

Dental Historian

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The History of Dentistry

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The *Dental Historian* is sent free to members of the Lindsay Society.

Editorial

The beginning of another year, a time for reflecting not only about our plans for 2016 but also to remember what was happening in earlier years.

One hundred years ago

January /February 1916

What was making the dental news? Dentistry and dentists were caught up in the beginning of the third year of WWI, but there also continued to be dentists working in the UK in the civilian sector. The British Dental Journal (BDJ) was a useful source of practical tips for dentists.

The British Dental Journal, Volume 37 p31 of January 1st 1916 provided the following very practical advice to colleagues, "Third molars with no occlusion should be removed to prevent second molars from decaying". In my opinion this was good advice for 100 years with no NICE guidelines to consider.

WWI

Many were beginning to realize that this war was going to be long and not over by Christmas as had been predicted or hoped for by many. Casualties were heavy and there was a need to recruit new conscripts.

Dentists had already enlisted and been posted to France and Belgium where there were many casualties.

Awards for gallantry

Several dentists had been mentioned in dispatches and been awarded medals for gallantry.

In the BDJ of January 15th 1916 volume 37 page 83,

"Temporary Captain William Kelsey Fry LRCP, MRCS, LDS, who was recently a demonstrator at Guy's Dental School, for his gallantry in May when he was wounded while attending others, was awarded the Military Cross.

Reported in the BDJ February 1st 1916 vol XXXVII,

"Temporary Lieutenant John Wesley Gilbert LDS Eng. 1912, from the University of Bristol was awarded the Military Cross for conspicuous gallantry and devotion to duty near Ypres, December 29th 1915".

Dental Students

Dental students were also affected by the war effort. Many students had already signed up, but there was also a need for trained dentists at home. There was a lot of correspondence in the literature about the best way forward. In the end a compromise was reached and this involved- "Dental Students and Lord Derby's Scheme". Instructions were sent out to all commands that dental students whose final examinations would take place in 1916 should not be called up. Students should produce a note from the Dean of their School.

What about women in dentistry?

The following was reported in the BDJ of January 1916

"With the withdrawal of private practice of a large number of dentists who have been given commissions in the army and the enlistment of many dental students, the openings for women are numerous".

As if to emphasize this point further, the possible role for women to study dentistry is described and an example is given

"The Royal Dental Hospital in Leicester square is open to women dental students. The gold medal for the best student of the year has been won two years running by a women student".

Dental Hospitals outside of London

Dental hospitals and schools outside of London were also playing their part.

In Manchester Dental Hospital (MDH) - Reported in the BDJ Feb 1916, p117

"Soon after the outbreak of war it (MDH), offered to make defective toothed soldiers dentally fit free of charge. Soldiers came in large numbers. Staff at the Manchester Dental Hospital treated 3,300 soldiers, effected 13,000 fillings and 12,000 extractions and supplied 3,000 artificial dentures. As a result of the work the institution is at a loss financially since the War Office grants and the donations from the public have not balanced the expense entailed. A public appeal for funds was launched."

Fifty years ago

What was happening 50 years ago and what was it like to train as a dentist in the 1960s? Certainly within living memory of many, but so different from the training of 21st Century dental students. Fortunately in this issue we have an account of what it was like to be a dental student in the 1960s.

2016

So turning our attention to 2016, the Lindsay Society is looking forward to the first joint meeting with our American sister society in London. Please keep the weekend of 7th, 8th and 9th October 2016 free to attend this meeting. Details of the meeting and suggestions for hotels will be sent out to you by our Honorary Secretary. Due to the location of the meeting in Central London you would be advised to book early.

The origins and nature of acupuncture in dentistry

Stanley Gelbier

Abstract: A description is given of the origins and different types of acupuncture. The historical origins and their application in dentistry are discussed.

Keywords: Acupuncture, dentistry

The nature of acupuncture (*Zhen Jiu*)

Before investigating the history of acupuncture it is important to consider exactly what it is. The word derives from the Latin *acus* (needle) and *pungere* (to prick). It involves the stimulation of known acupuncture points on the skin using its penetration by thin needles or the application of heat, pressure or more recently laser beams.

