and full denture prosthesis and other complex dental restorations.

On page 154 the following appears: “Mobility may be checked digitally by placing a finger on the buccal aspect of the teeth. Any tooth movement during closure on excursive movement will be felt (this is termed fremitus)”. I have practiced this clinical procedure for nearly 50 years and was delighted to learn the term “fremitus” at long last. There are many others gems of knowledge to be gleaned from this book.

I found some repetition in the authors’ presentation. This might be justified as a form of emphasis or perhaps on pedagogic grounds; yet, I feel
that the application of “Occam’s razor” by the authors might have trimmed the book somewhat. I also found some of the language and terminology to be somewhat at variance with American usage. I would recommend this book to those who want a “no-nonesense” book on occlusion.

— Reviewed by Max Geshwind, D.D.S.
Jamaica, New York


1985 was the 100th anniversary of Mark Twain’s classic, The Adventures of Huckleberry Finn. Upon rereading Huckleberry Finn to my young daughters during this anniversary year, I was reminded that it can be read on several levels of understanding with several different interpretations depending upon your stage in life. Although it is no Huckleberry Finn, Second Opinion by Myron K. Denney, a New York City surgeon, can also be read on several levels, depending upon one’s perspective. There is the viewpoint of interpretation by the practicing physician or dentist and the viewpoint of interpretation by the patient anticipating surgery. Both levels of understanding and interpretation are handled very nicely in this book for the information is presented in a straightforward yet sensitive manner. The book is not only easy to read, but is indeed interesting and informative, a combination not always available in our reading material.

While Second Opinion does not deal with dentistry or dental procedures specifically, Dr. Denney’s points about treating the patient as a whole and not just as “a tonsil” or “a gall bladder” or for us, “a tooth,” is well taken. Tunnel vision is a big problem in all health care specialists and we simply cannot afford that in dentistry. His points about taking time with patients to explain to them the procedure to be done, the alternatives to that procedure, and the consequences of that procedure are also well taken. It is certainly good practice regardless of our situation, regardless of our practice type. With today’s litigation it even makes more sense to have a patient that is well informed upon every aspect of the treatment one is about to render. So while the book does not deal with dentistry directly, there are some good points to be made that each of us needs to be reminded of from time to time and Dr. Denney does a good job of reiterating these points.

The second level of interpretation that Dr. Denney brings out in this book, and the main emphasis of his work, is the perspective of the patient for whom a surgical procedure is recommended. As Dr. Denney reminds us, “minor surgery is an operation performed on someone else”; but anyone who is contemplating any surgical procedure thinks of it as a major operation; and in Dr. Denney’s opinion, that is a very healthy opinion. Surgery should not be entered into cavalierly or with only half-information. There is a great deal of mystery and mystique associated with surgery and surgeons and Dr. Denney does an excellent job of shedding light on this often misunderstood area of medical practice. The book is an invaluable source of general information concerning over thirty very common operations. There is concise, yet thorough information regarding indications, benefits, complications and alternative methods of treatment for these operations. Dr. Denney makes the point that only a small percentage of operations are true emergencies and therefore the individual patient should have input into the type of operation done, the surgeon, and the anesthetic. While Second Opinion is enjoyable
reading, it is even a more valuable work as an information source for family
or friends or for our patients who may be facing surgery. Huck Finn said
Tom Sawyer's book "was mostly true," but I can say that Dr. Denney's book
is more than "mostly true," it's all true, and therefore would be valuable
reading both from our perspective as practitioners and our perspective as
potential surgical candidates.

— Reviewed by Daniel G. Fields, D.D.S.
Oral & Maxillofacial Surgery
Russellville, Arkansas

**The Non-chew Cookbook.** By J. Randy Wilson. 197 pages, $16.95, Glenwood

This is a cookbook that stemmed from a man's loving need to help his
wife when her jaws were wired shut for six months. With the aid of a com-
puter, the author came up with 200 recipes. Chewing disorders affect over
40 million people in the United States and in this book they will find some
relief in knowing they can eat a well-rounded diet that requires no chewing
at all.

Recipes range from beverages to main dishes, vegetables and desserts.
Main dishes include Chicken and Rice, Turkey Patties featuring twice-ground
turkey, and hot Crab-Avocado Casserole. Desserts feature such sweets as Coff-
eee Pastry Cream, Pineapple Cheese Dessert and Fruit Filling Cake. While
some recipes require a blender, most require only fine chopping and cook-
ing to make them easier to chew. All are appealing and a nutritional analysis
is added for each recipe. There is an additional chapter about nutrition which
helps stimulate those who really don't want to eat at all.

This book is highly recommended to everyone who has teeth, no teeth
and a "jaw-joint," whether it works or not. However, you cannot have my
copy of this book because I'm using it.

— Reviewed by Lloyd E. Church, D.D.S., Ph.D.
Department of Oral Surgery
Holy Cross Hospital
Silver Spring, Maryland

**The Disease Detectives: Deadly Medical Mysteries and the People Who Solved Them.**
By Gerald Astor. 216 pages, $14.95, New York and Scarborough, Ontario,
Times Mirror, 1983.

This book includes an exhaustive discussion of the activities of the
Centers for Disease Control (CDC) in investigating the causes of unusual
— mysterious — diseases; why they occur, what can be done to treat them
and how to prevent future attacks.

For example, the author describes in much detail events that determin-
ed the cause of the epidemic of the so-called Legionnaire's disease in
Philadelphia about a decade ago. When it was finally determined that Rickett-
siae were responsible for the disease, a restudy of several other formerly
"mysterious" epidemics found they too were caused by Rickettsiae. The
C.D.C. found that an unexplained epidemic in St. Elizabeth's Hospital in 1965,
a 1968 illness affecting 144 individuals who worked in a state office building
in Pontiac, Michigan and the epidemic striking a high percentage of guests
who spent a night in Indiana University’s Memorial Union all were caused by Legionella rickettsiae. Apparently this rather rare bacterium has been around for some time, but it took a team of persistent, competent “detectives” at C.D.C. to find and identify them and then determine methods of preventing recurrence of the disease.

The book includes similar dramatic accounts of epidemics of the John Snow disease (cholera) which no longer menaces large numbers of people in highly developed countries, but afflicts tens of thousands of individuals in some parts of the world. In 1981 an epidemic of cholera did affect 18 crew members (and visitors) of an oil rig in Louisiana, and cases still crop up in that area occasionally, but because of the rarity of this disease, diagnosis is often missed.

Also, considered are: Toxic Shock Syndrome, Acquired Immune Deficiency Syndrome (AIDS), long-term insidious effects of environment on human health (including radiation and noxious chemicals), Hepatitis B, Salmonella poisoning, leptospirosis, the “Black Death” in New Mexico (the plague caused by a bite from a flea infested with Yersinia pestis, a short thick bacterial rod) and others.

The author concludes the book with a discussion of possible future activities of the C.D.C. These “disease detectives” are constantly being asked to aid in solving unusual disease problems, and in preventing recurrences. Certainly the “neat, dramatic successes” of the C.D.C. should be sufficient to assure continued support.

I found the book to be fascinating; however, so many details are included, it became laborious reading in spots. The book should be in every health library, since it will serve as an excellent source of information about mysterious diseases and the C.D.C.

Reviewed by Maynard K. Hine, D.D.S.
Chancellor Emeritus
University of Indiana
Indianapolis, Indiana


These two volumes present oral and maxillofacial surgery through a period of very rapid growth to its present status. The progress from a mere handful of surgical procedures to the present list illustrates the remarkable growth of this specialty. All present orthognathic surgery and associated techniques are a result of research done 10 to 20 years ago. Even so, there are many problems yet unanswered. These volumes not only provide answers to many clinical questions, but present stimulus for further research. They are the work of many surgeons and orthodontists who are deeply involved in the treatment of dentofacial deformities. It was found quite early that there was an absolute need for those involved to plan, work and treat patients together.

The authors’ objective was to produce a comprehensive clinical reference on the interdisciplinary art and science of correcting dentofacial deformities by surgery and orthodontics. As a result, we have an atlas of surgical and
orthodontic procedures together with sound diagnostic and biologic guidelines for their application.

The text is profusely illustrated. The selection of contributors is good, although some are more thorough in their presentation than others. Although the historical material presented in some chapters, as in Chapters 5 and 6 in Volume III is correct, it is much too brief. Mere listing of names is not enough. The lack of histological illustrations reduces the value of some chapters. There is no histological presentation of fracture healing, and no discussion of one of the most important aspects of orthognathic surgery — treatment of the unfavorable results.

These three volumes are an outstanding effort by Dr. Bell and his associates to bring all orthognathic surgery procedures together. His results are excellent. These books should be on the desk of all professional people involved and interested in orthodontics and oral and maxillofacial surgery.

— Reviewed by Lloyd E. Church, D.D.S., Ph.D.
Associate Clinical Professor of Surgery
The George Washington University Medical Center
Washington, D.C.

MISPLACED FAITH IN ULTRA-VIOLET LIGHT!

At the turn of the century physicians and dentists were using the newly-discovered rays, including x-rays and ultra-violet rays for a multitude of purposes both therapeutic and diagnostic. It appears to us today that whatever salubrious results were achieved in the following case were probably the result of psychosomatic suggestion. Nevertheless, it’s easy to understand how many dentists fell prey to the purveyors of quack instruments, many of which were featured in past issues of the Bulletin. The below item appeared in The Dentist’s Magazine, Vol. 2, No. 11, November, 1907.

BLUE RAY IN DENTAL THERAPEUTICS

A seven-year-old boy with the lower right first molar, filled one and one-half years before, badly abscessed, and so painful that the child had not slept for three nights. It was very sensitive to percussion; in fact, all the indications of an acute abscess were present. Making an appointment for a later hour, I set about devising an apparatus for using the ray. Needless to say, that apparatus was crude; the results, however, were noteworthy. After thirty minutes’ exposure to the blue ray the tooth could be tapped sharply without pain; the ache was entirely gone, and the swelling completely reduced. The patient enjoyed an uninterrupted night’s rest, and the next morning I removed the old filling and cleaned out the tooth. Here I had a second demonstration of the efficacy of the blue ray. In cleaning the putrescent canals a particle of the cleansing agent apparently found its way through the apical foramen, causing excessive pain. Thirty seconds’ exposure to blue light brought complete relief, and the filling was completed without further inconvenience.

—Dr. W. J. Hodgson
Dr. Richard A. Glenner (left), Academy Historian, examining some of the items of dental advertising art exhibited by Dr. Gary Lemen of Sacramento, California.

Commemorative plate, especially commissioned by the Lindsay Club, Britain's counterpart to the Academy, which was presented at the meeting to the Academy president.

More Scenes From The Annual Meeting

President-elect Dr. Ben Z. Swanson, Jr. (left) receiving congratulations from outgoing president Dr. Ernest Beerstecher.
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Developing a broader understanding of the facts of dental history among the leaders in dentistry in order to aid them in their attempts in solving important problems in dental education and practice.
Stimulating more thorough and comprehensive research in dental history, thereby extending the boundaries of dental knowledge, giving substantial support to growing professional culture.
Creating an authoritative body to which important questions relating to dental history could be referred for factual verification.
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BOOK REVIEWS
Dental Treatment in the Stone Age

—Pia Bennike, Ph.D.
Lise Fredebo
Copenhagen, Denmark

Almost 2000 years ago the two Roman physicians Archigenes and Galen recommended that a hole be drilled into the pulp of aching teeth. However, skeletal finds from that time with evidence of such treatment have never been described. It was therefore surprising to find a skull dating back to the stone age in a passage grave on Langeland, Denmark, with a hole drilled into a carious molar using a flint drill. Through this extraordinary find it is possible to demonstrate that not only trephination or craniotomy was known in pre-historic times, but that dental treatment to relieve toothache was also used more than 4000 years ago.

It is almost inconceivable that our ancestors in pre-historic times should not have used extraction of teeth as an effective method of treating toothache. It is, however, difficult to prove such a practice by examining pre-historic skeletons, since extraction does not leave evidence distinguishable from natural loss of teeth.

Other traces, for example as a result of various attempts to clean the teeth, are easier to prove, and it is not uncommon to find evidence of the use of toothpicks in the examination of skeletons. Among some of the earliest Danish skeletons from the Mesolithic period* which are approximately 7000 years old, Alexandersen has shown grooves between molars, a result of diligent use of toothpicks made, for example, of bone.

On a skeleton dated much later, and one which happens to be the remains of a famous person, the Danish king Christian III (1503-1559 A.D.), the traces on the facial surface of the front teeth show that they have been rubbed or polished with some material, and the teeth also show signs of the use of toothpicks.

Following an examination of an anonymous skeleton from the middle ages from Aebelholt monastery, Moller-Christensen found a dental cavity with a pearl firmly embedded in it, and he concludes the pearl had been placed there to fill the cavity.

Turning to the finds of a similar nature in other parts of the world, among the best known are those of the Etruscans who used prostheses and bridges made of animal teeth as substitutes for the loss of natural teeth. These finds date from ca. 500 B.C., and not until 1700 A.D. do we find anything similar in Denmark.

The two Roman physicians, Archigenes and Galen from ca. 100-200 A.D.,

*In Denmark the Mesolithic age covers the period from 8300 to 4200 B.C., while the Neolithic is divided into three main phases: Early Neolithic (4200-3200 B.C.), Middle Neolithic (3200-2400 B.C.), and Late Neolithic (2400-1800 B.C.).
were familiar with dental drilling since both recommended that treatment for toothache. They recommended drilling directly into the middle or pulp of the tooth.

Even though this form of treatment has been known for 2000 years, the literature mentions no skeletal finds from Europe with evidence of dental drillings from these early times. Perforations of teeth have been described on Indian skeletons in both South and Central America, but most of these are only a few hundred years old. Since there is no evidence of dental disease, the perforations were presumably a form of mutilation done for the purpose of ornamentation or as a symbol of status. 4

The literature according to Leek5 shows descriptions of two skeletal finds from Egypt with holes presumed to have been drilled not into the teeth, but in the bone tissue of the lower jaw. A later examination concluded that these perforations were caused by abscesses at the apex of the tooth.

Fig. 1. Neolithic male skull from a passage grave on Langeland, Denmark, with a circular hole between the two facial roots of 7+. Photo: G. Hahn.

It was therefore surprising to discover during an anthropologic study of bones from a passage grave** in Langeland, Denmark, dating back to 2000-3000 B.C., the skull of an adult male with a molar (7+) in which it seemed that a hole had been drilled (Fig. 1).

**The great passage graves characterized by a narrow opening passage way were built during the Middle Neolithic period, and could contain over 100 individuals.
We know from many finds that flint drills were used to perforate animal teeth and amber for jewelry, and that the technique of drilling was known even back in the Mesolithic period in Denmark from the discovery of parts of these drills. In principle, they resemble instruments used to make fire. (Fig. 2)

In spite of the fact that the prehistoric population had drills, as far as we know there has not been any evidence of treatment using drilling into a firmly rooted tooth either in the large collection of skeletons in Denmark or in the rest of Europe.

The discovery of a firmly rooted human tooth with a drilled hole among the bones of a Danish passage grave posed a number of questions which had to be answered. It was necessary to determine if the skull could be dated back to the Middle Neolithic period when the large passage graves were built. In addition, it was necessary to determine how the hole had been made, and, if possible, why the treatment had been carried out in the first place. Finally, it was important to determine if the operation had taken place while the man was alive. These questions will be dealt with below.

The passage grave at Hulbjerg on Langeland contained more than 2000 bones and fragments of bones. As is usual in such passage graves, the bones were scattered without the appearance of any anatomical connection. That, at least, was the impression which the excavator, the late museum director Hakon Berg, got in 1960 when the passage grave was opened.

When the individual bones were later examined, it was possible to determine with the help of detailed excavation drawings and numbered bones, that the bones of a given individual often were found in close proximity. It had been debated why the bones in passage graves almost always lie in disarray. An exact anthropologic analysis has demonstrated that the skeletons were pushed aside when a newly deceased was buried. The many bones showed that the passage grave contained at least 53 individuals including 17 children. The passage grave was presumably used during several periods in the Middle Neolithic period between 3200-1800 B.C. (J. Skaarup, personal communication).

After this passage grave was closed, it remained undisturbed until 1960. During the excavation the individual bones were carefully numbered as previously mentioned, and their position in the passage grave registered on drawings and photos. As one of the few exceptions the skull with a hole drilled in the tooth lacked a number, and initially had to be considered undated.
Through perseverance, the matching lower jaw was found. It was not an easy task, since more than 30 loose laws and fragments of jaws had been excavated. From the number on the lower jaw its placement could be determined, and in close proximity a skull was located on the excavation drawings with a number not used for any other skull. On a corresponding photo of the excavation site it was possible to identify the skull partly on account of a large lesion on the right side which happened post mortem. The skull was not lying in the upper layer of the passage grave, but had been excavated from the middle layer in the actual chamber of the grave. It must therefore be concluded that the skull belongs with the other skeletons, and that it must be between 4000 and 5000 years old.

The cavity in question which is found on molar 7+ of the skull is located between the two facial roots. It is a circular, conical cavity with a maximum diameter of 4 mm and a depth of 6 mm which did not continue into the lingual root.

The large cavity is located at the mesial surface of 7+ and the distal surface of 6+. On 7+ the caries is so pronounced that it has led to an infection of the soft parts and nerves of the tooth. This has resulted in a chronic inflammation and root abscess on the disto-facial root manifesting itself in a rounded cavity. From there the drainage has taken place through perforation of the bone.

In both upper and lower jaw one finds advanced atrophy of the tissue around the roots of the teeth, a condition we today recognize as pyorrhea or periodontitis in which the roots of the teeth are gradually exposed. The roots of the last molars in the upper jaw (8+ and 7+) are exposed the most which may be a result of the lack of counterpressure from the two antagonists (8− and 7−). The 8− probably never surfaced while the other molar (7−) must have been lost at an earlier date.

The reason for drilling the tooth was an attempt at pain management since the demonstrated pathological changes of caries, abscess and pyorrhea often result in severe toothache and facial pain. The examination showed that not only was a hole drilled between the two facial roots on 7+, but an attempt was also made to drill between 7+ and 6+ where carious lesions were noted on both sides.

The Roman physicians mentioned earlier stated that when the tooth turned black it was a case of gangrene of the pulp, a form of putrefaction during which gases are generated leading to tension and pain in the tooth. They therefore recommended trephination i.e. drill-
ing into the tooth to lessen the pressure. However, it is not evident whether the treatment was effective, nor do we know if the evidence of treatment using the Stone Age drill actually helped the man from Langeland.

In order to illustrate how the drilling of the tooth was done, a drill was re-constructed using a flint from the Stone Age (Fig. 3). A hole was drilled into the contemporary tooth 7+. It took 5½ minutes to drill a hole identical to the one in the Stone Age tooth.

