A Century of Service

Dental Technology and Research

(Part Eight of a Series)

Dr. George Mathison (below) had much to smile about in 1898. After earning his dental degree from the Royal College of Dental Surgeons in 1897, he completed a year's graduate studies at the Pennsylvania College of Dental Surgery and was now opening a new office at Winnipeg's famous Portage and Main corner.

Dr. Mathison's office was typical of the day. M.B. Wilkerson had invented the hydraulic dental chair in 1877, and the Ritter Company had added the disc base in 1889. Although Dr. Mathison had running water and a cuspidor, he still relied on the foot pedal dental engine patented by Dr. James B. Morrison in 1871. The Ritter company first introduced the complete electrical dental unit with mounted drill, cuspidor, compressed air and water syringes in 1917.

Records from around the end of the 19th century indicate that Dr. Mathison would probably have charged up to $3.00 for a simple gold filling, $1.00 for an amalgam, 50¢ for an extraction and up to $15 for a full set of vulcanite dentures.

High-speed Dentistry

The method of delivering dental care by standing at chairside with a patient sitting upright did not change appreciably until the advent of the "high-speed" dental drill. One of the earliest gearless all-turbine dental handpieces was the Turbo-Jet, developed by Dr. Robert Nelson in the early 1950s while he was working at the National Bureau of Standards in Washington, DC. Driven by a stream of water generating almost two gallons a minute, the handpiece turbine could achieve speeds up to 60,000 revolutions per minute (rpm).

The Borden Airotor

A whole new era in dentistry was born with the invention of the air-driven handpiece by Dr. John Borden of Washington, DC. A dentist in the US Navy during World War II, Borden spent years developing his concept of using an air turbine rather than pulleys to spin a bur at speeds up to 250,000 rpm.

In 1957 the Dentists' Supply Company (Dentsply) negotiated an exclusive agreement to manufacture and distribute the Borden Airotor and then contracted with the S.S. White and Ritter companies to produce the controls and distribute the unit to the dental trade.

Sit Down, Four-Handed Dentistry

The high-speed dental drill with its demand for a clearing, cooling water spray on the dental operating field introduced a new concept in chairside dentistry. Almost as if he had a prophetic dream, in 1954 Dr. Sanford S. Golden, a former US Army dentist, convened a meeting of specialists in California to develop a reclining dental chair that would allow dentists to sit while treating patients. By the late 1960s every major dental manufacturer featured the "lounge" dental chair.

The Dental Bur

The S.S. White Company set the standard for steel dental burs with the introduction of the Revelation bur in 1891. When the Borden Airotor came on the market in the late 1950s a new bur concept was needed to meet the demands created by previously unrealized speeds. Beavers Dental Products in Morrisburg, Ontario, was ready to fill the need. In 1947 Mr. George Beavers had, with great foresight, persuaded the German metallurgist, Rudolph Funke, the 1917 inventor of tungsten carbide steel, to join his company. Beavers then went directly to the profession for advice on bur design. It was at this point that Vancouver prosthodontist Dr. W.R. (Bill) Scott — a legend in Canadian dentistry who retired in September 2001 after 63 years of active practice — began a long association with George Beavers. Dr. Scott was instrumental in the design of the 12-bladed finishing bur and the fine crosscut helical spiral bur.

Dental Radiology

Among the greatest contributions to the healing arts was the discovery of X-rays by Dr. Wilhelm Reöntgen in Würrtenburg, Germany, in 1905. Only months after this momentous event, Dr. C. Edmund Kells (right) of New Orleans, Louisiana, installed the first X-ray apparatus in his office, where he exposed the first dental radiograph in the western hemisphere.

A dedicated inventive genius, Dr. Kells introduced compressed air into the dental office, was the first to electrify his dental office from a central power station and invented the dental aspiration suction pump. Tragically, Dr. Kells also became the first victim of radiation necrosis.

In Canada, one of the key figures in the electrical revolution of dental offices was Dr. Frank D. Price, who worked in Toronto from 1892 to 1935. Shortly after graduation from the Royal College of Dental Surgeons in 1892 he was on staff at the College as instructor and later professor of electro-therapeutics. He built the first dental X-ray machine in Canada within a year of Reöntgen's discovery. Aware by this time of the dangers of radiation, Price and a brother devised a process of adding lead salts to rubber to make protective aprons and gloves.