The traditional approaches involved needle insertion, moxibustion and cupping. As will be seen below it is an important component of Traditional Chinese Medicine. The belief is that the stimulation of specific acupuncture points corrects imbalances in the flow of *qi* (pronounced chi) through channels (meridians); and is useful for disease prevention, therapy and maintenance of health. As a medical therapy it has been practised in ancient China and the Far East for thousands of years. Acupuncture analgesia is a more recent practice.¹ It was first used in Shanghai in 1958 during a tonsillectomy operation.

Variations on a theme

There are some variations, for example pressure (*Zhi Ya*), electro and auricular acupuncture. Acupressure uses direct pressure over the points without actually piercing the surface of the skin.

In electroacupuncture a small electric current is passed from a machine (an acupunctoscope, similar to some pulp testers) to flow between pairs of acupuncture needles. This apparatus provides electrical location and stimulation to help relieve many chronic complaints. It is particularly good for treating pain and some other conditions [as the author can confirm].

Microsystems are a subset of acupuncture theory in which the whole body is treated by using a single part. A number of such microsystems are practised in the United Kingdom, especially auricular (ear) acupuncture, which originated in Lyons, France in the 1950s. It was found that pain and other symptoms can be alleviated by needling, massaging or electronically stimulating parts of the ear which are said to correspond with specific regions of the body. There are over 200 acupuncture points on the ear, each named after an anatomical area to which it relates. The outer ear is said to act as a switchboard to the brain. Each acupuncture point treated triggers electrical impulses from the ear via the brain to the specific part of the body being treated.

The origins of Traditional Chinese Medicine including acupuncture

Acupuncture is the earliest means of healing recorded in Chinese history,² predating moxibustion and herbal medicine. Fire was used by many primitive people to relieve pain. The herb moxa (*Artemisia vulgaris*) came later, first used for medical reasons during the period of the Warring States (475-221BCE). Its actual use was recorded in medical works in the Western Han Dynasty (206BCE-24AD).

In Ancient China three legendary figures are regarded as the founders of Chinese Medicine.³ First came *Fu Xi* or *Bao Xi*, a legendary tribal leader who introduced nine types of needles amongst other things. *Shen Nong*, the Divine Husbandry Man, taught the art of husbandry and tasted 100 herbs to discover their curative values. *Huand Di*, the Yellow Emperor, appears to have discussed acupuncture and other medicines with his ministers; and also made nine types of needles. The types of needles used by *Fu Xi* are not known but there is archaeological evidence of *Bian Shi* or polished and sharpened stone needles. Some have been excavated from New Stone Age era remains in parts of China. Ancient documents describe "a kind of stone used for treating illnesses by pricking the body."⁴ Acupuncture was routinely used by the early 6th century. By 770-475BCE there were different schools of philosophical thought, a time when the theories of *yin-yang* and the Five Elements were applied to medicine. Yin represents the moon, earth, night, water, cold and dampness; yang the sun, heaven, day fire, dryness and light. Yin and yang are thought to be present through the environment and in the body. For good health there should be equal amounts for each organ, otherwise there is a disturbance.

During the period of the Warring States metal needles were developed.⁵ By 113BCE gold and silver were in use, with improved results. By the 5th century BCE the term *Jing Luo* or channels came into use. An important work is the *Huangdi Neijing*, the Yellow Emperor's internal classic which was probably written for him by a number of physicians and scholars between the 5th and 1st centuries BCE. Much of it deals with acupuncture and associated topics, which by then was a special branch of Chinese Medicine. This work dealt with needles, channels, points for needling and methods of manipulation. It was the first to record a systematic description of the theory of channels and acupoints, principles and methods of manipulation of needles the indications and contraindications for the use of acupuncture. It described 295 points, 12 regular channels and 15 main collaterals for the human body.

From the 3rd century AD acupuncture was recognised as a specialism. However, in the early 20th century its use was frowned upon and began to decline. In 1916 Sir James Cantlie, then dean of the Hong Kong medical school, tried it and wrote in the *Chinese Medical Journal*: "The benefit of this treatment was apparent, and its repetition further continued to do good ... there can be doubt that as a rational it has much to commend it."⁶ Nevertheless acupuncture was rejected by the Chinese ruling class and officials. A series of government measures in 1914 and 1929 tried to ban all forms of Chinese Medicine. However, over the past sixty years or so all of Chinese traditional medicine has been designated a national cultural heritage. The policy is to integrate it with Western medicine, with them working together. It does seem to bring benefits.