The cavity in the contemporary tooth now had to be compared to that of the Stone Age tooth, and to holes drilled in the Stone Age into teeth of animals and amber. The examination was carried our using scanning electronmicroscopy which not only magnifies greatly, but also provides depth of focus.

The comparison of the cavities in the two teeth showed great similarity in the surface texture (Figs. 4 and 5). A comparison with holes drilled in the teeth of animals and amber from the Stone Age showed a similar pattern. It is therefore likely that the cavity in the tooth of the Stone Age man had been made with a drill like the one reconstructed.
The last question to be answered was whether the hole in question was made while the person was living. The conical shape of the hole and the circular scratches are consistent with using a flint drill, and it is highly likely that the described pathological changes caused great pain leading to the operative procedure. However, the most telling evidence is the tartar found on the inner surface and edge of the drilled hole during the electronmicroscopic examination (Fig. 6) and a magnification of x4000 shows the tartar more clearly (Fig. 7). That means that the man not only was alive when they drilled into his tooth, but that he also lived for some time thereafter since tartar was formed. If he spent the remainder of his life with or without toothache remains uncertain.

The passage grave also contained a male skull with a partially healed trephination in the left temple, and we here see the result of a successful surgical operation. From the Neolithic period a total of 12 Danish skulls with evidence of trephination have been found9. Two of these were discovered on the islands south of Funen, Langeland and Aero, while the remainder are from regions scattered around the country.

It is likely that the treatment of toothache has been attempted in other locations in prehistoric times, but it is on Langeland that we have the first and earliest evidence that dental treatment in the form of drilling a hole was performed in the Stone Age.

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Fig. 6. Scanning electronmicroscopy of stone age tooth with hole drilled into it. On the inner surface of the hole and on the edge tartar is found. Photo: G. Hahn.

Fig. 7. Scanning electronmicroscopy of tartar from the inner surface of the hole drilled into the stone age tooth. Photo: G. Hahn.
REFERENCES


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Tufted Toothpicks and Teeth Blackening Customs in *Ukiyoe*.


Niigata, Japan

Many dental practices are portrayed in a popular Japanese art form called Ukiyoe — literally "pictures of the floating (evanescent) world." These colored woodblocks were immensely popular for over a hundred years and portrayed many facets of society from the life of courtesans to scenes in the theater. Among the customs frequently pictured were the use of a willow twig as a tufted toothbrush and the blackening of the teeth by married women and prostitutes for cosmetic, as well as superstitious, reasons.

The *fusayoji*, or tufted toothpick, first became popular in Japan as a toothbrush during the Edo era (1603-1867). It is generally accepted that its use in Japan originated with Buddhist priests who emigrated from India by way of China, bringing with them both their spiritual philosophy and their personal hygiene habits.

In India, pieces of linden wood, from the mulberry tree family, were used. Called *shiboku*, or toothwood, they were eight to twelve fingerbreadths in length. The Buddhist priests chewed these sticks every morning, creating a tuft on one tip. This tufted stick was used to clean the mouth before participating in daily services, and thus became an important item of the religious ceremonial equipment.

In Japan, toothpicks are known as *yoji*, and are so called because of the wood from which they are made; *yo*, in Japanese, means the willow tree, and *ji*, a branch. Therefore, *yoji* means that which is made from the branch of a willow tree. In addition there were toothpicks known as *hoyoji*, *tsubouchiyoji*, and *uchiyoji*. It was not until the previously mentioned Edo era that the *fusayoji*, or tufted toothpick, became popular.

Suitable lengths of wood, varying from 9-30cm and averaging 12cm, were beaten on the edge to form a tuft approximately 2cm in length. Long versions were known as *daiyoji*, or big toothpicks. The central part of the *daiyoji*, which was to be held with the hand, was squarely cut. The non-tufted end was tapered in such a fashion as to be useful for *shitakoki*, or tongue scraping. Versions with tufts on both ends and *shitakoki* on the edges have been discovered.

Toothpicks used by women were made out of the branches of a willow tree, while those for men were cut from the trunk of the tree. The women's toothpicks were softer in order to prevent scraping away the carefully applied *ohaguro*, or black tooth dye.

*Boshisuna*, a special polishing powder, was an integral part of daily bathing routines. This sand came from Boshu (the present-day Chiba prefecture), and was mixed with water, and then blended with yet another toothpowder scented with musk. A tooth polishing salt, such as *gyotoku* salt of Shimofusa or *Kira* salt Mikawa, and/or camphor was then added to the above combination. This ancient toothpaste was put on a wet *fusayoji* and used to cleanse the teeth. The tufted pick was also used as a brush to apply the *ohaguro* (black dye) to the teeth.
Fig. 1. A woman of the Meiji era brushing her teeth before breakfast with a fusayoji or tufted toothpick made of a willow twig. Ukiyoe, or colored woodblock print by Yoshitoshi Tsukioka (1839-1892).

From the Bunka (Bunsei period of the Edo-Meiji eras), ukiyoe artists, such as Harunobu, preferred to depict the courtesans in their paintings as holding fusayoji. These pictures were mildly erotic because of the early morning state of deshabille of the women.

Superstitions about both the willow tree and the fusayoji abounded. In Yoshiwara, because of the phonetic similarity of the words fusayoji and yoji (meaning business), guests of courtesans avoided the purchase of a single toothpick as this suggested they might be only onetime customers. The courtesans did not look favorably on those who were not regular and frequent patrons.

To prevent a variety of evil consequences, it was recommended that the fusayoji be bent in half prior to disposal.

These superstitions were taken seriously, as evidenced by the behavior
of the guests who frequented the Yoshiwara brothels. Even a dapper Edo boy on his way to the community bath, towel draped over his shoulder, showed his belief in these ideas... not only did he carry fusayoji in his tooth polishing bag, but also in his hair, and each toothpick was faithfully broken in half before it was thrown away.

**OHAGURO—THE ANCIENT JAPANESE CUSTOM OF DYEING TEETH BLACK**

In Japan, there existed a custom of having teeth dyed black which was generally referred to as Ohaguro or Kane-tsuke. In the old Imperial Court, it was called Desshi. The origin of this custom can be traced to ancient times. In the ancient Chinese book *Gishi-wajinden*, which is believed to have been written about 2,000 years ago, is the description that "to the east of the Kingdom, in the distance of more than one thousand miles over the sea, there is located a country of black teeth." It is generally believed that this country is Japan.

References to Ohaguro can be found only during and after the medieval ages. During the Heian period (9th century-mid 12th century), Ohaguro was practiced among the Court nobles, and during that period, the custom was prevalent among men as well as women. It is believed that men practiced it for a variety of reasons, among which were that it projected their amorous intentions, it created for them a gentle and tender appearance, and it represented a clear statement of their social status.

It is further believed that the custom of Ohaguro which had been practiced among the Samurai warrior class may have derived its origin from the Heike clan. During the last days of the Heian period, the military commanders of the Heike clan had become so powerful in central political cir-
cles that they began to assume the mannerisms and styles of those of the Court nobles. The practice of Ohaguro by the Samurai class was regarded as an expression of their invariable loyalty to their lord. However, its practice by males declined after the Muromachi period (15th century-mid 16th century) and was no longer popular among the general public.

It was during the Edo period (early 17th century-mid 19th century) that the custom for married women to dye their teeth black became widespread. The practice of Ohaguro by women had originated as part of their cosmetic regimen, and during this period almost all women were dyeing their teeth black when they became eligible for marriage.

Within the Edo period, by the time of the Genroku age (1688-1703), a large segment of the population had become wealthy, and their style of dress was expressed more gaily. During this age, the custom of Ohaguro had spread widely among common women, and, it was later established as a custom practiced by married women. Portrayal of Ohaguro was incorporated into various arts such as Ukiyoe, Kabuki, and the Noh-play, and was generally depicted as one practiced by beautiful women.

The Sengoku-jidai (the age of continual civil wars and strife) in Japan (about 1467-1568) became known as the age in the history of Ohaguro during which women began to dye their teeth at very young ages. During those days, warriors forced their juvenile daughters to practice Ohaguro; they hoped thereby to enhance their chances to arrange marriages for political reasons without regard for their daughters’ wishes. The daughters of these Samurai were attired in brilliantly colored bridal costumes and dyed their teeth black even when they were younger than ten years of age, in order to attract potential husbands.

By the middle of the Edo period (18th century), a cosmetic kit for the practice of Ohaguro had become one of the necessities of a bridal wardrobe. The kit consisted of a Fushi box (to contain Fushino-ko), Kanemizu (tooth-dye water) vessel, Watashi-gane, Tsuno-darai, gargling bowl, Ohaguro-brush, Fusayoji, and an Ohaguro pot. All of these items were stored in an Ohaguro box and brought to the new home by the bride.

The materials used for Ohaguro were Fushino-ko and Kanemizu. The former is a dried and powdered morbid lump produced by a worm (Nurudeno-mimifushi, Melaphis chinensis, Bell, or Melaphis Miyabei, Mats) on the leaves of the Nurude tree (Rhus javanica L.) or one of the trees of the Japanese sumac family. The primary ingredient of Fushino-ko is tannic acid, which has an astringent taste. Kanemizu is a compound consisting primarily of water, Sake (Japanese liquor made from rice), vinegar, and tea. The compound is kept

Fig. 3. A housewife of the Edo era admiring her blackened teeth in a hand mirror. Ukiyoe by Utamaro Kitagawa (1753-1806).
in an Ohaguro pot with an article of old iron (such as an old iron nail) and stored in a dark, cool atmosphere. The Kanemizu is used for Ohaguro when the Kanemizu has formed rust on the iron surface. It is believed that numerous secret recipes existed for the preparation of Kanemizu.

The method for dyeing teeth was to apply Fushinoko and Kanemizu alternately or to mix them with an Ohaguro brush (or Fusayoji). Since Ohaguro adheres to the tooth surfaces with difficulty, the skin of a punic apple was sometimes rubbed over the tooth surfaces to enhance adhesion.

It was the custom for a newly married woman, before she applied Ohaguro for the first time, to visit her relatives and friends to request a small amount of Kanemizu from each of seven homes. It was further regarded as charming to be particularly adept at making the teeth dye easily and well.

Teeth painted with Ohaguro were found in a skull excavated from an ancient grave, and these teeth were relatively caries-free. However, there is no indication in written records to indicate that Ohaguro was applied as a caries preventive. According to legend, if a devil entered the mouth, he caused decay. To prevent his intrusion, people protected their teeth through the application of dye. Thus, evidence suggests that the custom of Ohaguro originated both for cosmetic purposes and from superstitious motives, and continued to be practiced for more than a thousand years. The fact that the custom appears to have had an effect in the prevention of caries is an interesting sideline to a highly unique custom.

The actual mechanism by which Ohaguro prevents caries has been clarified by Dr. Yamaga and his coworkers. The principal component of Kanemizu is a solution of iron acetate. If this solution is applied together with tannin of the Fushinoko on the surface of teeth, it produces a black insoluble tannic acid-iron compound that dyes the surface of teeth black. Tannic acid-iron is a strong chemical compound that is capable of rendering tooth surfaces relatively free from caries. Applying these chemical principles of Ohaguro, Dr. Yamaga and others have developed a sodium-ammonia-fluoride which is now widely used as an agent to inhibit caries in primary teeth.

Though quite popular during the Edo period, the custom of Ohaguro gradually declined during the Meiji era (late 19th century-early 20th century) with the introduction to Japan of European and American culture and civilization. In the 6th year of Meiji (1873), Her Majesty the Empress ceased to follow the traditional customs by which married women shaved off their eyebrows and dyed their teeth. Thereafter, interest in Ohaguro began to decline among the general public. Although traces of its practice have been found as late as the period immediately following the Second World War, the custom is no longer practiced anywhere in Japan.

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The Enigma of Tic Douloureux Before 1900

—David O. Moline, D.D.S.
Iowa City, Iowa

Trigeminal neuralgia has historically been one of medicine's thornier dilemmas. Even though new treatment modalities are providing heretofore unknown relief, much research has yet to be done to ascertain what cause or causes are responsible for the problem.

Trigeminal neuralgia is a very puzzling disease. By its very nature it is difficult to study. The pain may come and go very rapidly and be of such severe intensity, although momentarily, as to almost disable the sufferer. The description by Dhopesh in Rose's Internal Medicine for Dentistry is quite generally representative of clinical descriptions given over the past 1,000 years.

"Trigeminal Neuralgia (tic douloureux) is characterized by brief paroxysmal attacks of severe pain in the distribution of one of the three divisions of the trigeminal nerve. The pain is so excruciating that it causes the patient to wince with obvious facial contractions, hence the name tic douloureux".1

As we study the innervation of the fifth cranial nerve and its divisions and ultimate innervation, it soon becomes apparent that trigeminal neuralgia must be associated with a dysfunction of some part of the fifth nerve. Indeed this is the case, with the most common site being the second or maxillary division of the nerve. The pain site then, in this case would be approximately the middle third of the face.

Because the disease was so mysterious in onset and duration, with no apparent external etiology, many of the early investigators attached a name to the disease that they thought best described the problem. This makes tracing its course through the early literature a very confusing problem because of the many names: autalgia dolorosa, Dolor cruciens faciei, Heterocrania, neuralgia faciei, prospalgia, trismus dolorificus, trismus maxillaris, leqvet, neuralgia facialis spasmodica, dolor faciei Fothergalii, hemicrania idiopathica, and Fothergill's disease.3, 4 In some way or another, each name is at least partially descriptive of the disease. It was not until well into the 19th century that the profession settled on the two most common names by which we know the disease, trigeminal neuralgia and tic douloureux.

There are some generalities that can be made about the disease: it is a condition involving a nerve or nerves of the head and face; it is intermittent or spasmodic and often paroxysmal in nature; it usually involves only one side of the face; it is very painful and it may be marked by a twitch in response to the pain. The etiology is largely unknown and little has changed about these observations in the past 1,000 years.

EARLY DESCRIPTIONS

Avicenna's description is thought to be the first of a neurological problem relating to the face. However, Heyck in Headache and Facial Pain reports that according to McGowan, the "Chinese physician Hua-t'o was beheaded during the Han Dynasty (25-220 A.D.) for his audacity in recommending trepanation of the skull to treat the facial nerve of a high ruling general who probably had trigeminal neuralgia." He further reports that "in the early middle ages Albucasis . . . recommended cauterization of the nerve by a hot iron. Penman (1968) states that a letter of medical advice by the Venetian physician Massa (1550) was the first description of tic douloureux in the Western
UNDER THE PATRONAGE OF
HIS MOST GRACIOUS MAJESTY GEORGE THE IV.
And humbly dedicated, by permission,
TO HIS ROYAL HIGHNESS THE DUKE OF CLARENCE.

OPINIONS
ON
The Causes and Effects
OF THE DISEASE DENOMINATED
TIC DOULOUREUX;
DEDUCED FROM PRACTICAL OBSERVATIONS
OF ITS SUPPOSED ORIGIN,
IN
Lateral Pressure, Distortion or Undue Contact in the Teeth;
BUT MORE PARTICULARLY THOSE NEAREST
THE MAXILLARY SINUS,
And thence conveying its distressing sensations to the more
distant extremities of the system.
THE WHOLE ILLUSTRATED BY
Three Lithographic Engravings,
WITH ANNEXED CASES CONFIRMATORY OF THE OPINIONS AND SUPPOSITIONS,
AS ALSO
A PECULIAR, AND EASY MODE OF ASCERTAINMENT,
AND CURE;

BY CHARLES BEW,
Surgeon-Dentist to His Majesty, and Royal Household: and also to their
Royal Highnesses the Duke and Duchess of Clarence.

LONDON:
WILL BE SOLD BY THOMAS AND GEORGE UNDERWOOD, 32, FLEET STREET; AND
IN BRIGHTON, BY J. CORDWELL, REPOSITORY OF ARTS, EAST STREET; AND AT W. TUPPEN'S LIBRARY, MARINE PARADE.
1824.

Fig. 1. Title page of a text of 1824 by Charles Bew, Surgeon-Dentist to His Majesty, King of England, dealing with the supposed causes and recommended treatment for Tic Douloureux.
world. Fehr and Schmidt (1671) gave it its first German characterization. It is generally recognized that John Fothergill's monograph in 1773 was the first English description of the disease.

Some mention the proximity of certain arteries to a portion of the nerve as a cause of the problem and claim it to be a recent discovery. However, Jurjani, a famous Persian physician who lived from 1066-1130, wrote in his *Thesaurus of the Shah of Khwarazm* the following:

There is a type of pain which affects the teeth on one side of the whole jaw on the side which is painful. With the pain there is a spasm of the face and anxiety. It should be known that the pain is from the nerves which are attached to the root of the teeth. The cause of the spasm and anxiety is the proximity of the artery to the nerve.

**AVICENNA'S DESCRIPTION**

There have been many translations of Avicenna's great work, the *Qanum* and each has engendered criticism. A recent translation by Dr. N. O. Ameli of Teheran attempts to rectify the problem. The relevant portions regarding the face and teeth are taken from this translation.

Leqvet is a type of organic disease affecting the face, and it causes abnormal changes on one side of the face, including lips and eyelids. The cause of this affection is either paralysis or spasm. In the paralytic type, as one side of the face has become weak and loose, the other side pulls it. This is when the condition is severe. If it is slight only one side is affected. If paralysis remains for 6 months, there is no hope of its cure. Know that sometimes Leqvet is a forerunner of hemiplegia. For this you have to be observant and careful to find if there are any signs of epilepsy or stroke.

SIGNS: the patient can blow with only one side of his face, and spit from one side. He cannot hold air in his mouth. If it is of spasmodic type, he may have pain in his face and head. In the paralytic type you can pull the diseased side and restore the natural shape of the face. Movements of the face are weakened and the face is soft to touch. The lower lid falls down and the skin under the chin on the same side as the affected eye is also soft and hangs down, and the tongue is also a little affected. Know the signs of spasmodic Leqvet; there is not much change in power and sensation. The skin of the forehead is pulled, and the muscles of the face are hard, and the part of the face affected is pulled down towards the neck. There is a diminution of saliva and moisture of the mouth. It is difficult to pull the face to its normal position. The other sign of the disease is pain in the face. The skin is dry and there are convulsions on that side of the face.

After the clinical description there follows a lengthy account of treatment, with emphasis on difference of treatment of the two types. For the "spasmodic" type Avicenna warned against using poultices, liniments or "warm" medicines. Repeated hot baths, rest in a dark room and wine were suggested and the physician was cautioned to be patient.