Within a year of Reöntgen's discovery of X-rays, Eastman Kodak entered into an agreement with him to supply plates and paper for the new process. George Eastman (1854–1932) bought his first photo equipment at age 24 and in 1880 invented and patented a dry plate formula for recording images. In 1885 Kodak introduced the first transparent photograph "film" as we know it today. In 1913 Kodak introduced the first prepackaged commercial X-ray film and in 1926 the company developed the bite-wing film.

By the late 1930s dental X-ray equipment was becoming essential to the dental practice. The timer on the 1935 Victor X-ray machine (right) indicates a 10-second exposure for a molar tooth! Advances in technology and Kodak's Ultra-speed intraoral film in 1941 were instrumental in reducing radiation exposure to fractions of seconds.

Focal Infection

One of the side issues associated with the use of X-rays was that this technology appeared about the time when it was recognized that diseases of the mouth might have an affect on general health. In 1910, Sir William Hunter, the prominent English physician, in a lecture to physicians at McGill University, made his famous pronouncement that metallic dental restorations "were mausoleums of gold over a mass of sepsis." For years the mouth came under suspicion for every disease possible, an attitude that resulted in the massive extraction of teeth and placement of dentures. On the positive side, dentists were forced to improve diagnostic capabilities and the X-ray became an essential aid. Increased knowledge plus enhanced diagnostic methods, improved root canal therapy, and new crown and bridge techniques brought an end to the controversy. But not before countless mouths had been mutilated.

Filling Materials

When the Canadian Dental Association was founded in 1902 the dentist had only two basic materials with which to fill teeth — amalgam and gold. Dr. Robert Arthur had introduced cohesive gold foil in 1855, and starting in 1864 Dr. Sanford Barnum's ingenious use of the rubber dam made placing gold foil much easier. Dr. G.V. Black's classic investigations on silver amalgam in the 1890s solidly established it as an effective filling material, a status that remained virtually unchanged until the development of high copper amalgam by Edmonton metallurgist Dr. William Youdelis in 1963.

Tooth-coloured fillings in the form of silicate cements were not available until after 1879 and were never entirely satisfactory. They were replaced with resin filling materials in the early 1950s and composites in 1957.

Technological Advances

Dr. Derek Jones of Dalhousie University has developed an excellent chronological summary on the progress of dentistry down through the ages. Some of the critical developments on his list are:

1774	Dental porcelain
1825	Dental amalgam
1844	Gypsum plaster impression material
1847	Gutta percha root canal filling
1859	Vulcanite
1879	Silicate cement
1879	Zinc phosphate cement
1900	Lost wax casting method
1929	Cobalt chromium base alloy
1935	Acrylic resin
1941	Alginate impression material
1955	Acid-etched enamel
1956	Porcelain fused to gold
1957	Bis-GMA and composite resin
1960	Polysulphide impression material
1965	Titanium osseointegrated implants
1968	Zinc polycarboxylate cement
1971	Glass ionomer cement
1973	White light photopolymerizing
1981	Dentine resin adhesive
1985	Machinable ceramic (CAD-CAM)

The Pioneering Dental Supply Houses

The dental supply houses and their dealers are an integral part of the practice of dentistry and enjoy a very personal relationship with individual dentists. In addition, through the years these companies have generously supported numerous dental meetings, conventions and social events.

On May 17, 1978, 67 manufacturers, dealer/suppliers and laboratories — formerly members of the Canadian Association of Dental Exhibitors — held the inaugural meeting of the Dental Industry Association of Canada.

The first recorded dental supply house in Canada was the Canadian Dental Depot, established in Newcastle, Ontario, by Dr. S.B. Chandler in the late 1850s. The second was the Toronto Dental Depot, started by Mr. C.H. Hubbard in 1860.

When Harry P. Temple (left) founded the H.P. Temple Co. in 1895 in Toronto he was laying the foundation for a dental supply house that flourishes to this day. Temple's first expansion was in 1902 when he and George Pattison of Montreal merged their two companies under the name Temple-Pattison. They opened their first Western office in Winnipeg in 1904 and soon after had branches in Calgary, Vancouver, Edmonton and Regina. In 1923 Temple-Pattison merged with the British company, Claudius Ash, to form Ash Temple Ltd.

In the Atlantic provinces the Maritime Dental Supply Co. commenced business in 1911 under the name of Webb and Bell and operated until 1962 when it was purchased by Ash Temple Ltd. The S.S. White Company, founded in Philadelphia in 1844, eventually became the largest dental supply company in the world and established its Canadian retail outlet in 1900. S.S. White in Canada was purchased in 1916 by the Dental Company of Canada (DENCO), which remained in business until 1990.