The principles involved

This Eastern technique uses several core principles, much of it puzzling for people brought up on the study of anatomical structures. For a start it doesn't seem to follow the usually accepted anatomical pathways, treatments sometimes taking place across the midline. It is believed that *yin* and *yang* are nature's two opposing life forces that must be balanced in each organ for good health.⁷ *Chi* is the energy that flows through body channels (meridians) along which opposing life forces points are located. There are 12 paired (left and right) and two midline meridians, with six extra meridians. They have a consistent anatomical route but no known matching anatomical structures. Any blockages in the meridians impair the flow of *chi* and cause ill health. The specific sites are identified and stimulated with appropriate sized needles, usually

inserted into muscle. Each site relates to specific organs, body structures and systems. Acupuncture releases any blockages. Ernst and Pittler say⁸ the above reasons are "more philosophical than scientific by nature".

For a long time nothing was known about the mechanisms involved but scientific study is slowly improving our knowledge. During needling endorphins and serotonin are released in the central nervous system and boost pain thresholds, function and general mood. Ernst and Pittler indicate a neurophysiological basis with several mechanisms: from activation of endogenous substances inhibiting nociceptive transmission to diffuse noxious inhibitory control. Rosted and Warnakulasuriya present⁹ a western scientific explanation for how acupuncture works, based on a "gate control theory". It has been shown that acupuncture "releases neurotransmitters which act at the second layer of the dorsal horn that can effectively block any incoming pain transmission via the C-fibres, by releasing enkephalin". Both traditional and Western acupuncturists identify acupuncture points by their location in the meridians. Western practitioners select points based on relevance to neurological and muscular anatomy. A detailed description of possible mechanisms is described by Rosted and Rosted.¹⁰ A review of a number of papers Rosted¹¹ suggests acupuncture is useful in alleviating pain during dental procedures and following surgery. Ernst and Pittler¹² point out the problem of using placebos: some practitioners use needles away from acupuncture points; or pressing on the skin without actual penetration.

Acupuncture would appear to be a very safe procedure. In a prospective study over 55,000 treatments by medically trained acupuncturists Yamashita et al found¹³ only 63, mostly minor, adverse events.

Acupuncture in dentistry

Many dentists and doctors regard these Chinese medical treatments with suspicion, believing them to be almost akin to *hocus pocus*, not something that 'real professionals' would contemplate. However an increasing body of opinion regards acupuncture as an important adjunct in improving the quality of care for a number of dental patients where conventional treatments have failed. Rosted reported¹⁴ on 74 papers in a number of languages published between 1966 and 1996. Although few met all the review criteria, 11 of 15 studies showed acupuncture to be effective in treating TMJ and facial pain; but for four there were no benefits.

Other successes are slowly being added to the list. Two strongly recommended uses are in the management of gag reflexes and the treatment of TMJ disorders.¹⁵ It has also been used to treat a number of other dentally related diseases, including, Sjögrens and some musculo-skeletal and other chronic painful episodes.

Michalek-Sauberer et al reported¹⁶ that perioperative auricular and auricular electroacupuncture had no effect on pain and analgesic consumption in the first 48 hours after third molar extraction. Neither alone reduced pain intensity or analgesic consumption. On the other hand, Tavares et al¹⁷ also tested electroacupuncture efficacy on pain control after mandibular third molar surgery and found that pain was significantly reduced; and less analgesic was needed. Pohodenko-Chudakova also reported¹⁸ that acupuncture analgesia is a useful adjunct to conventional anaesthesia in maxillofacial surgery.

In a randomized controlled trial Karst et al found¹⁹ that auricular acupuncture was as effective in treating acute dental anxiety as intranasal midazolam. Tao also recommended²⁰ its use in stress management. After an audit of clinical studies Rosted and his colleagues also suggested that acupuncture may be useful in the treatment of

temporo-mandibular joint dysfunction.²¹ Ka et al examined the results of treatment by acupuncture of inferior alveolar and lingual nerves sensory paralysis after oral surgery and found it to be beneficial.²² Morganstein reported²³ on seven patients whose outcomes exceeded his expectations: all reported an increased salivary flow and an improved ability to eat, speak and sleep. Blom, Dawidson and Angmar-Mansson demonstrated its value in Sjögrens disease.²⁴

Dickinson and Fiske reported²⁵ that acupressure helped to control the gag reflex in ten patients. They also used ear acupuncture points successfully to reduce gagging. Rosted et al²⁶ successfully used acupuncture to control the gag reflex in patients requiring an upper alginate impression. A questionnaire audit of treatment given by members of the British Dental Acupuncture Association indicated that needling acupuncture point CV-24 effectively controlled severe gastric reflux during dental treatment including taking impressions. A need was suggested to check the findings by a randomised controlled trial.