**LATER REFERENCES**

Dr. Samuel Fothergill in his 1804 monograph on tic douloureux cites the case of a Dr. Laurence Bausch, physician of Schweinforth, Franconia, who died because of the disease. Fothergill quotes from a 1688 publication:

He retired four years ago when he complained that the sensitive parts of his right jaw were weakened by the pain of a puncture; but in the interval he bore so much and so gently, treating (his illness) as of no importance, although the channels were driven more deeply because of this very
delay. Slipping into a more severe state on the 13 November last year he became so ill that our blessed one scarcely arising from his bed was able to digest nothing wholly solid; with immense pain like a thunderbolt suddenly pervading the sensory nerves of the jaw and brain he was worried to distraction.9

Dr. Bausch may have been afflicted with an oral cancer and not trigeminal neuralgia. No citation seems to exist where death of the patient is attributed to the disease, except perhaps suicide.

John Fothergill, a prominent London physician and uncle of Samuel, wrote the first fairly comprehensive article on trigeminal neuralgia in English in Medical Observations and Inquiries in 1773.10 His description is comprehensive and based upon his experience with patients with the disease. He states that the disease is more frequent in women than men and more common in older persons. The pain is described differently by different persons; it may be sudden, paroxysmal, excruciating, as often at night as day, with the slightest touch or breath initiating the pain. The pain is most frequently confined to the upper jaw, with occurrence in the lower jaw being very uncommon. So complete is his description of the pain, it could have been taken from any current text.

As to treatment, he is in a quandary as are most of the other early describers. He states that while opium will take away the pain “the cure is worse than the disease” in that the unpleasant side effects were often worse than putting up with the disease. Although recognizing that it is not a cure, he suggests the use of an extract of hemlock as giving the patient the most relief.

In 1790 John Moffatt wrote Artaeus, eight books on the causes and symptoms of acute and chronic diseases. One chapter was on cephalalgia. The following citation illustrates the confused understanding of head pain in the eighteenth century, but the passage certainly sounds like trigeminal neuralgia:

If the head, from any evident cause, is suddenly seized with pain, which lasts for several days, this affection is called cephalalgia. But should the pain usually remain a long time, increasing and becoming more violent at many different periods, attended with difficulty of cure, it is called cephalea. Of this there is great variety, in some the pain is constant, small and never intermits, others are seized with it at different revolutions, like those who labor under a quotidian intermitting fever, in others the attack is about sunset, which lasts till midday, and then it entirely ceases, or it begins at the last mentioned time, and lasts till the evening, or even through part of the night, but this revolution is not of long duration. Sometimes the whole head is pained, at other times the right, and again the left side, and now the front or back part of the head, all these frequently happen, in a very vague manner, the same day. But in other instances the pain is stationary, and affects only the right or left side, extending to the temple, the ear, one of the eye brows, the middle of the eye, or as far as where the nose serves as a partition between the two, beyond which the pain is not felt, this affection of one half only is called haeterocrania, which is by no means of a trivial nature, although it intermits, and at first appearance is slight, for should it make an acute attack, the most dismal consequences ensue, spasm and a distortion of the face, the eyes are fixed and rigid like horns, or being affected with spasm internally roll about here and there, insensible to light, the pain in them is deep, penetrating even to the meninges, a profuse sweat, as if it proceeded from a violent stroke, immediately flows from the tendons, which cannot be suppressed, nor can any reason for it be assigned, nausea and vomiting are likewise concomitant symptoms, and the patient being no
longer able to stand falls to the ground, if the disease increases, death is the inevitable consequence. But should it be in a smaller degree and not highly dangerous, it continues for a length of time, and the concomitant symptoms are, great sluggishness, ambiguity of mind, with a very disagreeable burthensome life, for the patient shuns the light, and finds some relief only in darkness, he has no relish for seeing or hearing anything pleasant, the olfactory nerves are affected, and the most odoriferous smells give no delight, the aversion to such as are disagreeable is likewise great, life itself is hated, and death is ardently wished for. The cause of these calamities is, a great degree of cold, attended by driness, but should the disease still be protracted, and gather strength more and more, the violent pain is succeeded by vertigo, which is the subject of the following chapter.

In 1804 Dr. Samuel Fothergill, nephew of John, wrote a monograph of 105 pages on tic douloureux. He begins with a lengthy description as well as the history of the disease. Then he spends considerable time on case reports of patients he has seen. In Chapter 9 he writes:

"Of the inefficacy of the most medicines, in the cure of this cruel disease, we have abundant and melancholy proof. Those which have been said to procure ease, are, Opium, Cicuta, Zinc, Stramonium, Belladonna, Argentum Nitratum, and Arsenic. But the instances in which a cure was effected by their use, are very rare: indeed some practitioners, from painful experience, deny their efficacy altogether. All manner of topical applications, from blisters to the smoking entrails torn from living pigeons, have been in vain applied; and baths and bleedings of all sorts."

He then continues and reports about two possible cases of tic douloureux caused by venereal disease and the use of mercury in their treatment, noting, however, that in other cases of tic douloureux, mercury had no effect:

M. Watson, Professor of Chemistry in the Central Schol of Vaucluse, relates two cases of tic douloureux arising from venereal causes. The first was of an officer in the French army, aged thirty; the other, that of a lady, aged forty. They were both completely cured by a course of mercury. These cases in some respects differed from the morbus crucians, but had its most distinguishing characteristic, darting pains in the direction of the nerves. We learn nothing more from them, however, than that, where the symptoms of the morbus crucians are excited by the existence of a venereal taint in the habit, they will depart when that taint is overcome by the action of mercury: but it is found from experience, that in ordinary cases the symptoms are not in the least relieved by the use of mercury.

THE USE OF GALVANISM AND MAGNETISM

By this time, electricity was becoming popular as a treatment modality, and he reports an interesting case that was brought to his attention by another practitioner:

"Recourse has next been had to electricity, to magnetism, to actual cautery, and finally, to the section of the affected nerves. Electricity sometimes procures temporary ease, but, as frequently, increases the pain; though Mr. Blunt, in the Medical Journal, relates the case of a lady afflicted with tic douloureux being cured by electricity.

The pain was chiefly seated in the right temple, and the symptoms are so well described as not to be disputed. She was electrified twice in the day for several minutes each time, first with sparks, then with shocks, after having previously endured a long and ineffectual course of powerful medicines. Immediately after the second application of electricity, she ventured to eat, and performed that necessary operation without any inconvenience. The pains afterwards recurred very slightly; the electricity
was continued; and in the course of a short time, she became entirely free from the complaint. The decided success of this, though a solitary case, in such a dreadful disease, authorizes us to hope that future trials may be made of the application of electricity. 14

Dr. Fothergill philosophized about so-called “wonder treatments” and then launched into a sermon on medical quackery:

Magnetism, about thirty years ago, was as hotly pursued as is Galvanism, or Perkinism, in this our time. It was the fashion of the day, and consequently applied to every affection of the body; to charm a cancer from the tongue, or chase a pain from the great toe. — Of course, such a wonder-working and miraculous agent, was tried in the morbus crucians; and, as we might expect, there were not wanting those who immediately attested its powers, and confirmed its efficacy, the pain instantly retreating upon its application.

In some few cases, where the disease was recent, and the pain slight, the use of the magnet certainly procured ease; but merely, I should conceive, by forcibly acting upon the imagination; like the modern tractors, and all such absurdities, with which the credulity of mankind is daily gulled, and deservedly duped. Indeed it is much safer, and more prudent, to ease people of their superabundant cash with a patent, than to delve into their pockets without one; the one practice is attended with riches and honor, the other with infamy and disgrace. 15

SURGICAL ATTEMPTS AT TREATMENT

Fothergill reported the works of several surgeons who had “divided” the nerve and hoped, by severing it, to stop the pain. Some of these surgical operations are described in detail. 16 His conclusion was that nothing known at that time was efficacious in treating morbus cruciens, his term for tic douloureux.

In 1822 Benjamin Hutchinson published a fairly long (189 pages) and comprehensive study in-

CASES
OF
NEURALGIA SPASMODOICA,
COMMONLY TERMED
TIC DOULOUREUX
SUCCESSFULLY TREATED.

By BENJ. HUTCHINSON,
FELLOW OF THE ROYAL COLLEGE OF SURGEONS OF LONDON, &c. &c.

SECOND EDITION,
ILLUSTRATED WITH
ADDITIONAL EXAMPLES OF THE SUCCESS ATTENDING THE AUTHOR’S MODE OF MANAGING THIS DISEASE:
AND WITH A PLATE REPRESENTING THE DISTRIBUTION OF THE NERVES OF THE FACE, USUALLY AFFECTED.

Quicquid in arte med. possum prominer curae,
Quod non, FERRO, liquidare potent elecra.

LONDON:
PRINTED FOR LONGMAN, HURST, REES, ORME, AND BROWN,
PATERNOSTER-ROW.
1822.

Fig. 2. Title page of the thorough and well documented book by the English surgeon, Benjamin Hutchinson, published in 1822.
cluding case reports of "neuralgia spasmodica douloureux." After some introductory remarks, he describes the anatomy of the fifth cranial nerve and then discusses what he believes is the correct name of the disease. He quotes several earlier writers, including Pujol, Fouquet, Fothergill, Astley Cooper, Lenten, Hartenkeid, Heldebrande and Baldinger on their experiences in studying and treating tic douloureux. Many investigators attempted various surgical procedures, most frequently with unpredictable results, as evidenced by the following quote:

Dr. Darwin's case, operated on by Mr. Thomas, was attended with a happy result, and Dr. Haighton's operation was successful. To these might be opposed a long catalogue of failures, wherein the knife had been used by no niggardly hand, and with scarcely more than a temporary relief, to reward the patience and fortitude of the sufferer.¹⁸

Joseph Fox, in his *Natural History and Treatment of Diseases of the Teeth* gave the following narrative of a case of tic douloureux successfully operated on by Sir Astley Cooper; and this was cited by Hutchinson:

An elderly gentleman applied to Mr. Fox for the purpose of having some stumps extracted from the upper jaw, stating that he suffered considerable pain from them; without further enquiry, Mr. F. performed the operation. Two days afterwards he came to Mr. F. again, and expressed a wish that he would extract the teeth which were remaining on that side of the upper jaw. The teeth to which he directed his attention were two molares, both of which appeared to be perfectly sound. Mr. Fox then enquired what the particular kind of pain was: he described it as a pain which had come on at intervals, for nearly two or three months past; at first it was slight, but had gradually arisen to such a degree of acuteness as almost to cause fainting; while he sat still, he was easy, but if he spoke quickly, or ate anything which required mastication, or walked hastily, or was shaken by riding in a carriage, the pain returned, shooting through his cheek, and affecting his teeth and all the side of his face, as if he had received an electric shock. Mr. Fox had an opportunity of seeing him during two or three of these painful attacks. While he was relating the above statement, he was seized with so much pain, that he suddenly stopped, and the water streamed from his eyes. On comparing his descriptions, Mr. Fox immediately conceived that his complaint was caused by a disease of the suborbitar branch of the fifth pair of nerves, and offered to accompany him to Sir Astley Cooper, in order to take his opinion. As they proceeded in the coach, one sudden jolt caused another attack.

Sir A. Cooper, after having heard the above statement, concurred in the opinion Mr. Fox had given; but was more particularly confirmed in it, by producing another attack with only rubbing the hair of his beard contrary to its natural direction.

The gentleman assented to the operation, which Sir A. Cooper immediately performed. The nerve was completely divided, as the power of raising that side of a lip ceased, and it remained as in a state of paralysis. The wound healed in a few days; after which the pain entirely left him: he could eat with comfort, and take exercise without fear. His joy was so great at the deliverance which he had experienced from so much suffering, that he could not afterwards speak of it without shedding tears.

It is very difficult to read of these early surgical procedures without having great empathy for the patient. This is pointedly shown in a case Hutchinson cites from number 69 of the *Edinburgh Medical and Surgical Journal*:

Mr. Lizars' patient was a man fifty-five years of age, and of a sound constitution: the pain began near the second molaris of the inferior maxillary bone, darting from thence to the ear, eye, and temple of the same side, accompanied with a violent convulsive action of the muscles of the
Two of the molaris had been extracted, in the idea that it was a toothache; and narcotics, purgatives, blisters, and local bleeding, were all tried without avail. The nerve was then divided by Mr. Lizars, as it emerges from the mental foramen, and a piece of it removed; and by this the man was relieved from all suffering for TWELVE MONTHS. His pains then suddenly returned as violent as ever; and the nerve, which was supposed to have reunited, was divided again at the former place, and the wound cauterized with the hot iron, but in vain. The inferior twig of the facial nerve, which communicates with the mental, was next divided, but with the same want of success. On the 25th of February, it was proposed, to the gentlemen who had before met Mr. Lizars in consultation, to cut, first, the inferior maxillary nerve as it enters the osseus canal; then, the facial at its exit from the stylo-mastoid foramen; and thirdly, the infra-orbital, rather than suffer this poor wretch to endure such misery.

On examining the mouth, great pain was given by touching the coronoid process of the lower jaw-bone, as well as the gum all along the right side. The next day, the 26th, Mr. L. tried to divide the nerve, by introducing from the inside of the mouth, a sharp-pointed curve bistoury along the inside of the coronoid process of the inferior maxillary bone, between it and the pterygoideus internus muscle to the foramen; then lateralizing the instrument outwards, and cutting towards him, with the expectation of hooking the nerve. In this he experienced considerable difficulty, from the superior maxilla, as it were, shutting up the space. The poor man felt at one time excessive pain, indicating the division of the nerve; he was easier during the afternoon, but passed nearly as bad a night as formerly. The following day, the 27th, the pain was confined to the seat of the extracted tooth: this, therefore, was cauterized. As the operation of yesterday had caused considerable tumefaction, so as to prevent an examination of the wound, Mr. L. put him on a course of a carbonate of iron, which he took for FOUR DAYS without benefit. On the 4th of March, Mr. Lizars prevailed on his patient to allow the application of the moxa; which was accordingly done, but he could scarcely suffer it: he was, however, a little relieved during the afternoon of the day the moxa was applied, but on the following his sufferings were as severe as ever. The tumefaction of the muscles in the neighborhood of the wound last inflicted having now subsided, and the sore formed by the moxa healed, Mr. L. again attempted to divide the nerve as it enters the foramen; but in place of the bistoury, he made first a perpendicular incision with a scalpel close to the coronoid process, and then introduced a round-shaped gum-lancet between the process and the internal pterygoid muscle, and scarified the bone at the foramen. When the lancet reached the seat of the nerve, the pain he experienced was intolerable, and it was with difficulty he could sit still till the nerve was completely divided. From this moment there was a sudden and satisfactory termination to all his sufferings, similar to what had occurred after the first operation in December, 1819; and from this time he continued well.

**EARLY USE OF MEDICATION**

When surgery proved insufficient to deal with the problem, medicaments were resorted to. Hutchinson decried the use of calomel and opium in pill form, stating that it is deleterious to the tissues of the mouth. Liquor of arsenic seemed to have some temporary salutary effects; however, conium maulatum, stromium, preparations of lead, copper, silver, belladonna and antimony seemed to be useless as cures singly or in combination. Nevertheless, he recommended "carbonate of iron" as being a palliative.

John Scott in his book *Cases of Tic Douloureux and Other Forms of Neuralgia,*
published in London in 1834, reported a number of cases he had treated using most of the medicaments mentioned by others and added a new one to the armamentarium: dento-iodinet of mercury ointment applied over the affected area. He described its effect:

it . . . produced considerable inflammation of the skin; but the pain attending it was so much less severe than that of the original disease that he did not complain of it. The paroxysms continued with their accustomed frequency and severity for those days and then they began to gradually subside, becoming less frequent and of shorter duration, and some days he was free from pain during the whole day. The application was renewed once in ten days or a fortnight and each time with a decided influence on the paroxysms, but they showed disposition to return as soon as its effect upon the skin had subsided, although they were comparatively slight, and much less frequent than before.

On this account the patient came to town on the 19th of December, in order that the disease might be more effectually controlled. He continued free from pain until the 31st, when, the skin being perfectly healed, the paroxysms began to recur; under these circumstances the ointment was again applied, and renewed as frequently as would keep up such an effect upon the skin as was necessary to control the disease.

About the same time, a 38 page pamphlet extolled the virtues of "The Specific Pill", a "sure cure" for tic douloureux. This booklet by M. Grosskopff, published in London possibly in the early 19th century, was one of the early evidences of the quack patent medicine business that soon grew to alarming proportions worldwide. Of course, he gave no list of the contents of the pill.

In 1856, William Morgan, member of the Royal College of Surgeons of England, and one of the medical officers of the London Homeopathic Hospital, published a monograph on tic douloureux, extolling the virtues of treating the problem with homeopathic remedies. The case reports that he presented are dealt with in detail; he had no single formula for all of the patients, but rather specific remedies for each case, determined by his assessment of the problem.

ELECTRO-THERAPEUTICS

The middle 19th century ushered in a flood of articles in journals and textbooks describing various electrotherapy modalities. Dr. Wilks of Guy's Hospital, London, wrote in the July 9, 1870 issue of the British Medical Journal of "curing" a patient by using a continuous galvanic current from 25 batteries.

In the Sept. 14, 1872 issue of the Clinic, published in Cincinnati, Ohio, Dr. Jas T. Whittaker also reported using galvanic current as the therapeutic agent:

one electrode (Siemen's and Halske's battery, eight amps) was applied behind the ear, the other was played about the face with longest contact over the supra and infra orbital foramina. As at first the application was decidedly pleasant. In four days (five minute sessions) he was well again where upon he returned to his work.

By the mid-nineteenth century several textbooks appeared in which various electrotherapy modalities were described. A Textbook on Electrotherapeutics and Electro-Surgery, by John Butler, M.D., contained an interesting way of selling the idea that electrotherapy was preferable to surgery in the treatment of tic douloureux. He reported a case in considerable detail of a failed surgical procedure where the patient was apparently cured with elec-
trotherapy, thereby illustrating that surgical procedures were senseless butchery that could be avoided. The patient was a rugged 64 year old outdoorsman. Approximately 5 years earlier signs of trigeminal neuralgia appeared, growing in intensity until the attacks reached the rate of twenty to thirty a day. His physician thought several curiously teeth were contributors to the pain and extracted them but the symptoms persisted. Subcutaneous injections of morphine were the only remedy that would control the pain. Next, leeches were used to no avail. Then, a series of surgical procedures was performed, with some initial relief of the pain, but there was always a recurrence, worse than before. A one inch piece of the infra orbital nerve was taken from its canal and found to be quite healthy. Then painful parts of the alveolar process were removed with no chloroform given so the patient could direct the surgeon to the painful part. A few months after that procedure, an osteoplastic resection of the upper jaw was performed which included the posterior wall of the antrum, posterior past and lower portion of the orbit, and the second branch of the fifth nerve up to the foramen ovale.