The first supply depot in Vancouver was the British Columbia Dental Supply Company, founded by a Mr. Wolf in 1907. In the mid-1920s it was purchased by A.E. (Ted) Sinclair who later amalgamated the company with DENCO. Bruce Sinclair, Ted's son, left DENCO in 1971 and founded the Sinclair Dental Co.

Dental Research in Canada — Beginnings

When the CDA was founded in 1902 there was no provision for a committee on research. This aspect of dentistry must have been on the profession's mind, however, because within a few years Dr. A.J. McDonagh of Toronto was organizing the Canadian Oral Prophylactic Association (COPA), which became a pioneer in health education and research. A note from the Association's records shows that in 1914 the sum of $1,000 was donated to the Executive of the Canadian Dental Association for prizes in dental research in Canada.

The Father of Dental Research in Canada

The year 1914 is very important in the history of Canadian dental research. It was the year that Dr. Harold Keith Box (right) graduated from the Royal College of Dental Surgeons and was offered a $1,000 scholarship in pathology. He immediately became a part-time staff member and in 1920 was named professor of dental pathology and periodontology. The same year, Dr. Box received a PhD in pathology from the University of Toronto. Dr. Box's lifetime of leadership was to set the course and future of dental research in Canada.

CDA Research Committee

In 1916 the Canadian Dental Association, during its meeting in Montreal, appointed its first Research Committee, recommending that each of the four dental colleges be assigned a specific research problem to be worked out in their own laboratories.

In 1920 the Research Committee established a trust fund — the Canadian Dental Research Foundation — in recognition of the sacrifices that dentistry had made in World War I. It was proposed that dentistry should raise a fund of $50,000 with all dentists donating 1% of their income for one year, and that the public be asked to donate a similar amount. In 1950 the Research Committee of CDA assumed responsibility for the Canadian Dental Research Foundation. Today, after more than 80 years, the Research Fund is still active and is administered by the Dentistry Canada Fund in the form of a biennial research award.

In the 1940s, under the chairmanship of Dr. R.G. Ellis (right), the CDA Research Committee doggedly petitioned the federal government for an Associate Committee in Dentistry as part of the National Research Council (NRC). The committee was finally constituted on December 15, 1945, with Dr. Ellis as chairman and representation on the committee from basic and medical science, as well as 10 dentists from across Canada. By 1952 there were 27 research projects active in Canada with the NRC financially supporting 15 of them through an annual budget of $35,000.

After Dr. Roy Ellis was appointed dean at the University of Toronto in 1947, he continued his profound interest in dental research throughout his entire 22-year decanal career, attracting to Toronto some of the most prominent dental scientists Canada has ever known.

The Canadian Dental Association: 1902-2002 — A Century of Service is a Centenary project of the Canadian Dental Association in collaboration with the Dentistry Canada Fund, the charitable foundation for the dental profession in Canada. The 11-part series is written by Dr. Ralph Crawford, Historian and Past President of CDA, with sincere thanks to all those who have contributed so generously to the preservation of our rich dental history.

(All statements of opinion or supposed fact are published on the authority of the author and do not necessarily express the views of the CDA or the DCF.)

Special thanks to Ash Temple Limited, a proud sponsor of ***The Canadian Dental Association: 1902-2002 — A Century of Service***. Ash Temple, itself a pioneer, was founded by Harry Temple, who opened his Toronto office, H.P. Temple Co. in 1895. In 1902, it merged with George Parrison's supply house in Montreal. From 1904 to 1929, Temple's company expanded westward to Winnipeg, Regina, Calgary, Edmonton, Vancouver and Victoria. In 1906, a branch was opened in London, Ontario.

In 1922, the company merged with the Claudius Ash Company of England. Branches were opened in Toronto and Hamilton, Ontario. The company changed its name to Ash Temple Limited and opened another branch in Ottawa. The purchase of Maritime Dental in 1962 — with branches in Halifax and Saint John — and the opening of a branch in Quebec City in 1976 made Ash Temple a full-service dental supply company from "sea to shining sea."

In 1983, a Canadian management group acquired Ash Temple Limited. "Although Harry Temple died in 1944, the company still operates according to its founder's philosophy, first enounced 106 years ago," says Michel A. Hart, Ash Temple's chairman and chief executive officer since 1982. "Harry Temple had a firm belief that fair and ethical business practices are the only way to sustain customer confidence and loyalty, and that's how we conduct our business every day of the year." In 1994, CDA named Hart a 'Special Friend of Canadian Dentistry', — the highest honour that the Association can confer on a non-dentist.

Grateful thanks to ALL sponsors of the series,
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