Acknowledgement

Many thanks are due to Professor Kan-Wen Ma. We shared accommodation at the Wellcome Centre for the History of Medicine for a number of years. Many happy hours were spent discussing the origins and practices of Traditional Chinese Medicine. I learned an enormous amount from him and was encouraged to write this paper. He died in 2014 and I dedicate the paper to a good colleague

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Author Biography:

Originally a professor of dental public health in the University of London, after retirement Stanley Gelbier was able to devote time to his longstanding love, dental history. For nearly thirty years he was honorary curator of the BDA museum. He was editor of Dental Historian and published many papers on the subject. Since 2010 he has been honorary professor in the history of dentistry at King's College London

Memories of being a dental student in Liverpool Dental Hospital and School 1962-1966

Philip Wander

Abstract: Recollections of being an undergraduate dental student in Liverpool during the 1960s.

Key words: Liverpool Dental School and Hospital

As with all aspects of life, reminiscences can paint a rosier picture of past experiences but one stark fact remains: I can't believe it is nearly 50 years since I attained my BDS from Liverpool University.

Liverpool in the early 1960's

As a direct result of being port city, Liverpool had a very diverse population originating from many different countries across the world. Seamen arriving on ships, settled in Liverpool, making it their home and added their cultures to the existing ethnic mix. For example, Liverpool has the oldest Chinese community in Europe.

Liverpool in the 1960s was a golden era not just for the Dental School, but Liverpool as a City was booming. The football team was a dominant force and looking back I was lucky to come out alive being a Manchester United Fan. Work had just started on the Roman Catholic Cathedral situated just a few hundred yards from the Dental Hospital and close to the Students Union. The structure looked strange and futuristic and somewhat controversial in its day, especially when compared to the Anglican Cathedral, some half a mile away. It looked to me like a "rocket launcher" and was completed in 1967 and is sometimes locally known as "Paddy's Wigwam" or the "Mersey Funnel".

In the 1960's the Port of Liverpool was thriving with many ocean going cargo ships docking at the Pier Head which was virtually in the heart of the city. It is interesting to observe some half a century later, even though the commercial trade has moved and is now in container ships, there is a revival of the Pier Head docks as cruise ships stop at Liverpool as well as the famous ferry across the Mersey.

Brief history of Liverpool Dental School

The Liverpool School of Dentistry was founded in 1861, twenty years before the formation of the University of Liverpool in 1881. Originally called the Liverpool Dispensary for Diseases of the Teeth, it was operated by Captain William J Newman, who in his own private clinic devoted three mornings a week to providing free dental treating for the poor of Liverpool. In those days there was no National Health Service and dental treatment was out of the reach of most poor people. Gradually more dentists joined Newman, offering their service for free. By 1863 his dental rooms at 82 Russell Street were re-named the Liverpool Dental Hospital¹. The school was recognised by the Royal College of Surgeons in 1876, and in 1880, with a growing number of dentists, patients and students, the hospital moved to 50, Mount Pleasant. This was the start of full-time students being taught at the hospital, which became associated with the University in 1899.

The Dental School and Hospital I attended, 1962-1966, was designed by architect G de C Fraser at a cost of £13,493. The Dental School built in 1910, was situated in Pembroke Place, Fig 1 close to the present Dental School and opposite the then Royal Infirmary, where we shared lectures along with the medical students, attended post mortems, as well as

adjourning to the conveniently situated "Royal Pub" for refreshments, celebrations and commiserations of exam results.

The hospital fully merged with the university when the Louis Cohen Chair in Dental Surgery was established in 1920. W H Gilmour, the third dean, became the first professor in dentistry in the UK.



Fig 1. Liverpool Dental Hospital and School, Pembroke Place in 1910.