The zygomatic, superior alveolar branches and infra orbital nerves were removed in their entirety. The next operation removed the buccinator nerve, lateral wall of the antrum, the posterior dental nerves and the mental nerve at its foramen. All of this surgery set the stage for the ultimate sloughing away of the submaxillary gland. The next operation tied off the left common carotid artery just below the mylohyoid muscle. At this point, with the pain again increasing in intensity, the patient was referred to another physician, who applied electric current to the area, subsequently effecting a cure after a series of treatments.

At the beginning of the 20th century Harvey Cushing, John Hutchinson, Jr., and others wrote extensively on the surgical approach to the treatment of trigeminal neuralgia via the gasserian ganglion, now generally accepted as the "seat" of the disease. It was also the advent of the truly scientific approach to the treatment of this disease.

Many different methods of intervention have been tried in this tragically difficult disease and those probably represent only a small portion of the attempts at resolution of the disease. Some of the newer drugs offer hope of relief of pain. But even today the etiology of the disease is almost as obscure as it was 1,000 years ago. Jurjani, the 11th century Persian physician who postulated that pressure from an artery on the fifth cranial nerve was a likely cause, seems to have been closer to the truth than most investigators of the past.

There is hope, however, because studies in neurobiology are beginning to unravel some of the mysteries of both impulse transmission and nerve
fiber biology. Until these questions are solved, however, the treatment of the symptoms will most likely dominate the therapeutics of trigeminal neuralgia. Fortunately for sufferers of this disease, treatment modalities such as percutaneous stereotaxic rhizotomy and the more recent percutaneous retrogasserian glycerol injection produce a high degree of relief.

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13. Ibid, page 84.
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The author gratefully acknowledges the assistance of Dr. John Parascandola, Chief, History of Medicine Division, National Library of Medicine, Bethesda, MD; Mr. Richard Eimas, Librarian, Health Sciences Library, University of Iowa; Dr. Roger Hornsby, Chief, Classics Department, University of Iowa, for their valued help in preparing this paper.

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Alex Peck, Antique Scientifica, offers an exceedingly fine presentation dental chest put together by Kern of Philadelphia. The fitted rosewood case holds some 130 instruments, many with handles of mother-of-pearl (some set with gold-mounted jewels), coral, ivory and ebony. A gold plaque attached to the lid is inscribed

Lloyd Quinby.

It is thought that the set was given to Dr. Quinby in 1859 as a wedding present from Fanny Ringgold, his bride. Quinby was graduated from the Baltimore College of Dental Surgery and practiced in Houston, Texas.

Besides the many other dental and medical antiques in stock, Alex Peck is now carrying Elizabeth Bennion’s new book *Antique Dental Instruments*. $40.00 postpaid.
Oddments in Dental History: An Unusual Case of Macroglossia a Century and a Half Ago

—Malvin E. Ring, D.D.S.
Rochester, New York

Macroglossia, a relatively common ailment, has been plaguing mankind for many, many years and has been described in the literature under a variety of names: hypertrophy of the tongue; chronic intumescence; displacement of the tongue; swelling of the tongue; edematous tongue and prolapsus of the tongue.

In the Bodleian-Ashmole manuscript of 1380 A.D. entitled Science of Cirurgie, a case report states:

ther was a man that his tunge was so swolle that it mite not be conteyned in his mouth. & first I made him purgaciouns & waischingis, & than I made him consumynge thingis; & in this manner he was curid.

What these "thingis" were that cured the patient we have no idea; and the likelihood of a cure having been obtained is remote. But an interesting case presented itself to Dr. Thomas Harris, a surgeon of the Pennsylvania Hospital, in June, 1829, and was reported by him in the American Journal of the Medical Sciences, Volume 7, 1830. Heroic measures were adopted by the physician to ease his patient's frightful suffering, measures that were untried and fraught with danger. The fact that this occurred in the days before anesthesia makes the story even more chilling!

Margaret Lawson, aged 24, was admitted to the hospital with a chronic enlargement of the tongue. Until the age of four her tongue was of normal size. Soon after, however, her tongue began to swell and projected from her mouth three inches, and in this protruded state uninterruptedly continued, increasing in size with the growth of her body.

When she first consulted Dr. Harris the protrusion measured four inches from the incisal edges of the upper anterior teeth and its circumference was almost seven inches! The prolapsed part of the tongue seemed materially changed in structure. It was dark chocolate in color and covered with a slimy exudate; the part within the mouth, however, appeared completely normal.

The weight of the tongue drew the hyoid bone and the larynx upward and caused a downward growth in the shape of the mandible. The only teeth which occluded were the molars, which, surprisingly, allowed her to masticate her food satisfactorily. Her speech, however, was unintelligible. Her lower lip was so inverted that the vermilion border was down beneath her chin and saliva flowed constantly from her mouth.

The lower incisors and cuspids were forced horizontally by the position of the tongue, and covering her lower incisors was a large mass of tartar which had eroded her tongue's ventral surface. It was this painful ulcer that had caused her to seek professional help.

After trying in vain to reduce the tongue's size by application of leeches, the surgeon decided to "strangulate" the extruded portion by drawing a wire around it and twisting it until the blood supply would be cut off. "Though great force was used in the application of the wire," the surgeon wrote, "yet it was with regret that I observed, in two hours after the operation that the circulation was not entirely interrupted." So a strong waxed silken thread
was placed in the furrow created by the wire and it too was drawn tight with such tension as to hopefully cut off the blood flow. After 48 hours he reported that again he had the "... mortification to discover that the circulation was again fully restored, even to the apex of the tongue; that the portion of it within the mouth was painful and much swollen, and that her face was flushed, and accompanied by severe pain in the head and back."

Wishing to spare his poor patient further suffering, Harris decided on what to him was an extreme measure — amputation. Leaving the wires and ligature in place, he severed the protruding part right through that furrow and was able to immediately stanch the flow of blood by ligating the arteries. "The pain caused by the knife was trifling indeed, when compared with the torture inflicted by the ligature," he wrote. "I have long thought that the practice of removing tumors by means of a ligature is a relic of barbarous surgery and ought to be discarded."

Within a few weeks the patient was much improved although the jaw still hung down. The surgeon then extracted the elongated molar teeth which allowed the jaws to be brought together. But the surgeon was assisted by nature "... which has the power of altering the condition of parts, so as to adapt them to new circumstances and thus remedy defects [which] would in due time not only bring the parts in contact ... but would restore the muscular power of the lip as to give the patient entire control over it. This expectation has been fully realized."

The surgeon concludes the case report by saying that her face which, before the operation was "disgustingly offensive" is now one of "comeliness, cheerfulness and content." And the girl now "no longer an object of loathing ... is soon to be married to an intelligent, prudent and thriving mechanic." A happy ending to a trying case!
One Hundred Years of the Odontographic Society of Chicago

—Hannelore T. Loey, C.D., M.S., Ph.D.
Walter E. Dundon, D.D.S.
Chicago, Illinois

Many new clubs, formed to keep members current in new techniques and knowledge in dentistry, have been created over the years. The average club lasts ten years. It is unusual to find one which is still flourishing after 100 years and a study of its doings gives us a better insight into the development of American dentistry.

The need for continuing education in order to improve professional standards, to acquire new knowledge and to improve delivery of patient care has been a recognized tradition of progressive practitioners in dentistry. This led to the formation of independent dental study clubs as well as state and local dental societies. The study clubs have the purpose of bringing a group of busy practitioners together for socializing and also for education. Some of the study clubs have been successful and persisted for years. Norton is of the opinion that the life of a study club is about 10 years. Therefore, a study club that has been survived 100 years is of major importance in our evaluation of the history of dentistry in the Midwest. G.V. Black throughout his career gathered groups for study and inspired the development of several dental study clubs as well as gold foil study clubs, some of which carry his name.

The importance of new thoughts and ideas was undoubtedly in the minds of the senior dental students of the Chicago College of Dental Surgery, Class of 1887, when they implemented the suggestion of one of their classmates, Charles Edwin Bentley (Fig. 1), and formed a study club. The main purpose was the study of new dental developments, professionalism and ethics. They met during their senior year and upon graduation named their club The Odontographic Society of Chicago. The purpose stated in the constitution was:

"The object shall be for the purpose of study, intellectual improvement and the awakening of an interest in the literature, science and art of the profession of dentistry"

Fig. 1. Charles E. Bentley, the moving force behind the founding of the Chicago Odontographic Society.
Bentley's 22 classmates were an interesting group and it was his good fortune to have such a receptive group of people with which to start his study club. Most were willing to present talks at meetings and write them as formal papers, so that they were available to the dental literature of the time. Many of Bentley's classmates attended the meetings and several became presidents and officers of The Odontographic Society of Chicago. Others became officers of the Illinois Dental Society and the Chicago Dental Society, and many even became officers in all 3 groups. They were a remarkable group. At that time Chicago College of Dental Surgery had an outstanding group of teachers which included Greene Vardiman Black, Truman W. Brophy, William H.G. Logan, Eugene Talbot, Edmond Noyes, Garrett Newkirk, Allison W. Harlan and Charles Nelson Johnson. The whole environment helped Bentley to lead his classmates in establishing a study legacy that has endured for 100 years.

Several study clubs existed in the U.S. at the time, so Bentley used existing tradition to create this new environment of study. At the time, the Odontographic Society of Philadelphia was in its 25 year of activity; it was a busy group of practitioners concerned with the study of dentistry and the development of a dental museum in Philadelphia. The members of the Philadelphia society met almost every month and had several study sessions on dental history and comparative dental anatomy.

The Odontographic Society of Chicago was more structured. Topics were assigned to its members and presented regularly. Meetings took place once a month with the exception of July and August. Each month at least one paper was presented; often two were given. An annual dinner usually took place in winter, and for that meeting the topic was not strictly on dental science. At the annual dinner of 1892 G.V. Black spoke on 'The use of books', while in January 1891 A.W. Harlan discussed "Recreation and the conservation of energy".

MAKEUP OF THE SOCIETY

Once The Odontographic Society of Chicago was formally organized, it immediately recruited new members from the dental community, both recent and earlier graduates. Of the speakers announced for 1888 and 1889, seventeen were not members of the graduating class of 1887 of the Chicago College of Dental Surgery, while 9 were. Among Bentley's classmates were students who had come from the Dakota territory, Minnesota, Missouri, New York, Indiana, Michigan and Wisconsin. Several returned home, while others located in other areas. The 1895 membership list has about 130 names, 14 of which were from the class of 1887. By 1897 membership had risen to 200, 13 from the class of 1887. There were 10 honorary members in 1895 (nine in 1897), among them the first woman member, Mary Thompson Bacon, an 1886 graduate of the University of Michigan who practiced dentistry in the Columbus Building on State Street.

Many different topics were discussed. In 1890 these ranged from clinical studies on dental caries, the 6 year molar, dentures, tic douloureux, and amalgams and their characteristics to studies on the etiology of malocclusion. Similar topics can be found in the programs for 1891 and 1892.

A frequent speaker at the meetings was C.J. Underwood, a graduate of the class of 1887, who was not a member, but who came in from Elgin, Illinois, apparently when the weather was good enough to permit a trip. John Liggett also was a member of the Society in 1895, but no longer in 1887 and
since he lived in Richmond, McHenry County, the distance probably interfered with his attending regularly. However, when he died in 1913, the pallbearers were chosen from among his classmates of 1887.2

MEETING PROGRAMS

Over the years the emphasis was on everyday dentistry, not on research or esoteric subjects. Possibly this is the reason for the longevity of the group. Several papers on the business aspects of dentistry, compensation for services and ethical practice of dentistry, were also given. In 1891 a paper was presented on the dental engine and the care of office machinery and apparatus, and in 1895 the advantages of electricity in the dental office were discussed (Fig. 2).

Bentley continued to be active in the group and was program chairman several times. His skill in inviting the right people at the right time created the environment that contributed to the growth of the Society. At the third annual dinner, held at the Commercial Hotel on January 12, 1891, 40 people were present. The 10th anniversary was celebrated at Northwestern University, on February 21 and 22, 1898, with clinical papers and discussions being given in the lecture hall of the University. By the time of the 15th anniversary in 1903, Northwestern was prepared to host The Odontographic Society of Chicago in style since it had purchased and refurbished the Tremont House, an old established hotel at Dearborn and Lake Streets. The 5th and 6th floors were reserved for the dental school. There were many lecture rooms; a great clinic room, lighted on two sides and with a sky light its full length, accommodated 130 units. In this large setting, the 15th anniversary meeting of the Society attracted about 2,300 dentists and 1000 students for a period of several days for clinics, presentations, papers, and discussions. The function was called the largest dental meeting ever held.3

A dinner for 764 dentists and their guests took place at the Auditorium Hotel

Figure 2. Early scientific program of the Society.
and one of the speakers was the program chairman C.E. Bentley. His words explain the success of the Society:

"Such meetings can be made possible as long as there is unity of purpose and the subordination of self in (the) community. Chicago is not capable of doing any more than any other city. If you get cohesiveness, cooperation, and the submergence of self in other cities you can do equally as much as we have done here."  

PARALLEL EXISTENCE OF THE CHICAGO DENTAL SOCIETY

At the same time that The Odontographic Society of Chicago was involved in the presentation of scientific programs, the other problems facing organized dentistry were being handled by the Chicago Dental Society. This was a much smaller group, but composed in part of the same persons who participated in The Odontographic Society. It was felt that a union of these two groups would be beneficial to all, and to dentistry in particular. The merger of the two groups took place in May 1905 and the first joint scientific meeting held in September 1905 was attended by 210 dentists. Further meetings took place at the Chicago Public Library, at the corner of Michigan and Randolph, on the 3rd Tuesday of each month, except July and August. By 1908 the new group, now called Chicago Odontographic Society, had 850 members. The Dental Review of 1908 announced that this new society would hold a meeting and clinic on January 12 and 13 to celebrate the attainment of a membership of 1000. C.N. Johnson stated in his editorial in the Dental Review that the Chicago-Odontographic Society was "the largest local dental society in the world."  

REORGANIZATION OF THE ORIGINAL SOCIETY

In 1910 a major reorganization of the American Dental Association took place and this required a change of name of the Chicago-Odontographic Society. Under the Presidency of F.H. Zinn, one of the original students of the Class of 1887, the name of the organization had to be changed to Chicago Dental Society. It continued to hold major scientific meetings, as well as smaller branch meetings. In time, some of the original members of the earlier Odontographic Society launched an effort to reorganize the Odontographic Society as it had been originally planned. By 1924 under the leadership of two graduates of the Chicago College of Dental Surgery, D.C. Bacon (Class of 1887), Fig. 3 and Hart Goslee (Class of 1895), Fig. 4, the Odontographic Society obtained from the State of Illinois a new certificate of organization. Although it became a smaller group, it was nevertheless a major force in the development of continuing education in dentistry.

The certificate of organization is dated December 31, 1924, and was petitioned by James E. Keefe, George N. West, H.H. Wilson, C.E. Bentley and Thomas A. Broadbent, all of the 1887 group, as well as by C.F. Stowell, C.E. Jones, P.D.B. Idler, E.W. Elliot and C.M. Cahill. A reorganization meeting took place at the Assembly Hall of The John Crerar Library on Tuesday evening, March 10, 1925 under the chairmanship of Hart J. Goslee, with 51 members present. The stated purpose of the Society was:

"This organization thus formed is for scientific research and investigation for mutual improvement."

By April 1925 it was decided that the membership of the Society would be limited to 150, with obligatory attendance at the scientific sessions. Three non-excused consecutive absences disqualified the member. Papers were presented regularly, and invited speakers came from different states and even
from abroad. Although membership was limited, numerous non-member
dentists attended the different meetings. One of the major history making
events sponsored at that time by the Society was a debate on the subject:
"Resolved: that practically all infected pulpless teeth should be removed". Weston A. Price of Cleveland, Ohio had the affirmative side while John P.
Buckley of Hollywood, California, the negative. The meeting, held at the
La Salle Hotel, was preceded by a dinner at which 736 persons were present
and approximately 1,500 persons attended the debate.

In May 1926 Hart Goslee suggested the phrase Procede sed semper sano
animo as the motto for the Society, and it was adopted. By 1927 the member-
ship was further reduced to about 100.

The Society was in full swing again by the time of C.E. Bentley's death
on October 13, 1929 at the age of 70. He had contributed greatly to the develop-
ment of many other important societies including the NAACP, and the ser-
vices held at the Good Shepherd Congregational Church at 5700 Prairie
Avenue were attended by many members of The Odontographic Society as
well as numerous other mourners. Eulogies were presented by C. N. Johnson
and others. Hart J. Goslee died soon after on May 30, 1930, even though he
was 11 years younger than C.E. Bentley.

SECOND REORGANIZATION OF THE SOCIETY

In October, 1937, The Odontographic Society of Chicago became an af-
fliate of the Institute of Medicine of Chicago. By that time too, emeritus
membership was instituted. This new category required active membership
for at least five years. By the end of World War II in 1945, the Society had
103 members, 10 of whom were in the Armed Forces. At that time a new
reorganization took place, and in 1946 a Board of Governors was instituted.
By 1948, the membership was 1 honorary member, 13 emeriti, 3 academic
members, 3 non-resident members and 103 resident members.

The Society continued to hear papers, although by now there were fewer
meetings each year. Many papers of The Odontographic Society were in archival storage at The John Crerar Library, a move which allows us today to better understand the progress of dentistry in Chicago during the last 100 years. Another major event took place in 1951. Walter Dundon was elected Secretary of the organization, and maintained this position for the following 17 years. This gave stability to the group and undoubtedly helped its survival. On April 1, 1957 the first student awards were given to one student from each of the dental schools in Illinois. Jerome G. Murphy received the award for Loyola Dental School, Richard E. Reiser for Northwestern and Franklin M. Weine for the University of Illinois. This was the beginning of a tradition that is still carried on today. Of the three initial awardees, only Franklin S. Weine settled in Chicago and he is a member of The Odontographic Society, a former Treasurer and member of the Board of Governors. Dr. Murphy is in Seattle, WA and Dr. Reiser is in Provo, Utah. Also, by 1958 The Odontographic Society held its first two day seminar out of town, with a two day meeting at the Wagon Wheel, Rockton, Illinois in June. After that, the seminars were scheduled yearly. About ten such seminars were held but in later years they were discontinued because of poor attendance and lack of interest.

In May, 1966, The Odontographic Society of Chicago Research and Education Foundation Fund was founded, due in part to the generosity of Mrs. Berthe Martin.

WOMEN ENTER THE SOCIETY

At the beginning of the century the Society had one woman member, (first as an honorary member, and later as resident member.) No other women were invited to membership in spite of the growing number of women teachers and practitioners in Chicago. In 1967 this changed. Mrs. Kathryn M. Dundon became a "Benefactor" in recognition of all the work she had done for the Society since the early fifties. Later, through a change of By-Laws, Mrs. Dundon was awarded well-deserved honorary membership.

The minutes of the first meeting of the Board of Governors which took place on October 4, 1971 has the following item:

There has been an inquiry about female dentists becoming members of the Society. The Constitution does not rule against female dentists becoming members. No Board action.

Apparently the chairman of the Membership Committee did not let much grass grow under his feet. On November 4, 1971, Dr. Lawrence H. Johnson had written a recommendation for membership for Dr. Jane Selbe, and by November 15, Dr. Stanley Korf had written on behalf of Dr. Elaine Stuebner. Both were considered for membership at the second meeting of the Board on December 6, 1971 and were approved for membership. Dr. Selbe is still a very active member of the Society today. A few years later Dr. Juliann Bluitt-Foster became a member of the Board of Governors. She also served as Program Chairman.

THE SOCIETY TODAY

Today The Odontographic Society of Chicago is a very active group of dentists of all ages who come from different backgrounds and different schools, from the United States and abroad. The number of members has remained fairly constant during the years. The reason for this had been stated in 1937 by Stowell. 

When an organization becomes too large, elements not knowing the origin nor caring a whoop get in by devious devices and first thing the Society is run away with. Then comes deterioration-decay-disintegration and finally such a society becomes extinct.

There is a total of 159 active fellows, 17 life fellows, 18 emeriti fellows and 6 honorary fellows. Besides Mrs. Kathryn M. Dundon the honorary fellows of the Society included Mrs. Lois Dummett; Dr. Clifton O. Dummett; Dr. Harold Hillenbrand; Dr. George C. Paffenbarger; Mr. Henry M. Thorn-ton; Dr. Harry Sicher and Dr. Andrew Ivy.

There are four meetings a year held on the first Monday of October, December, February and April. The present members are very conscious of their heritage, their catchword being: “It is not an honor society, but an honor to belong”.

REFERENCES

DR. LOEY is professor of clinical pediatric dentistry, Department of Pediatric Dentistry, College of Dentistry, University of Illinois at Chicago. DR. DUNDON is a former secretary of the Odontographic Society of Chicago and is at present chairman of the History Committee. Requests for reprints should be directed to Dr. Loevy at 801 South Paulina, Chicago, IL 60612.

THE GRAMMARIAN LOSES A TOOTH

At last I braved
The dentist’s door:
That tooth will pain
Me nevermore.

A stinging block,
A frightful tug,
And gone for good
That old humbug!

The doctor’s nurse
Was very kind,
But, oh, the pain
She left behind!

“It don’t hurt, now?”
I shook my head,
But ough, it hurt!
“It don’t,” she said!


From the collection of Professor Gardner Foley,
Baltimore, Maryland
In the complex field of dental science there have been a handful of individuals who, by their zeal and dedication, mastered many of the facets of this complex field. One of these, Otto Walkhoff, laid the groundwork for many of our modern procedures as well as enhanced our horizon.

At the beginning of the twentieth century, the accumulation of human knowledge had already reached the point that it was no longer possible to be a universal scientist. Since then we have experienced the division of science into hundreds, perhaps thousands, of different branches.

The route of progress in any branch of science goes through milestones and turning points. There are significant events, beginning with inspiration of an idea leading to discoveries or inventions that find practical use and application in society.

Parallel to the gradual progress are the contributions of some geniuses who have played important roles in the development of particular areas. The spirit and the essence of greatness of such personalities continue to survive long after their death.

Recalling the efforts and dedications of pioneers can serve as a stimulus and inspiration to the younger generation of our profession, stressing devotion to the science of dentistry in place of commercialism.

With this in mind, last year I published various historical notes as tributes to Friedrich Otto Walkhoff, one of the most distinguished authorities of the dental profession, who died June 8, 1934.1,2

Friedrich Otto Walkhoff, the youngest of three children, was born on April 23, 1860 in Braunschweig, Germany. There he attended primary school, from 1866 to 1870, and the gymnasium (high school) from 1870 to 1877. His
older brother, who had studied medicine, was at the time already in medical practice in Dresden.4

Following the advice and recommendation of Dr. Wilhelm Niemeyer, a close friend of Walkhoff’s family, Otto Walkhoff decided to study dentistry. At that time the regulations for the admission into dental study required some years of apprenticeship. With the support of Dr. Niemeyer, who was at that time the vice-president of the German Association of Dentists, Walkhoff began his practical training in the private office of Dr. Sauer in Berlin. Dr. Sauer was also professor of prosthodontics at Berlin University.4

After two years of apprenticeship under Dr. Sauer, Walkhoff’s manual skill and dexterity were complemented with theoretical and didactic learning at the University of Berlin. During his study in Berlin from 1879 to 1891, Walkhoff was fortunate to have a number of the most famous scientists of that era as professors.4

The lectures of Dubois-Reymond, professor of physiology, Hermann von Helmholtz, professor of physics, and Rudolf Virchow, professor of pathology, expanded Walkhoff’s horizon. They motivated him, stimulated his high spirit, and nurtured his broad spectrum of knowledge in different areas.5

Walkhoff was one of the last universal men at the turn of the century with a broad knowledge of anatomy, physiology, histology, pathology, anthropology, pharmacology, microphotography, and metallurgy.

The last day of March 1881 was Walkhoff’s graduation day at the Berlin University. After one year of military service he was appointed as an instructor at the Dental Institute of Berlin University. He spent one year serving in the Technical Department there and then moved to the Operative Department where he worked and taught until the end of September 1885.

WALKHOFF ENTERS A NEW LIFE

During all those years in Berlin, Walkhoff worked in the private office of Dr. Sauer where he had begun his practical training before his admission to the study of dentistry. Gradually the teacher-student relationship between Sauer and Walkhoff developed into friendship and later into a family relationship. On September 18, 1885 Otto Walkhoff married Gertrud, the daughter of Professor Sauer.6

Less than two weeks after their marriage, the new family Walkhoff left Berlin. Walkhoff returned to his birthplace, Braunschweig, to take over the dental practice of his initial promoter and friend, Dr. Niemeyer.6

Here in Braunschweig, for the first time, Walkhoff could work independently, devoting himself to scientific study and experiment alongside his professional activity as a dental practitioner.5

In 1894 Walkhoff brought out the first volume of his two-volume atlas, dealing with the normal dentition, Mikrophotographischer Atlas der normalen Histologie menschlicher Zahne. The volume dealing with pathology, Mikrographischer Atlas der pathologischer Histologie der menschlicher Zahne, followed in 1897. But Walkhoff’s dedication to the science of dentistry was not limited to a few special areas. He designed a series of specific instruments and apparatus which were needed for his experimental work. The construction of those instruments was accomplished in close cooperation with one of his friends, engineer Oskar Lutter.4

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Actually, Walkhoff was the first German dentist to have his own scientific laboratory, and was fearlessly prepared to undertake any measure or experiment if the result could contribute to the progress of dental science.

An example of this was his pioneering work with the Roentgen rays. In late 1895, Wilhelm Konrad Roentgen discovered the X-ray (Fig. 1). This was hardly introduced to the scientific centers of Europe when Walkhoff recognized the value of Roentgen's discovery for dentistry. Only two weeks after the X-ray discovery, he prepared the first dental roentgenogram ever made. He radiographed his own teeth.

Louis I. Grossman, the noted endodontist, who called the X-ray discovery “the third event that converted endodontic treatment to a scientific discipline”, describes the event of Walkhoff’s self-experiment. Grossman visited Walkhoff in 1928, during his graduate study in Berlin, and heard the story directly from Walkhoff himself:

Professor Walkhoff took a sensitized glass plate, wrapped in the rubber dam, put it in his mouth between teeth and tongue, so that he could steady the plate with the tongue, and lay on the floor for 25 minutes to expose the plate to the X-rays. The image he obtained was of the crowns of the maxillary and mandibular posterior teeth. It was, in fact, the first bite-wing image.

At the end of his description, Grossman assessed that “what he had done was almost of equal importance to dentistry as the original discovery by Roentgen was to medicine.” (Fig. 2)

Recognizing the importance of the X-ray image to dentistry, Walkhoff established, in cooperation with another friend, the chemistry professor Fritz Giesel, the first dental roentgenologic laboratory in the world. For many years, this laboratory provided a number of medical and dental practitioners with X-ray images of the head and jaw. (Fig. 3)

Soon afterward, some European physicists began studies to determine whether a relationship exists between the emission of rays, such as X-rays, and the exposure of various elements to light. The English scientist Henry Becquerel found during his examination of the salt of uranium that it spontaneously emitted rays without being exposed to light. He observed that uranium salt placed on a sensitized photographic plate and wrapped in black paper made an impression on the plate similar to that produced by X-ray.

This constantly disengaged energy in the form of radiation fascinated Marie Curie. Her passionate interest to understand and explain this phenomenon finally resulted in the finding that radiation by uranium salt was the atomic property of uranium. To find out how general this property
was among all other elements, she began to examine all known chemical bodies.

At first, Marie Curie found the same property in thorium and later, by identifying a more powerful radiation in another mineral substance, she discovered a new chemical element, radium.9

In July 1898, Marie Curie and her husband Pierre Curie announced their findings in the proceedings of the Academy of Science: "We believe the substance we have extracted from pitchblende contains a metal not yet observed."9 (Fig. 4)

In 1900 Walkhoff and his friend, Professor Fritz Giesel, published an article about this new substance, radium, and the therapeutic property of its radiation. This was the starting point of radiotherapy in medicine.10

We know today how hazardous it is to be exposed to radioactive rays. And it is obvious that these scientists' pioneer work, very often combined with self-experiment, could not be without tragic results. In 1927, the close friend and co-worker of Walkhoff, Professor Giesel died from carcinoma of his hands, a consequence of radiation.4

In 1896, Walkhoff had earned an M.D. degree from the University of Erlangen. His doctoral thesis was about enamel and dentin development. His professional and scientific fame was so great that the universities of Freiburg in 1896, Marburg in 1897, and Breslaw and Munich in 1900 offered him a professorship.
Although Walkhoff's private practice in Braunschweig was very successful, in 1900 he accepted the chairmanship of the Operative Department at the University of Munich with lower income. From 1900 to 1922 he was very active in teaching and research at the University of Munich. In 1922, he accepted the directorship of the Dental Institute at the University of Würzburg, where he worked and taught until his retirement in 1927. 4 (Fig. 5)

Walkhoff was not only a dedicated teacher and devoted scientist, he was also deeply interested in all aspects of his profession. In 1883, when he was appointed as assistant at the Dental Institute of the Berlin University, he joined the Central Association of German Dentists. In recognition of his activities, the association honored him in 1901 with its Golden Award. Five years later in 1906, he was elected president of the association, a position he held for 20 years.

As president of the dental association, full-time professor of the dental institute, and a well-known scientist he fought to establish the status of the dental profession as an independent and equal branch of the health sciences. His success in promoting the dental profession integrated in the university study with the final degree of Dr. Med. Dent., was an enormous step for the profession with an influence far beyond German boundaries.

Walter Hess, an earlier student of Walkhoff and a famous authority on European dentistry who co-authored with him some publications, stated in a memorial tribute to Walkhoff, that the respect the dental profession enjoyed, as well as, the entire development of dentistry should be credited to Walkhoff. 3

Euler, another student of Walkhoff and a famous German scholar, stated that Walkhoff had always attempted — in all his scientific activities — to approach his objectives in theory as well as in practice.

Euler, who was the president of the German Dental Association at the time of Walkhoff's death, acknowledged his teacher's dedication to the dental profession and recognized him as the authority whose research created the foundation for dental science in his era. 11

WALKHOFF'S WORK IN ENDODONTICS

Walkhoff in 1883, a century ago, recommended chlorophenol as a therapeutic agent for the diseased pulp. 16 years later his studies of this medicament were introduced to the American dental profession by Hermann Prinz, the person who encouraged Grossman to take his graduate study in Berlin.

To avoid the rapid evaporation of chlorophenol by body heat, Walkhoff combined the original compound with camphor. He also added menthol to
Fig. 5. The Dental Institute at the University of Würzburg at which Walkhoff held the post of Director from 1922 to 1927.

mask the bad odor of necrotic tissue and the final compound became the most preferred therapeutic agent in pulp treatment.

In 1963, Grossman published the results of his research and clearly underlined the positive properties of camphorated chlorophenol menthol. And today, more than one hundred years after its creation and recommendation by Walkhoff, this therapeutic agent is still considered one of the best intracanal medicaments.

Concomitant with his finding of a therapeutic agent for pulp treatment, Walkhoff concentrated his efforts on building a systematic method for conservation of teeth with diseased pulps. In 1924, he introduced his method in a monograph which was followed in 1928 by a book entitled “My system for Conservative Treatment of Severe Diseases of Dental Pulp and Periodontium.”

Walkhoff’s system was based upon many years of research and experiments on animals, and his filling material became well known over the world as “Walkhoff’s Paste.” This consists of a combination of camphorated chlorophenol with iodoform.

Walkhoff’s sincerity in sharing his knowledge with colleagues and students was reflected in the large number of papers he published. Euler once referred to him as “perhaps the most productive author among dentists.” Walter Hess mentioned 24 books and monographs in various areas of dental science, 120 research reports and scientific papers in dental journals over the world, 73 articles concerning the status of dentistry as an equal branch of health sciences, dental study, curriculum and examination, and the role and duty of professional organization.

He was also editor of a publication series pertaining to scientific essays.
The development of a safe and effective local anesthetic has been one of the cornerstones in the growth of both the medical and dental professions. While there have been many unsung heroes involved in the quest for such an anesthetic agent, the efforts of one man in particular, Dr. Carl Koller, led to a discovery that might otherwise have been postponed indefinitely.

The search for an anesthetic agent that would eliminate pain without eliminating consciousness may have begun as far back as 1532. The explorer Pizarro observed the remarkable physical feats performed by the Incas after chewing the ‘Divine Plant’, Erythroxylon coca. Approximately three hundred years later, in 1860, a young chemist named Albert Nieman experimented with this plant and extracted its active ingredient which he named cocaine. Nieman wrote that it “benumbs the nerves of the tongue, depriving it of feeling and taste.” In 1862 Schroff, the first to experiment with the new alkaloid, wrote about the anesthetic state produced by cocaine. In 1868 Moreno y Maiz implied that “it might be used as a local anesthetic” after having injected cocaine into the leg of a frog in which he dissected the sciatic nerve. Vasili Anrep, in 1880, experimented on various animals, including himself, and implied that cocaine might be used as an effective local anesthetic. Cocaine, however, was largely ignored by the medical community. A pronouncement by a British Medical Commission in 1880 went so far as to deem cocaine “an undesirable substitute for caffeine, but otherwise devoid of medical interest.”

Around this time Sigmund Freud was becoming interested in the properties of cocaine. Desiring to learn more about the systemic effects of the drug, and in an attempt to break the morphine habit of a brilliant colleague, Freud invited the collaboration of a recent Vienna graduate, Carl Koller, who was studying ophthalmology under Professor Ferdinand Arlt. Freud referred to him as “the man with the permanent interest in the eye.”

Carl Koller was born on December 3, 1857 in Bohemia. In 1875 he entered the University of Vienna to study medicine, receiving his M.D. in 1882. He then took an appointment as intern and house surgeon at the Allgemeinen Krankenhause, the largest teaching hospital in Vienna. Freud and Koller undertook a joint investigation into the effects of cocaine on muscular strength and fatigue. Freud was mainly concerned with the general action of the drug,
and treatises in different areas of dentistry. Entitled “The German Dental Healing Science,” it was published by George Thieme Publishing House in Leipzig. The last issue of the series under his editorial guidance was No. 88 and was circulated after his death.13

In memorializing Walkhoff over 50 years ago, Walter Hess said:

With the death of Walkhoff we lost one of the best authorities of our profession; not only a first class researcher, a highly talented university professor, and well respected leader of the dental profession, but also a man of independent spirit, high ideals, and above all, a genius of precious character.

REFERENCES


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while Koller, who had experimented with bromides, chloral hydrate and mor-
phine in an attempt to find a suitable local anesthetic for ophthalmological
operations, was hoping cocaine could become such a vehicle. Koller was so
impressed by the numbing effect cocaine had when placed on the tongue,
that he attempted to anesthetize the eyes of frogs and guinea pigs. No one
before had thought to do this even though it had been known for over a
quarter of a century that cocaine paralyzed the terminal sensory filaments.
On September 15, 1884, Koller announced his discovery at the meeting of
the German Ophthalmological Congress in Heidelberg. His paper was
presented in his absence by his close friend Dr. Brettauer of Trieste. Koller
presented a more elaborate paper on October 17 (reprinted below) before
the Gesellschaft der Aerzte of Vienna. The age of local anesthesia was born.
The era of painful surgery and screaming patients was now a thing of the past.

While Koller confined his work to the eye, he did convince others of the
anesthetic properties of cocaine. Among the developments stemming from
Koller's discovery was the development of conduction anesthesia by William
Stewart Halstead. Halsä estad demonstrated that one could anesthetize almost
any part of the body by injecting drugs around important nerves supplying
the operative area. Using a 4% cocaine solution Halstead gave the first man-
dibular injection to Dr. R.J. Hall at Bellevue Hospital in New York City in
November, 1884, and then extirpated the inferior alveolar nerve in order to
treat tic douloureux.

The further progress of developing a suitable anesthetic waited for the
discovery of an agent less harmful than cocaine as it was becoming painful-
ly apparent that it had many undesirable side effects. In 1904 Alfred Ein-
horn synthesized procaine, known under its trade name as Novocaine, and
this greatly enhanced the safe use of local anesthesia. It was shown to be
considerably less toxic than cocaine and produced less systemic reaction when
injected into tissues. In 1905 Heinrich Braun of Germany introduced Novo-
caine into clinical use.

In 1888 Koller immigrated to the United States where he established him-
self as an ophthalmologist in New York where he remained until he died.
He was appointed ophthalmic surgeon to Mount Sinai and Montefiore Hospi-
tals and the Hebrew Orphan Asylum. He was honored for his work with
cocaine, receiving honors from the American Ophthalmic Society in 1922,
the University of Heidelberg in 1928 and the American Academy of
Ophthalmology and Laryngology in 1934. He was the first recipient of the
award from the New York Academy of Medicine in 1930.

It is ironic and paradoxical that two dentists, Horace Wells and W.T.G.
Morton, should discover inhalation anesthesia, used primarily by physicians,
while a physician, Carl Koller, discovered the anesthetic properties of co-
caine, and yet another, W.S. Halstead, introduced block anesthesia, a proce-
dure universally used by dentists.