Liverpool University founded a Chair in Dental Science in 1963. This dental school building was later demolished to make way for the current dental school in 1969. The senior staff: Professor Farmer, Professor Sir Frank Lawton and Professor Ronnie Hartles played an important role in the planning and development of the new dental school.

Notable staff members

It was a golden era too at the Dental School, under the guidance of the Dean (1957-1980) Professor Sir Frank Lawton and his team of superb lecturers: A V Newton in Prosthetics and Jim Mumford in the Conservation Department. Professor Oliver, "Monty" headed up Periodontology and later became Dean of Liverpool Dental School (1980-86) and Dean of the Faculty of Dental Surgery of the Royal College of Surgeons Edinburgh. Professor W R (Bill) Tyldesley, who graduated from Manchester became Dean of Liverpool Dental School (1986-89). Peter Bird headed up the Radiology Department and was a great help to students working in the Admissions/Casualty Department.

Professor Desmond Farmer (Pathology) became Dean of the Liverpool Medical School and was also appointed to the role of Pro Vice Chancellor of the University of Liverpool. Ron Hartles and Desmond Goose in the Paediatric Clinic were famed for their book, *Principles of Preventive Dentistry* (1963).

Student life in the 1960's

I started my studies in 1962, Fig 2, the same year as the Lindsay Society was established. The first year was mainly studying anatomy, physiology and pathology. A lot of time on the course was spent in the prosthetic laboratories and later on in the operative technique room which was called the phantom head room.



Fig 2. Philip Wander in 1962 -a fresher dental student starting out on a dental career.

In the second year, students had to buy their instrument box and two hand pieces-straight and contra-angled. The box and instruments were bought from Claudius Ash Dental suppliers and cost approximately £120. Fig 3.

Fig 3. Student dental instrument box

If you were lucky you could buy a second hand kit from a final year student for about £50. The instruments were stamped or engraved with your number so that they could be retrieved from the boiling water sterilizer at the end of the session. Students were responsible for cleaning, sterilizing and maintaining their own instruments. No gloves were worn for routine dental treatment and in those days even syringe needles were hot water sterilized and reused. There always seemed to be a never ending supply of patients, many of whom were sailors from different countries needing emergency treatment such as: extractions, abscess drainage and surgical extractions.



As students we were taught to extract teeth under local and general anaesthesia, taking it in turns to be the extractor or the anaesthetist. In addition, our theoretical knowledge of oral pathology was enhanced by actually seeing and sometimes detecting patients presenting with a snail track ulcer and other interesting but rare pathology. Looking back what great clinical

training and experience we had in those days. There were only three female students in our year but they showed very early on that you didn't need brute force to extract teeth, but that technique was all important. Our restorative and conservation clinics was watched over by a number of eagle eyed lectures and demonstrators. We usually tried to seek out a friendly Scotsman, Mr Ferguson, because we usually received an "Aye it'll do" without too much fuss. However, Professor Lawton would on many occasions suddenly appear on the clinics and with his steely blue eyed stare put us in our place. We only had 2 air-rotors (Wispairs) for the whole department and of course no high-speed suction or dental nurses to assist us. The air-rotors were wheeled around the clinic to be used by a succession of students. Whilst the students were queuing up to use this modern technology, Professor Lawton could demonstrate to us his huge skill in cavity preparation just using chisels, hatchets and margin trimmers and complex crown and gold inlay preparations could also be completed with hand instruments and tungsten carbide discs. Posterior teeth were restored with silver amalgam or gold. The main decision being whether to do a direct or indirect gold inlay. Anterior teeth were restored with silicate cements. I was fortunate to be inspired by the teaching staff to achieve the Prize in Preventive Dentistry in 1965 for the then princely sum of twelve guineas (twelve pounds and twelve shillings) Fig. 4. I was also fortunate enough to achieve the Prize in Prosthetic Dentistry in 1966 and receiving the grand sum of £20.00. Students had to

complete their own laboratory work, then called Dental Mechanics, for all dentures, crowns, bridges and inlays. We were fortunate to have a wonderful instructor technician, Derek Stananought, who was the author of two books. Gold inlays were constructed either by a direct wax up in the mouth or alternatively using an indirect technique using a copper ring impression in greenstick composition and a locating impression. A die was then copper plated and the inlay waxed up, invested and cast in gold. The Beatles led the "Mersey Sound" with a string of number one hits, which I recall singing along to in the Prosthetic Laboratory, just as long as the then Senior Lecturer Roy Storer, later to become Dean of Newcastle Dental School, was not within earshot.