The following selection is taken from a paper read by Koller at a meet-
ing of the Vienna Royal Imperial Society of Physicians on October 17, 1884.
It was translated and revised by J.N. Bloom, M.D. and reprinted in the Lan-

GENTLEMEN,—I take the liberty of addressing you in order to in-
form you about some experiments which I have undertaken in order to
produce anaesthesia on the eye. It is not the first communication which
I have made on this subject. I have already addressed such a one, in order
to preserve my priority in this discovery, to the Convention of German
Oculists, which, as it annually does, met on the 15th and 16th of September in Heidelberg. Dr. Brettauer of Trieste was kind enough to bring my communication into notice and to repeat my experiments before the Convention, and since then the same have been repeated and confirmed in various other places.

It is a well known fact that cocaine, an alkaloid produced in 1859 by Nieman from the leaves of the *erythroxylon coca*, possesses the peculiar property, by its local application, of anaesthetising the mucous membrane of the tongue. Prof. Schroff mentioned this fact for the first time in 1862 in a lecture on its nervous effect read before this assembly. It is also well known that cocaine narrows the peripheral arteries when taken internally; further, we know that cocaine dilates the pupil by means of its local application as well as by its internal use. We therefore see that cocaine has already been applied to the eye, but until now those phenomena have not been observed which I make the object of my discourse to-day. After repeated experiments with its internal use cocaine fell into discredit and disappeared from the scene. Dr. von Anrep in 1880 produced a comprehensive research into cocaine, at the end of which it was hinted that the local anaesthetizing action of cocaine might in the future become of considerable importance. In Vienna, especially, cocaine has been brought to the front through the interesting therapeutical work of my colleague in the general hospital, Dr. Sigmund Freud.

I have started with the premise that a substance which paralyses the terminal sensory nerves of the mucous membrane of the tongue would not act very differently on those of the cornea and conjunctiva; so I undertook a series of experiments on animals, which I carried out in the laboratory of Prof. Stricker. My results, in brief, are as follows:—If a few drops of an aqueous solution of muriate of cocaine are dropped upon the cornea of a guinea-pig, a rabbit or a dog, or if the solution is instilled in the usual way into the Conjunctival sac, the animal blinks for a while, clearly as the result of a weak irritation. After a period of from thirty seconds to one minute the animal opens its eye, which gradually assumes a peculiar expression of rigidity. If one now touches the cornea of the animal with the head of a pin, being careful not to come in contact with the eyelashes, no reflex closure of the lid occurs, the bulb does not deviate, and the head is not thrown back, as would otherwise happen. On the contrary, the animal remains quiet, and by the employment of a stronger irritation we can convince ourselves that the cornea and conjunctiva are completely anesthetised. For instance, I have scratched the cornea of the animals upon which I experimented with a needle, pricked the same, irritated the cornea with an induction current which was so strong that it produced a painful sensation in the fingers and was unbearable on the tongue, and cauterised their cornea with a pencil of nitrate of silver until it became as white as milk; all without a single movement on the part of the animals. The last two experiments convinced me that the anaesthesia included the whole substance of the cornea, and not only its surface. However, after I had cut into the cornea, the animals showed decided signs of pain at the moment, when the aqueous humour gushed out and the iris prolapsed. Even in my later experiments on animals I was unable to determine whether the iris also could not be anaesthetised by the instillation of the solution into the corneal wound, or by a continued instillation into the conjunctival sac, begun and kept up for some time before the operation; for experiments testing sensibility of animals which are not narcotised are very difficult, and, especially if they are in the slightest degree complicated, are apt to give equivocal results. I had yet to find out experimentally whether cocaine could produce anaesthesia of the inflamed cornea, and this question was answered in the affirmative, when the animals upon which I produced an
artificial keratitis, by means of a foreign body, showed the same anaesthesia of the cornea as the healthy ones. Complete anaesthesia lasts on the average of ten minutes, when a 2 per cent solution is used.

After such successful experiments I did not hesitate to apply cocaine to the human eye. At first I experimented upon myself and a few colleagues; later, on a large number of other individuals; the results of which without exception proved that the cornea and the conjunctiva were thoroughly anaesthetised by its use. The sequence of the symptoms is as follows:—When a few drops of a 2 per cent solution are introduced into the conjunctival sac, or, better still, if they are allowed to run over the cornea, together with an increased secretion of tears, a slight burning sensation is felt, which disappears after an interval of from thirty seconds to a minute, to give way to an obscure feeling of dryness. To an observer an eye thus treated has a peculiar rigid expression, very like that which I noticed as remarkable on the animals upon which I experimented. This expression arises from a decided widening of the palpebral fissure, the explanation of which I shall give later. If now the head of a pin is brought in contact with the cornea we note the absence not only of the pain usually associated, but we absolutely do not feel the contact, and all reflexes are absent. The same holds good for the conjunctiva, which loses its sensibility to heat and cold. Without any inconvenient sensation, or the slightest reflex movement on the part of the patient thus treated, we can grasp the conjunctiva of the bulb with a toothed forceps, or we can pit the cornea by pressure. In this connexion the only thing to be observed is that the appearance of objects becomes indistinct, which naturally is caused by the changed curvature of the cornea. This complete anaesthesia lasts from seven to ten minutes, to give way to the normal condition after a considerable period of subnormal sensibility. From fifteen to twenty minutes after the instillation the pupil begins to dilate; the dilation reaches its maximum during the first hour, decreased decidedly in the second hour, and disappears completely in a few hours more. The dilatation is never a maximal one, and during the whole time the pupil reacts promptly to light . . . I have observed in the normal conjunctiva, especially in the conjunctiva palpebrarum, a decided ischaemia, about the duration of which I can say nothing certain. I shall for the present pass over certain other observations not yet completely confirmed, as, for instance, those concerning the appearances shown by the ophthalmaloscope, only stating that I have never seen any symptoms of irritation arise from the use of cocaine . . . As regards the anaesthesia, I have some still practical and important points to bring forward.

1. The anaesthetic effect of cocaine can be increased to a certain limit—that is, if cocaine is dropped into the eye after the partial cessation of the anaesthesia, a second complete anaesthesia results which lasts longer than the first. In this way I have produced complete anaesthesia lasting from fifteen to twenty minutes from the last application by a continuous repetition of the application at intervals of five minutes. 2. The anaesthetic effect is pre-eminently a local one—i.e., it is stronger on those places to which the solution has been directly applied and where it has been for some time on contact. 3. Since, as may be proved, cocaine is absorbed, and after every instillation a quantity, even though small, reaches the anterior chamber, one would a priori expect that the deeper portions of the eye would be rendered anaesthetic were it possible to introduce large quantities of cocaine into it. But as, one the one hand, a certain time is necessary for its absorption, and on the other the anaesthetic effect in point of time is limited, the anesthesia of the cornea would be over when the iris and ciliary body began to be affected; it would therefore be necessary to anesthetise the cornea again. I believe I can meet
both of these conditions, as the following will show. By means of a con-
tinuous application repeated every five minutes with a 5 per cent solu-
tion kept up for some time (about half an hour) I succeeded in producing
such an effect upon the deeper parts of the bulb that its sensibility to
strong pressure was very decidedly diminished.

Through the kindness of Professor von Reuss, who placed at my dis-
posal for experimental purposes the material of his clinic, I was able for
two or three weeks to test the effect of cocaine upon the pathological eye.
From the very beginning I held cocaine to be valuable therapeutically
for two purposes: one for its use as a narcotic in painful diseases of the
eye; the other as an anaesthetic in operations on the eye. As for its use
in the first instance, I expected much good from its action, especially in
diseases of the cornea and conjunctiva, where there is much pain and
intolerance of light. Indeed, I used cocaine in a 2 per cent solution on
a large number of patients with conjunctivitis pustulosa (herpes corneae).
Several minutes after the instillation all the patients thus treated expressed
an improvement as regards their subjective condition. The pain was
diminished and the intolerance of light was decidedly lessened. With the
same unanimity the patients complained that the pain and intolerance
of light returned two or three hours after the instillation. We would ex-
pect that the pain and intolerance of light could be done away with, or
at least diminished, by a frequent application. This method of applica-
tion could not be carried out up to the present time because of the ex-
 pense of the drug. I have not observed any influence, beneficial or
otherwise, on the course of the disease in the experiments I have made
as given above.

I come now to the second use of cocaine — namely, as an anaesthet-
ic in operations on the eye. Cocaine is used with excellent results in the
removal of foreign bodies from the surface and substance of the cornea,
an operation which is often rendered so difficult by the restlessness of
the patient. I anaesthetised a considerable number, almost thirty, of such
patients, making each, either seated or standing, look downwards, and
allowing two drops of a 2 per cent solution to flow down the cornea.
After a period varying from three to five minutes the instillation was
repeated. All the patients thereupon asserted that they had lost the sen-
sation of a foreign body in the eye, and believing it was removed, pre-
pared to go home. They held their bulb quiet during the extraction of
the splinter by means of needles, and when asked what they had felt
answered that they had felt nothing at all.

Dr. von Reuss performed the operation for staphyloma upon two chil-
dren — one a boy, aged ten years, the other a girl of seven — without
narcosis, using only cocaine in the manner to be described later on. The
children remained perfectly quiet, and according to their own confes-
sion, experienced no pain. Dr. von Reuss kindly allowed me to employ
cocaine in several cases of iridectomy and cataract operations after Graefe,
which he performed. In general, I only wish to state that these cases,
one and all, ran their course without any irritation, and this, to say the
least, calls for further trials of the drug. The experimental use of cocaine
gave results which were more or less favourable according to the strength
of the solution and the manner in which it was employed. The most
favourable and almost completely satisfactory results as regards painless-
ness in operations were given by the cases in which the following method
was carefully observed. For at least half an hour before the operation two
drops of a 5 per cent solution are instilled every five minutes. The pa-
tient is placed horizontally (without a pillow under the head), the upper
lid is elevated, and while the patient is told to look towards his feet, the
solution is dropped upon the sclera just above the cornea.

Among those so treated was a woman, upon whom a linear extrac-
tion was made and who was questioned during each stage of the opera-
tion; she answered that she felt absolutely no pain from the cornea-scleral incision, the seizure and cutting off of the iris caused her but little pain. During the whole operation there were not reflex movements. A like result was obtained in the case of an idiotic woman upon whom the same operation was performed, and upon whom Dr. von Reuss hesitated to operate because she was in other respects very sensitive.

The following case appears to me to be worthy of notice on account of its peculiar circumstances. Iridectomy was performed upon the left eye of a man with a bilateral seclusio pupillae. Cocaine was employed. The man did not move in the slightest degree during the operation, and asserted he did not feel the corneo-scleral incision at all; that he felt the seizure and cutting off of the iris, but it did not pain him. Eight days later the other eye was operated upon, but this time without the use of cocaine; he writhed and "bore down," so that the operation was rendered decidedly more difficult. Although a large majority of people who have to undergo such operations are torpid individuals and bear their pain with patience, nevertheless, the last case appears to prove that even in such cases an anaesthetic might be of excellent service.

DR. HERSCHFELD is in private practice. His address is 3101 Bristol Road, Bensalem, PA 19020. Requests for reprints should be made directly to the author.
The Contributions of John Ross Callahan

—Harvey Janke, D.D.S.
Sarasota, Florida

Each year since 1922, the Ohio Dental Association has presented the prestigious Callahan Gold Medal Award to a person who has earned distinction in a manner which reflects the search for truth so characteristic of one of dentistry’s great leaders, John Ross Callahan. This paper traces the life and works of this outstanding individual and lists the recipients of the award.

The Ohio Dental Society, in 1922, created a special Callahan Memorial Commission and charged it with selecting a worthy recipient each year of a gold medal struck in the memory of one of Ohio’s noted dental researchers and a leader in organized dentistry, John Ross Callahan. The presentation ceremony is held at the Callahan Awards Luncheon of the Ohio Dental Association Meeting and not only recognizes exceptional individual accomplishment but also marks a continuity of meritorious service to the dental profession and to the public at large. The roster of the recipients of the award reads like a “Who’s Who” in dentistry and gives special meaning to these lines of Henry Wadsworth Longfellow:

Lives of great men all remind us
We can make our lives sublime.
And, departing, leave behind us
Footprints on the sands of time.

In addition to the annual presentation of the Gold Medal, the Callahan Commission has, since 1940, provided annual awards to outstanding dental graduates of Ohio State University and Case-Western Reserve University. These awards are made possible by a fund established by the Commission in 1922 and subsequently enhanced by contributions from individuals and dental societies in this country and abroad. The Commission consists of eight members — five of them from the state of Ohio — elected by the House of Delegates of the Ohio Dental Association.

CALLAHAN’S PROFESSIONAL LIFE

John Ross Callahan was born in Higginson, Ohio, on June 28, 1853. Early in his childhood, his father, Dennis Callahan, who was both a physician and a dentist, moved the family to Hillsboro, Ohio, where he was associated in the practice of dentistry with Dr. John Ellis. Young Callahan’s destiny was shaped in this professional environment by these two dedicat-
ed men, and when he became old enough they invited him to join them as a preceptoral student in their busy office. The inquiring mind, which was to become a hallmark of this young man's remarkable career, along with the desire to expand his professional skills and knowledge, prompted him to leave Hillsboro after several years of apprenticeship and enroll in the Philadelphia Dental College. He received his degree there in February, 1877.

As members of a generation that was constantly exposed to stories of opportunity on the developing western frontier, and no doubt encouraged by Horace Greeley's editorial challenge in the New York Tribune: "Go west, young man, and grow up with the country," Callahan and a classmate, Washington G. Winter, traveled to San Francisco. There they opened an office in partnership, but after two years Callahan returned to Hillsboro, married and settled down to an early involvement in clinical and scientific research, organized dentistry, and the pleasant task of raising a family of two daughters and one son.

In 1890, after eleven years of practice in Hillsboro and with several noteworthy clinical investigations already underway, he moved on to Cincinnati. Among the reasons for this latest move was the availability of the highly successful practice of Dr. C. R. Taft, along with a desire to provide his family with the advantages of the big city, especially the many cultural opportunities. Perhaps above all, Dr. Callahan wanted to satisfy a personal desire to acquire more knowledge through formal education. Shortly after his arrival, and while conducting a busy practice of dentistry, he enrolled in the Miami Medical College and pursued the study of medicine to within two months of graduation. Only after he had obtained all the knowledge that he considered necessary to continue his research was he ready to abandon his study of medicine.

Callahan demonstrated his scholarly talents early. Dr. Alvin Morris has made the following astute observation:

The first glimpse of Callahan's alert and eager mind in the literature is found in the December 1883 issue of the Journal of the Ohio State Dental Society. A discussion is recorded in which Callahan is quoted as describing a new approach to using fibrous foil built on a core of amalgam for the restoration of a badly decayed premolar crown. His few comments reflect clinical curiosity, ingenuity, and a disciplined approach to observation that is unusual for a young man in his early years of practice.

HIS WIDELY PUBLISHED ARTICLES

His first really influential paper, "The Conservation of the Dental Pulp," was read before the Mississippi Valley Dental Association in 1888. While root canal problems continued to be the chief focus of Callahan's research, the literature contains a number of his articles on a variety of subjects. Although he published voluminously, he was eagerly sought as an essayist at dental meetings. He always made himself available to his colleagues and is said to have delivered ten or twenty times as many lectures as he had published. The range of his interests is indicated by a sampling of his articles on such topics as "Fees," "The Nervous Patient," "Care of Children's Teeth," "Hypnotism," "Imagination," "The Use of Non-cohesive Gold and Tin" and "Carious Tooth in a Dermoid Cyst."

His paper on "Sulphuric Acid for Opening Root Canals," read before the Ohio State Dental Society in 1893, firmly established him as an authority in the field of endodontics and was widely reprinted. In 1914 another paper recommending the use of a rosin solution for filling root canals was read
before the Rehwinkel Dental Society. That report followed seven years of research, and the technique was soon widely accepted. Other research interests included dental materials, practice management, and histologic studies of the maxilla and mandible. In the last three years of his life, Dr. Callahan was deeply involved in research supported by grants from the Research Institute of the National Dental Association. A display of his histologic and endodontic studies is housed in the basic science laboratory of the Ohio State University College of Dentistry, on permanent loan from the Ohio Dental Association.

HIS ACTIVITIES IN ORGANIZED DENTISTRY

His involvement in the activities of organized dentistry really began in 1884 when he was elected secretary of the Ohio State Dental Society, a position he held for seven years. He served as president of the Society in 1892 and was a member of its board of directors from 1894 until his death. While practicing in Cincinnati, he gave generously of his time in promoting the activities of the local society, serving as its president in 1906 and 1907. In addition, his medical studies gave him an expertise which resulted in his organizing a microbiology study group; he also became an active member of the Cincinnati Research Society. He was the originator and director of the Cincinnati Dental Research Club, and through his appointment as head of the Dental Department of Cincinnati General Hospital, he had access to its laboratories and clinics and thus gained wider scope for his research. He was a life member of Delta Sigma Delta.

Moving on to the regional and national scene, Dr. Callahan was active in one of the most rapidly growing dental organizations of its time, the Mississippi Valley Dental Association. He became its president in 1889, and he also served for years in the House of Delegates of the National Dental Association, precursor of today's American Dental Association. He was a member of several councils of the Association. He is likewise credited with helping to establish the Research Institute of the National Dental Association.

HONORS AND AWARDS

From his patients, Dr. Callahan earned respect and admiration as a sensitive, firm but gentle, hard-working practitioner. His colleagues found him to be a modest, methodical clinician and scientific investigator who was always considerate of others. The appreciation and esteem of Dr. Callahan's colleagues were clearly demonstrated when they presented him with a modern x-ray unit at a meeting of the Ohio State Dental Society in 1915. Soon thereafter he received additional equipment from friends in Atlanta to help him in his research. In 1917 the Dental Society of the State of New York bestowed the Jarvie Medal upon him for "scientific attainment of distinction." At a dinner of the Cincinnati Dental Society on June 12, 1917, Dr. Callahan received a special commendation from leaders of the dental profession in recognition of his achievements in research. And when he expressed his appreciation for the kindly sentiments and good fellowship, he reminded the group of his resolve not to take himself too seriously. He said he had written a thirteenth commandment for self-application: "There are others who have done things."

On Tuesday evening, February 12, 1918, after a busy day at his Cincinnati office, Dr. Callahan went to the Queen City Club and began working on a manuscript which would describe some of his current research. When
after a time he opened a book to relax, he fell asleep and never awakened. Death was attributed to a stroke.

The Journal of the National Dental Association paid the following tribute to Dr. Callahan:

His sudden and untimely death makes it quite difficult to appreciate that his highly skilled and practical hand is forever stilled; that his trained and studious brain, with its broad vision, is no longer struggling with complicated dental problems; that his warm and pulsating heart, so full of sympathy for everything connected with his chosen profession, has ceased to perform its function; that his remarkable reserve force, which was unfortunately overtaxed on many occasions, has been finally and completely exhausted, and that the GENIAL, CHARMING AND MAGNETIC CALLAHAN IS NO MORE. No, Dr. Callahan is not gone; such men never die — are never lost to those who love them, and while we can no longer press his hand and see his smile of greeting, yet these are but incidents compared to the research truths and the professional advice which time itself can never efface from our minds and hearts.

In August of 1918, a memorial hour for Dr. Callahan was set aside during the annual meeting of the National Dental Association, and the event was described in the June, 1919, issue of the Association's Journal. Dr. Callahan's last article, "Supporting Structures and Vascularization of the Teeth" was also printed in that issue, along with reflections about him by Drs. T.I. Way, Thomas Hinman, and Rodriques Ottolengui. Dr. Hinman's comments on the steadfast character of this unassuming professional included the following:

There never was a man truer to his friends or more generous to his enemies. I never heard him speak unkindly of anyone. He always saw the good in everyone and it always overshadowed the fault. He was not a rich man, as the world counts riches, but in noble qualities, truth, honesty, and charity, his wealth had no bounds. If he had been content to use his knowledge for personal gain, he could have lived in ease and comfort. But no! His desire was to work and give.

Dr. Callahan lives on, in large part through the efforts of the Memorial Commission created by the Ohio Dental Association in 1920. The medal is cast in gold, with Dr. Callahan's head in relief on one side and the recipient's name and the year of the award on the reverse side. The first person to receive the award was Dr. J. Leon Williams, of Solon, Maine, the distinguished dental histologist and anatomist whose classification of tooth forms still provides the scientific basis for tooth selection for prostheses.

On December 6, 1922, in the same year in which the first medal was presented, a bronze bust of Dr. Callahan, sculptured by Frederick C. Hibbard of Chicago, was unveiled. It was dedicated on the grounds of the Cincinnati General Hospital, with the cooperation of city and hospital officials and in the presence of dental leaders from local, state and national societies. Due to the expansion of the hospital, the bust was removed to the College of Dentistry, Ohio State University, at Columbus, Ohio, and rededicated in 1937. It is now located near the west wall of the courtyard of Postle Hall.

Recipients of the Callahan Award Medal are:

1922 James Leon Williams
1923 Frederick B. Noyes
1924 Clarence J. Grieves
1925 Edward C. Rosenow
1926 Percy R. Howe
1927 Howard R. Raper
1928 William J. Gies
1929 Russel W. Bunting
1930 Rodrigues Ottolengui
1931 Weston A. Price
John Ross Callahan represented all that was good in dentistry. His life had a lasting impact upon his profession and his colleagues. A Cincinnati newspaper, in an editorial after his death, summed it up:

The scientific imagination was one of Dr. Callahan’s tributes, the ability to see beyond the immediate causes, into the causes of causes, to trace symptoms to their source instead of being satisfied with superficial manifestations.\(^3\)

**REFERENCES**


DR. JANKE, now retired from active practice, is a Life Member of the American Dental Association. His address is 3224 Tournament Boulevard, Sarasota, FL 33580. Requests for reprints should be made directly to the author.
Antique Book Collector’s Corner

Suggested Reading for Oral Surgeons: A Book Printed in London in 1687

—Max Geshwind, D.D.S.
Jamaica, New York

As a collector of old dental and medical books, I often pick up an old friend of a volume to restudy it. On one such happy occasion I chose to peruse a 17th century tome that announced on its title page:

CHIRURGORUM COMES:
OR THE
Whole Practice
of
CHIRURGERY
Begun by the Learned
Dr. READ;
Continued and completed
By a Member of the College of
Physicians in London.

Licensed,
Feb. 15, 1686-87
London

Printed by Edw. Jones, for Christopher Wilkinson
at the Black Boy in Fleet street, over against
St. Dunstans Church, 1687.

Unfortunately there is no hint of who the author was or who completed the work. Searching through the text for information on dental practice such as the extraction of teeth or the treatment of toothache, I found nothing. Yet I found much relating to oral surgery.

On page 517, “of cutting Tongue-tied children”, the author shows brilliant surgical insight into the diagnosis, treatment, and prognosis of this condition. He is so remarkable that I think every oral surgeon who does frenotomies should read this chapter in the original. I can guarantee a rewarding and even thrilling adventure to all who do. Here are brief selections from this chapter:

The tongue — when the membraneous ligament or Fraenum, which connects it, is either too short, or extends to the tip of the tongue: Then the children are said to be Tongue-tied. But before I meddle with the separation of the Tongue from the parts under it, by cutting the Fraenum, I must make some just Animadversion upon the temerity of some Midwives, who always wear one of their Nails of great length, and being thus ready with an incision instrument in their hand, wherever they come to do their office, they cut the new born Child’s Tongue, and unless they did this, they believe the Children could not speak. —The worst is, the Child, when the Chirurgery of the nail has raised an Inflammation, cannot take hold of the Nipple, nor get any milk, and so it dies, and which is yet worse, they impute the whole cause of Death, either to the Birth, or to its inability to take hold of the Nipple, or to any thing, rather than to the true, viz. the Midwives claw.
He then advises parents, "... who value their children, have a care that the Midwives meddle not with cutting their tongues. If the ligament be such as requires cutting, it may be cut in time enough; but this rarely happens. Because Nature had never designed Man to speak, had she not furnished him with apt instruments. Of many thousands, that are born with this ligament, scarce one requires cutting."

The author then describes how he performs the operation of frenotomy when necessary, cautioning against cutting the blood vessels that run under the tongue, "and then washing with a little Claret and Diameron, and it will heal of it self." He cautions parents anxious, over their children's speech, that there may be other causes than tongue-tie that prevent or interfere with speech, and that cutting the frenum is no panacea.

The author also has an uncanny insight into cause and effect of the inflammatory consequences of cutting the frenum with a dirty fingernail. And his recommendation of an alcoholic rinse after the operation is a near miraculous insight.

Also recommended reading to the student of the history of oral surgery is page 22: "Of curing a Tumor come to Suppuration". Here he describes lancing an abscess to establish drainage when the "opostern" (tumor or abscess) is just at the right stage of "maturation", or pointing. He also discusses using a very small sharp lancet when opening an abscess on the face to keep scarring at a minimum. Also on the suggested reading list are page 216, "Of Ulcers of the Mouth"; page 501, "of Luxation of the Jawbone"; page 645, "Of supplying the Nose, Ears or Lips when deficient"; page 700, "On curing Hare-Lip and supplying a Lip deficient"; and finally, page 704, "The history of the Nose artificially engrafted".
What Is It?

-Alex Peck, Antique Scientifica
Charleston, Illinois

The current poser is from the collection in the Rare Books and Manuscript Division, Francis A. Countway Library, Harvard University, and appears here through the courtesy of Richard Wolf, Curator.

It is about nine inches long and is made of a combination of ivory and nickel plated steel. The beaks are sharpened so that they have knife-like edges. As the handle is turned upon the ratchet the beaks are brought closer together until they touch. To release them the ratchet handle is turned in a reverse direction.

This item is really a stickler and we're not sure ourselves just what its purpose is, but we've got a pretty good idea. Let's see if any of our readers can come up with a good explanation.

The interesting little item in the last issue is a masticator! This was used at the table by a person without teeth and substituted for the teeth in reduc- ing food to swallowing size. The handles are under tension because of the spring between them and they can be locked in a closed position much as a pair of garden snippers. The tines resemble two tines of a fork and are so placed that they can pass through the other when the handles are brought together. The person who was unfortunately edentulous would hold the masticator in his hand, pick up a pic of meat or other food, squeeze it between the tines, and let the crushed food fall to his plate. It would then be picked up with a fork and put in the mouth. After the meal was over it would be wiped off and replaced in the little leather purse.
Amedee Charles Henri de Noe (1819-1879)—published under the pseudonym CHAM—French

William Rogers Dentiste d’Ibrahim—Engraving published in Album de Caricatures, a compilation of 393 engravings and drawings by CHAM completed circa 1860 and edited by Garnier freres, 10 rue de Richelieu, Paris

Caption: John, my master said to me, bring these false teeth into town; they are waiting for them for lunch.

William Rogers, an English dentist practicing in Paris during the middle of the 19th century, capitalized greatly on his brief relationship with the son of the then Egyptian ruler, Ibrahim Pasha. Mr. Rogers apparently successfully fitted him with a set of false teeth and his servants subsequently appeared to have theirs constructed. This was widely publicized and caricaturized in the press, particularly in Le Charivari where Mr. Rogers regularly placed advertisements as the “dentist to the court of Ibrahim”. Rateliers was a term used during that era to denote false teeth, namely full dentures.

Comments by Bernard S. Moskow, D.D.S., M.Sc.D., Clinical Professor of Dentistry, Columbia University School of Dental and Oral Surgery. Dr. Moskow is the author of the text Art and the Dentist
NOTES & QUERIES

WESTERN AUSTRALIA HONORS TWO DENTAL PIONEERS

Dr. R. F. Stockwell, formerly Senior Lecturer in Dental Science at the Dental School, University of Western Australia in Perth and now retired, has apprised us of the commemoration by the University of two of the region’s early dentists in which a display case containing memorabilia relating to their careers was housed. The newspaper The West Australian of August 22, 1985 had a lengthy article about the occasion.

The display concerned the lives and works of Dr. Harold Mattingly and Dr. Leonard Nathan and was opened by the chairman of the hospital’s board of management, Rabbi Dr. Shalom Coleman.

Dr. Mattingly was a 19-year-old newly graduated dentist when he arrived in Coolgardie in 1898. He was enthusiastically welcomed by the people in the thriving town. He established a successful practice and travelled long distances on a camel to give dental relief. His work with Aborigines was the subject of a thesis he wrote for his University of Melbourne doctorate in 1914. It attracted worldwide attention and is regarded as a landmark in Aboriginal
Dr. Harold Mattingly seated on the camel that carried him to remote communities and mining camps to practice dentistry.

of six brothers who immigrated to Australia in the early part of this century. At least four of his nephews were prominent members of the dental profession in Western Australia and helped establish the Perth Dental Hospital and the Western Australia College of Dental Science, which ultimately merged to form the University of Western Australia Dental School.

Dr. Nathan, who was born and educated in Christchurch, New Zealand, began his study of dentistry as an apprentice in Katanning in 1910. Four years later he went to the United States and enrolled at Harvard University and was graduated in 1917. He accepted the position of assistant professor in prosthetic dentistry and then assistant professor of biology and anesthesia, ultimately becoming professor of pathology and embarking on a long career in post-graduate research and training. He helped many young dentists get post-graduate experience and his personal generosity was a by-word, especially among young Australian dentists.

He retired from the post of professor of pathology at Harvard to become chief of dental services at Beth Israel Hospital for 15 years; for another 5 he served with the United States Public Health Service.

Through frequent visits he maintained a close association with Australian dental schools and their graduates. His friends in the dental school of the University of Western Australia established the Leonard Nathan Prize in Oral Pathology and Oral Medicine in his honor. Harvard honored him with a Distinguished Alumnus Award in 1972.

Dr. Nathan died in Boston in 1978 at the age of 95 and was buried there in Sharon Memorial Park.

WILLIAM BEAUMONT AND THE NORTHERN REACHES OF NEW YORK.

William Beaumont, a surgeon in the United States Army, in 1833 published his famous Experiments and Observations based on his study of an accidental gastric fistula in a Canadian named Alexis St. Martin. Beaumont was able to put pieces of meat into St. Martin's stomach through this artificially created opening and draw them out in various stages of digestion. Beaumont first began his studies on this unusual patient in the wilds of Michigan and
brought him with him when he was transferred to the Plattsburgh Barracks in New York, 2000 miles away. Garrison, the outstanding historian of medicine, quotes another writer named Vaughan who said that “Every physician who prescribes for digestive disorders and every patient who is benefited by such a prescription owes gratitude to the memory of William Beaumont who, in 1825, on the island of Mackinaw, began his studies of digestion, which he pursued with labor and skill for the benefit of mankind.”

Dr. Raphael Escoe, a dentist of Massena, New York, not far from the City of Plattsburgh, found this tablet commemorating Beaumont’s pioneering work. Erected by the Physicians Hospital of Plattsburgh, it is no longer a part of a military barracks, but today graces the wall of a pizzeria! The plaque reads:

William Beaumont, M.D.
America’s Pioneer Physiologist
Born Lebanon, Conn. 1785—Died St. Louis, Mo. 1853
His Scientific Researches in Gastric Digestion were Fundamental
Brevetted Surgeons Mate 1812
In Battle of Plattsburgh 1814
Here Opened Office and Drug Store June 1815
Published His “Physiology of Digestion” at Plattsburgh in 1833.

WE BUY AND SELL BACK FILES OF DENTAL JOURNALS AND BOOKS ON THE HISTORY OF DENTISTRY
BARTEL DENTAL BOOK COMPANY
Post Office Box 463
Brooklyn, NY 11207-3004
To the Editor:

I am writing a thesis for my M.A. in Economics on the “Transformation of Delivery and Payment Mechanisms in Dental Care.”

I’m looking for information on the history of these aspects in the U.S. The A.D.A. does not have material to help me. Perhaps you can.

I’m particularly interested in finding why dentistry developed separately from medicine, which didn’t occur in many European countries. Also I’d like to know when charitable clinics, such as the Guggenheim in New York, and governmental clinics such as in the public schools, first appeared.

Sincerely,
Seymour Krauth, D.D.S.
24 Old Farm Road
Lake Success, NY 11020

To the Editor:

Let me compliment the officers and committee members on the outstanding job they are accomplishing with the Academy and its publications. Reading the Bulletin and Newsletter is like getting an extra ray of sunshine into my life. I look forward to receiving them and devouring every word! Thank you so much.

Sincerely,
Joseph Serio, D.D.S.
West Hempstead, NY

To the Editor:

A grammar school student contacted me requesting information about the Tooth Fairy legend for a class assignment. I hunted everywhere without success.

If you have any information about the Tooth Fairy legend, as to country of origin, how it became popular, what the Tooth Fairy was called, and any available illustrations, I would be most grateful.

Sincerely,
Michael P. Balbo, D.D.S.
Director of Academic Resources
New Jersey Dental School
Newark, New Jersey
To the Editor:

I enjoyed reading *Historic Insights on Dental Radiography*. Drs. Bober-Moken and Perez have produced a paper that adds to the scholarship in this area and provides entertaining reading for those with general interest in Dental History.

Since I have particular interest in the history of periodontology, I was disappointed to find two important references missing from an otherwise extensive bibliography:


Both of these works provided atlas like views and interpretations of the radiographic changes in a variety of periodontopathies. Thoma stated “The Roentgen method affords an excellent means of studying the progress of Pyorrhea Alveolaris, and is a valuable aid in the diagnosis and prognosis of the disease, as it registers the extent to which bone has been affected . . .”. The Weski work was a standard reference work throughout Europe during the second quarter of this century.

Thank you once again for the opportunity to read this fine review of dental applications of roentgenography during its early years.

Sincerely,

Steven I. Gold, D.D.S.
School of Dental and Oral Surgery
Columbia University
New York, NY

To the Editor:

Thank you for your help in determining the origin of the drawing in the ancient Egyptian surgical papyrus dealing with luxation of the mandible.

I sent the drawing on to Dental Abstracts and it made a colorful and interesting cover for this fine journal. I have now contributed four covers to this publication.

Although ancient, the drawing looks so modern and has, in addition, a diagnosis and prognosis for the condition, that it reminds me of the Piltdown Man hoax where, unfortunately, a dentist contributed to the fakery with his dental grinding machine and silver nitrate stains.

Thanks again for your interest.

Sincerely,

Dr. Carlos Perez Martinez
Bucaramanga, Colombia

To the Editor:

We understand that among your readers there are those who have an interest in unusual books on dentistry. We quote the following curious item that may be of interest to some.


We think that this is a very rare piece of satire on dentistry and the condition of this copy is usually fine!

Thank you for your attention.

Cordially,

Louis Appelfeld
Appelfeld Gallery
1372 York Avenue
New York, NY 10021
To the Editor:

I'm very much interested in helping arrange a celebration of the 150th birthday of the great G. V. Black. If you can send me as much information on him that you may have I shall turn it over to Dr. Victor H. Montes, president of the Federacion Odontologica Colombiana and to the directors of the dental schools here in Colombia.

Yours sincerely,
Dr. Efraim Ardila Garcia
Bucaramanga, Colombia

To the Editor:

Through the A.D.A. library I've just received, on loan, the Bulletin of the History of Dentistry, Vol. 33, No. 2, October, 1985. Can we purchase a copy for our dental library, and let us know the cost.

We were especially interested in the article about Daniel Hally-Smith. We have his bust from the American Hospital of Paris. He sent it to us when we opened the Institute in 1972 and it is in our Educational Department suite.

Best wishes to all of you for your great service!
Sincerely,
L.D. Pankey
L.D. Pankey Institute for Advanced Dental Education
Key Biscayne, Florida

To the Editor:

While listening to a broadcast on National Public Radio I caught the last few minutes of the interview with you regarding your book on dental history. I am very interested in the subject of quackery and have been active and influential in the area of cancer quackery and unproven methods of cancer management.

Could you let me have the name of your book and its publisher, and where I might purchase it. I would be interested in learning of instances of dental quackery.

Best wishes,
Helene G. Brown, Director
Community Applications and Information/Public Relations
Jonsson Comprehensive Care Center
University of California, Los Angeles

An Old Salt

Being asked by the dentist to indicate the tooth he wished drawn, he replied in nautical phraseology: "Dorck, it is the hindmost grinder aloft on the starboard quarter."

American Dental Weekly (Atlanta)
Vol. 1, page 82, Oct. 21, 1897.

Dr. Hoffman-Axthelm, one of the world's great dental historians, first brought his fine book out in 1973. It filled a much needed void in the scholarship of dental history and was translated into English in 1981, into Japanese in 1985, and is being brought out in Spanish. There had not been a good comprehensive text on the subject in over half a century and his book quickly became recognized as the authoritative work in the field.

The new edition is completely re-worked and improved, with information gleaned by Professor Hoffman-Axthelm which adds to our rich knowledge of the background of this important profession. The author points out that basic writings in the field of periodontics were done 200 years before Fauchard by Girolamo Cardano in his book De Dentibus. And although Cardano wrote in a difficult late Latin, Hoffman-Axthelm has succeeded in presenting Cardano's findings for us, giving us many new interesting details of early dentistry.

There are several new chapters in the book: the chapter on fractures of the jaw has been enhanced by a discussion of x-ray techniques and the development of the panoramic x-ray. In the section on prosthetics the development of articulators and other instruments and materials is thoroughly treated. Orthodontics has a new chapter "Gebissanalyse und Craniometrie" (occlusion analysis and craniometry) which traces work in the field from Leonardo de Vinci and Durer to Angle and Broadbent. New findings in the scientific development of dental anatomy and histology are also included.