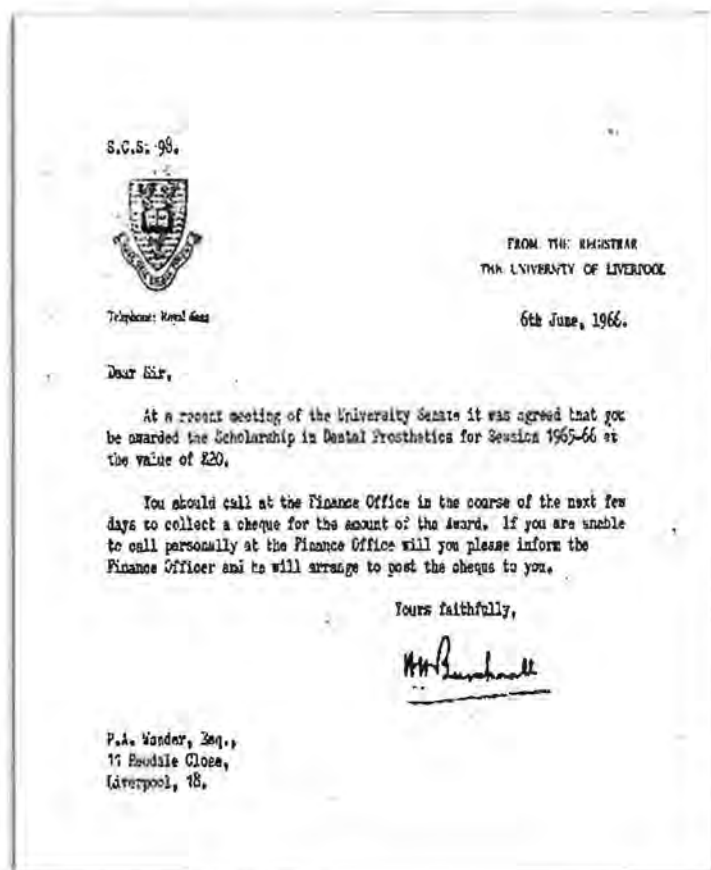


Fig 4. Prosthetic Prize

The text book, which every student had to buy, was of course Hubert Stones book (Professor of Dental Surgery at University of Liverpool and Dean 1935-1957) "Oral and Dental Diseases". In the common room, over cups of tea and games of Bridge, we discussed our problems and generally put the world to right. We celebrated the success of the books of Matthew Finch, (Merton Fink, and a Liverpool Graduate) and the subsequent film based on his book and his time as a student at Liverpool Dental School, "Dentist in the Chair". A dental student in the 1960's had probably greater clinical commitments than perhaps current undergraduates. For example, Saturday morning clinics were considered to be routine. However, it was not all hard work and in those days "Panto" or "Rag Week" was also a time for great fun for all students at Liverpool University to let their hair down in the town, selling the "Rag" Magazine and raising money for charities. I did as a student, actually get to treat one of the Mersey Beat group, Aaron Williams, my first "celebrity patient!"

Fig 5. Phil Wander graduating BDS 1966



After four years and one term as a dental student, graduation day arrived. Fig 5. There was no Vocational Training or Foundation Training, the majority of graduates went straight into practice, a few stayed on as house officers.

More recent developments in the Dental School

In subsequent years, the hospital has undergone a series of major refurbishments in order to modernise and upgrade the building. An Operative Techniques Suite was built in 2006. In 2008 the on-site lecture theatres were refurbished and new education rooms built in an extension of the east side of the hospital. The most recent additions are a new sedation suite on the west side of the building with the addition of new research laboratories to replace the Edwards Building and a complete refurbishment of the interior of the hospital. The future looks bright it *seems* like "Yesterday" (The Beatles, 1965) since I was there, how time flies!