This second edition has about 100 pages more than the first and contains many new pictures. There are 532 black and white illustrations which add greatly to the interest of the book but also serve to inform and educate
the reader. Of major importance, too, are the copious footnotes and the excellent lists of references which lead the reader to additional information of import.

A reviewer for a medical history magazine, in commenting on the previous edition of Haffman-Axthelm's book, said that it was astonishing that it was possible to collect the whole history of dentistry into one book of 500 pages. The new edition does that feat even better! And an English translation of this new edition will greatly add to the resource materials available to the scholar in the field of dental history.

—Reviewed by Malvin E. Ring, D.D.S.
Rochester, New York


This autobiography was written by A. W. Paffenbarger, DDS (1856-1949), when he was in his 80's. Just before his death, he gave the rough copy to his dentist son, George. Dr. Paffenbarger, Jr. did not edit his father's writings until he, himself, was 81. In editing, the son added footnotes and biographies of himself and his brother.

Andrew Wolf Paffenbarger was named after the doctor who delivered him in exchange for the doctor giving the family a lamb! Called Doc from infancy, he was raised on a farm in MacArthur, Ohio, the youngest of eleven children. Life was uneventful. Other than mentioning that the neighbors hid their horses when Civil War soldiers came through, Doc's remembrances are of the farm, the neighbors, the harvesting, etc. His schooling was very limited but he does mention a teacher who specialized in vocal music and taught geography by singing it!

At 16, Doc was sent to a neighboring town to learn merchandising. In 1876, he went to Philadelphia for the Centennial celebration. As a person who had led a very circumscribed life, the Centennial must have been splendid indeed. He describes the trip in detail. The experience changed his life. Doc quit his job and returned to public school. He became a teacher (without a high school education) at $35 a month. Although he does not state what sparked his new interest, Doc enrolled in the Ohio College of Dental Surgery at Cincinnati in 1882. He left without a degree and set up practice in his hometown, but returned in 1885 to complete his degree.

One of his patients became his wife over the strong disapproval of her family. The couple was forced to run off to marry. Doc led a long life and had a devoted family. He was a 72 year member of his church, helped found the town bank, the telephone company and was on the school board. He was a loyal member of the Masonic Order and describes with fond memories the trips that he took with the Order.

Doc wrote at a time when people kept emotions and their inner thoughts to themselves. His first two children died within weeks of their births. He mentions his wife's grief but does not comment upon his own feelings. He never mentions the serious illnesses that his son, George, had. In fact, he mentions his sons rarely, mainly commenting on their birth dates, that they graduated from Ohio State and that they turned out well. But then he surprises us by describing quite graphically what he and his wife did to ensure that their next child would be a boy.
The book depicts a simpler era and has a certain charm. However, it is to be regretted that as an autobiography of a dentist, his profession is mentioned so rarely. Doc describes his entire career of dentistry in a few sentences. He does mention that in his last office, from 1926-1939, he paid rent of $5 a month. It is in the footnotes that one learns that Doc’s dental office had no water or sewage. Water was hand carried in a bucket from the town pump, and the cuspidor was rinsed each evening in the street gutter!

For this reviewer, the most interesting parts of the book appear in the footnotes. In them the son tells of his own life and career. He graduated first in his dental school class at Ohio State in 1924.

He returned to practice with his father but within six months he came down with tuberculosis and after some treatment moved with his wife to Hawaii. Then he developed an ulcer and for the next year had to pump his stomach nightly.

Slowly recovering his health, he returned to Ohio to teach for three years at the Ohio State College of Dentistry. But in 1929 he left to join the National Bureau of Standards where he remained for over half a century although he lacked any formal research training! He learned quickly and had a brilliant career testing and setting standards for dental materials. He served in the Navy during World War II and was largely responsible for procuring and maintaining an adequate supply of the 800 items on the dental supply list. He retired from the Navy as a rear-admiral.

Dr. Paffenbarger obtained the second Panorex x-ray machine used in the metropolitan Washington, D.C., area and the first for the Bureau of Standards. He was shown how to use the machine by the possessor of the first Panorex in the area, the present Book Review Editor of the Bulletin of the History of Dentistry, Dr. Lloyd E. Church.

Dr. Paffenbarger was Senior Research Associate for the American Dental Association until his retirement from the Bureau of Standards in 1967. During his career he presented 200 research papers and many lectures. He was the recipient of four honorary degrees and was widely honored both in this country and abroad. He died in 1985.

Reviewed by Cynthia Chappelka, R.D.H.
Assistant Research Professor
Dental Auxiliary Training Program
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University of Kentucky

A Practical Treatise on Dentition. By Joseph Hurlock. 258 pages, No price given, London-Bridge, Sold by C. Rivington and S. Austen in St. Paul’s Churchyard; and by J. Hodges against St. Magnas Church. 1742. (Facsimile reprint by Classics of Dentistry Library.)

This book, while relatively small in size, is a landmark work. Although nothing is known about Hurlock personally, his book was influential in the development of the profession. It is the first book in the world to be entirely devoted to children’s teeth. He was a strong believer that difficulty of teething was a cause of infant mortality and advocated incising of the gums above an erupting tooth as a life-saving measure. He pleaded with parents and nurses to be allowed to carry out this procedure, claiming that it was entirely without danger and the salvation for many infants who would die without it. Because of his persuasive writing this nefarious practice remained until
well in the middle of the century. Hoffman-Axthelm points out that not even the great John Tomes could completely free himself of this prejudice in his textbook which was published in 1859.

Hurlock discussed the havoc wrought by caries in deciduous teeth and believed that this was due to the diet. He recommended that such stricken children be sent to the country where fresh air and better food could be obtained and to buttress his opinion presented many case histories which are of great interest. Many of Hurlock’s conclusions are valid even today.

This special edition has been privately printed for the members of the Classics of Dentistry Library by the Rae Publishing Company. Everything about this book is special. Reading the early English print will take you back to 1742 and you will thoroughly enjoy every page. This book is highly recommended to every professional person related to dentistry. To the pedodontist, it is an absolute must.

—Reviewed by Lloyd E. Church, D.D.S., Ph.D.
Bethesda, Maryland


There have been thousands of books and articles published on American history. The majority of these works consider only the role men played in the development of this country; women, with few exceptions, are virtually ignored. When they are included, their function as housewives and helpmates is stressed, while tales of individual achievement in careers and causes are rare.

Famous American Women addresses the dearth of information on notable women in the history of the United States. It contain biographies of 1035 women in 1022 separate sketches. These sketches are arranged alphabetically and have an average length of 400 words. Subjects range chronologically from Virginia Dare (1587), the first European child born in America, to modern figures, such as Beverly Sills and Shirley Temple. Unfortunately, there are no illustrations.

Each entry includes date of birth, place of birth, and a brief description of the education and background of the woman being written about. The bulk of the entry is an account of the woman's accomplishments and career, as well as her relationship to the historical events of the period. Entries end with place and date of death, or a description of current activities if the woman is still living.

Famous American Women has two indexes. The first arranges biographical sketches by occupation or area of expertise. In the second, organizations and institutions which were established, operated, or otherwise influenced by women are listed. Bibliographic references are not included. Although this does not detract from the book's value, it would have been helpful to have materials suggested for further reading.

Twenty-six names are given under the heading “Physicians and Dentists” in the Careers index. Of these, only one woman is a dentist, Lucy Beaman Hobbs Taylor. This entry is representative of the contents of the book as a whole. Dr. Taylor's education by the Dean of the Ohio College of Dental Surgery and her struggle to be admitted as a regular student is discussed. The entry also covers the details of her dental practices, both as a single
woman and later with her husband. Because of her service to the Iowa State Dental Society and the American Dental Association, she is also listed in the Organizations index.

A treat is in store for those who add Famous American Women to their collections. Not only is it a valuable source of biographical information, but it also makes for enjoyable reading. Although it contains a minimal amount of information on dentistry, it will be useful for anyone interested in history or biography. This reviewer recommends it highly.

Reviewed by Sara Anne Hook, M.L.S.
Public Services Librarian
Indiana State University
School of Dentistry
Indianapolis, Indiana


As the title suggests, the book deals primarily with medicine, although dentistry is mentioned throughout the text often enough to warrant our interest. The author has chosen to "portray the quack, not merely as a rogue, but as a dedicated amateur with a mission, or a villain with a heart." In this endeavor, he succeeds admirably, and he takes a reader on "a journey through time traversed by the patient, the physician, and his shadow, the quack."

This book traces the origins of quackery and examines the different "cures" among the Chinese, the Egyptians and other ancient civilizations. It leads us through the European "Dark Ages" to the Renaissance, to the great age of quackery of the late 18th century and up to modern times. The reader, interested in painless oral surgery for his patients, could try the prescription advocated by John of Gaddesden, an orthodox Renaissance physician who told his patients to "let a green frog which leaps from tree to tree be seized and let the gut be taken. Any tooth squeezed with it will immediately fall out." The role of the "worm", which caused all of the dental problems for so many centuries is discussed at some length, and even Shakespeare is drawn into the controversy. The reader will learn that the art — rather than science — of tooth transplants flourished widely in 18th century England. Even Lady Hamilton "was almost reduced to selling her teeth"; fortunately for Hollywood, her dentition and history, she chose Lord Nelson as a safer haven for her financial security. It is precisely this attention to human detail, the personal glimpses from the past history of mankind, which makes this book so delightful to read. An appended bibliography allows the reader to pursue the topic further in depth if so desired.

My regret is that the book does not have more illustrations; out of 19 illustrations, only one deals with a dental subject. And why no mention of Painless Parker? The New Brunswicker who left Canada in 1896 at the age of 24 and moved to the United States to become the most colourful and controversial member of our profession surely deserves to be included. Also, typesetting errors such as "agaony" instead of "agony", on page 128, could have been avoided with more careful proofreading. But those are small details, and they do not detract from the enjoyment of the book.

The author dedicated this work "to the Quack, the peddler of Hope". It is my hope that this book will be read and enjoyed not only by members
of the health professions, but by everyone who is interested in mankind’s age old fascination with health.

—Reviewed by Oskar Sykora, D.D.S., M.A., Ph.D.
     Halifax, Nova Scotia, Canada


This book, *Indomitable Lady Doctors*, proves to be a delightfully encouraging publication for all professional women. Although the emphasis is here on female medical doctors, the accounts, accomplishments and personal interjections would be appreciated by all women.

These women not only practiced medicine but frequently were the suppliers of dental remedies, such as in the case of Dr. Susie Rijnhart. Bits and pieces about dentistry, such as the fact that some of these women doctors had dentist husbands, and references to the dentition of the women themselves make this book of interest to those in the field of dentistry.

The plights, adventures and experiences of these Canadian female physicians are strikingly familiar to all women and thus these women doctors come alive for the reader. However, the appeal in these stories is not limited to women but can be enjoyed by all, especially by those in minority groups who struggle so hard to reach a goal and who find after they’ve reached it that there is still resistance to be overcome.

Ms. Hacker beautifully delineates the step-by-step process needed to overcome prejudice against higher education for women. She points out that a balance is needed between the position of the suffragist who leads the way to changes, and the passivist who frequently contributes much by merely excelling in her chosen field of activity, thereby proving that it “could indeed be done.”

The book’s many strong points — easy-to-read, chronological arrangement and current relevance — overshadow the favoritism shown to the women doctors in the book as noted in personal annotations.

—Reviewed by Elizabeth Salley, D.M.D.
     Milledgeville, Georgia

*Treatise on Dental Caries.* By Emile Magitot. 264 pages, no price given, Boston, Houghton, Osgood & Co., 1878. (Facsimile reprint by Classics of Dentistry Library.)

It is highly recommended that any professional person who is interested in general dentistry, periodontics, endodontics, oral medicine and public health secure a copy of this book. As one reads through the contents he will wonder why this book was not made known years ago. I can only hope that it was because communication was slow, and because of the almost complete inability of American dentists to read French.

To do this book justice, it is necessary first to discuss the author and then the book. Emile Magitot, the “Father of Stomatology”, was a dominant figure in French dentistry and oral medicine for most of the latter half of the 19th century, extending from 1855, the date of his first work, to 1897, the year of his death. He was born in Paris in 1833 and died there in 1897. His father graduated in medicine, chose dentistry and attained the grade of health
officer. His son followed and far exceeded his father in every phase of his chosen profession. He was placed in intimate contact with all the great minds of medicine of his day and developed a classification of dental anomalies and his publications in this area are classics. His first works were devoted to the questions of normal human and comparative dental anatomy, and to research in histology and embryology. The work of Magitot in pathology equaled his anatomical work and his publications are valid to this day. His clinical work with reimplantation and grafts formed the basis of experimental work for years to come. He was greatly interested in therapeutics and supplemented this with work in hygiene. He attacked the problem of phosphorism and its dangers. This led to hygienic measures to do away with white phosphorus in the fabrication of matches. Thanks to Magitot phosphorism, and its worst manifestation, necrosis of the jaw, disappeared from human pathology. His support of dental hygiene in schools was the first step in the prevention of dental caries in infants, and his Treatise on Dental Caries was perhaps his greatest work.

Throughout his professional career he was convinced that persons practicing dentistry should initially qualify in medicine. This brought him into active opposition to the dentists in France, and it persisted throughout his professional life.

In this text he developed tables to illustrate the geographical pattern of dental caries and demonstrated the possible role of geography and dietary and economic factors. This was important because the exemptions from military service for poor teeth were excessive during the period 1837-1849. His study on caries frequency, physiology of dentine and plaque-acid production and related micro-organisms are valid today. His research in experimental caries production and the oral physiology of sugars was voluminous. His methods of pulpal diagnosis and the use of scientific restorative materials are still valid; it was he who developed a successful cement for dental restorations.

Emile Magitot may surely be described as one who personified the greatness and glory of France at a time in which she achieved world leadership in the biological sciences. In a period which produced a Pasteur in microbiology, a Bernard in physiology, an Ampere in physics, and a Carnot in mathematics, it is indeed gratifying that a dental researcher of comparable stature was quite their equal.

This special edition, printed especially for the members of the Classics of Dentistry Library, is bound in top-grain cowhide with gilded edges and the covers brass-die stamped in 22 carat gold. The book is beautifully designed. It is an absolute masterpiece!

Reviewed by Lloyd E. Church, D.D.S., Ph.D. Associate Clinical Professor of Surgery The George Washington University Medical Center Washington, D.C.


This attractively bound book was published in 1981 to commemorate the centennial of the University of Illinois' prestigious College of Medicine in
Chicago. The first section is devoted to the early history of the College and traces its beginnings as a proprietary school, originally called the College of Physicians and Surgeons. The faculty were the owners of the school. Purchase price to become an owner was $2000 for full faculty members and $500 for lecturers. The teachers occasionally received a dividend from the school but were expected to support themselves by private practice.

The first section is entitled “An Experiment in Medical Education: or How the College of Physicians and Surgeons Became the University of Illinois College of Medicine.” The author, Patricia S. Ward, Research Associate in Humanistic Studies at the University of Illinois Medical Center, outlines in some detail the gradual development of medical education in the last part of the nineteenth century and the early years of this century. She wrote that every governor of Illinois from 1893 to 1913 favored the acquisition of the College of Physicians and Surgeons. But it was only after loyal faculty and alumni purchased P & S stock and gave it to the University, that the University of Illinois took over. This section of the book is well illustrated and historians will find it of interest.

The remaining 287 pages include a keynote address by Rosalyn Yellow entitled “Science and Technology: Problems and Perceptions”, and a series of scientific papers on “Medicine in Transition” by scientists who at one time were students, trainees or former faculty members of the Illinois University College of Medicine. Biochemists, pharmacologists, geneticists, an ophthalmologist, a chemist, a pediatrician, and a physiologist contributed scholarly articles which, however, are primarily of interest to those in the discipline represented rather than to historians.

—Reviewed by Maynard K. Hine, D.D.S.
Chancellor Emeritus Indiana University
Purdue University at Indianapolis
Indianapolis, Indiana


This is a delightful book. It is divided into twenty-three chapters with intriguing titles such as “From Small Beginnings”, “To a Sea of Troubles”, “Almost Defeated”, “Survival of the Fittest”, “Medicine and Slavery”, “Organizing Dentists and Pharmacists” and “The Last Forty Years”. The author points out that the first medical practitioner came to the Colony of Georgia in 1733 and that he was also the first settler to die in this thirteenth and last English colony.

The book is sprinkled with interesting and little known facts. It serves not only as a history of the medical profession in Georgia, but as a source of information on history of medicine and dentistry, and medical and dental education in the United States and sociology of the South.

The final eighth of the book is devoted to extensive notes on each chapter, a bibliography of almost 100 books, nearly as many journal references and an excellent index to the text. This book is recommended to all who have interests in medical and dental history of the United States, particularly of the South.

—Reviewed by Frank B. Johnson, M.D.
Chairman, Department of Chemical Pathology
Armed Forces Institute of Pathology
Washington, D.C.

There is no more valuable tool for the worker in the field of dental history than this outstanding bibliography. Issued annually, it is cumulated every five years in a handsome, cloth-bound volume.

The bibliography is prepared from citations added to the file at the National Library of Medicine and is computerized and placed in the data base in the history of medicine known as HISTLINE. Detailed searches using the computer in the field of medical history and the history of adjunct fields may thus be made from computer terminals at any of over 3,000 medical schools, hospitals, universities and health science libraries. Thus a dental researcher has access to this vast accumulation of historical information by means of the center closest to him. The Bibliography will be essential in helping him in his or her inquiries.

The Bibliography is divided into three main parts: Part I, "Biographies", Part II, "Subjects" and Part III, "Authors". Thus citations can be gotten in a variety of ways. The section DENTISTRY in the "Subjects" portion runs to 13 pages and contains over a thousand citations. Our Bulletin of the History of Dentistry is thoroughly indexed and makes its contents available even to those who are non-readers of the publication. The cross-indexing makes it exceptionally easy to use, allowing one to approach a subject in many different ways. What makes the Bibliography even more valuable is the fact that scores of dental journals from foreign lands are indexed also, allowing us to stay abreast of what is being done in the field abroad.

This valuable tool is available from the Superintendent of Documents, Washington, D.C., Public Health Service Publication 1540.

—Reviewed by Malvin E. Ring, D.D.S.
Rochester, New York

Farewell, old tooth, thy parting gave me pain,
And yet, forsooth, I would not have thee back again
To abide with me.

And as I gaze upon thy worn-out form, how innocent thou dost appear,
One would not think the howling storm that filled my head with pain and fear
All came from thee.

From the collection of Professor Gardner Foley,
Baltimore, Maryland

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