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The bicentenary of the birth of Sir John Tomes

Dr B. K. B. Berkovitz

Abstract: John Tomes was initially destined for a career in medicine but after being introduced to dental histology, changed careers and gave the first series of lectures on dentistry in Middlesex Hospital. His early academic career resulted in four major papers on the structure of teeth and bone that were read before the Royal Society, establishing his reputation as a leading histologist. He was awarded an FRS at the age of 35. The last 40 years of his life were devoted to establishing dentistry as a regulated profession with the founding of a dental hospital, examinations undertaken by the Royal College of Surgeons, a dental register and regulation by the British Dental Association. He was knighted in 1886. The bicentenary of his birth was recognised with the restoration of his grave.

Keywords: Sir John Tomes, Royal Society, Hunterian Museum, History of Dentistry

I have been privileged to be the Honorary Curator of the Odontological Collection at the Hunterian Museum of the Royal College of Surgeons of England since 1989. I am ashamed to admit that, until recently, I had little detailed knowledge of the contribution Sir John Tomes made towards dental science, the Hunterian Museum and the dental profession. However, I became aware in 2013 that the bicentenary of his birth occurred during 2015 and that, in my capacity as Honorary Curator of the Collection that Tomes helped establish, I should be prepared to give a talk on his achievements. As I had retired and now had time to delve into his life, it was soon obvious that our dental profession owes him an incalculable debt of gratitude. His career can be divided into two main phases: an initial, scientific phase followed by a political and organisational phase.

Scientific Phase

Born on March 21st, 1815, in Weston-on-Avon, Gloucestershire, Tomes (Fig.1) was destined for a career in medicine on registering as a student at King's College and the Middlesex Hospital in 1837. However, after being involved in the preparation of some ground sections of teeth, the topic provided so much interest for him that he soon decided to change subjects and to pursue a career in dentistry, eventually being appointed as dentist to the Middlesex Hospital in 1843. This appointment involved presenting the first organized course of lectures in dentistry, which started in 1845 and was published as a series of papers in the Medical Gazette and later collected together as a book in 1848 entitled "Lectures on dental physiology and surgery".



Figure 1. Sir John Tomes. Courtesy BDA.

At this time, Tomes was also one of the first to use ether as a general anaesthetic after news of it reached the United Kingdom from America at the end of December, 1847. Indeed, the book of his lectures published in 1848 contains probably the first major account of general anaesthesia in any textbook.

Between 1849 and 1856, Tomes had four important papers read to the Royal Society and published in their Proceedings, establishing himself as a major figure in the emerging science of dental histology.

His first paper, published in 1849 was entitled "On the Structure of the Dental Tissues of Marsupial Animals, and More Especially of the Enamel" (Vol. 139: 403-412). A second paper, published in 1850, was entitled "On the Structure of the Dental Tissues of the Order Rodentia" (Vol. 140: 529-567). The third paper, published in 1853, was a joint paper with Campbell De Morgan on the structure of bone, entitled "Observations on the Structure and Development of Bone" (Vol. 143:109-139). His fourth and final paper was published in 1856, entitled "On the Presence of Fibrils of Soft Tissue in the Dentinal Tubes" (Vol. 146: 515-522). For his contributions to dental science, Tomes was awarded an FRS in 1850 at the young age of 35.

Apart from a review article on bone published in Robert Bentley Todd's monumental "The Cyclopaedia of Anatomy and Physiology" in 1859, Tomes never published another major scientific paper. The first edition of Tomes' textbook entitled "A system of dental surgery" was published in 1859. This remained the standard text on clinical dentistry for decades, with second (1887) and third editions (1887) revised by his son Charles. Even today, his name is still associated with four structural features associated with tooth structure, namely the Tomes process, the Tomes fibril, the granular layer of Tomes and the resorbent organ of Tomes.

Political Phase

The second and politically-oriented phase of Tomes' career was dedicated to changing dentistry from an unsupervised trade to a regulated profession. When Tomes first practised dentistry, no qualifications were required. Anyone could call themselves a dentist. Although some had learnt their trade as apprentices and even had medical degrees, many others were uneducated and untrained and would have put their patients at risk of very poor treatment. In the five main stages necessary to redress this situation, Tomes was at the forefront.

The first stage was to unite the various factions within dentistry into a single organisation with a united aim. This process started with the formation of the Odontological Society of London in 1856, initially designed to advance and spread scientific knowledge in dentistry, and included figures such as S. Cartwright, R. Nasmyth and E. Saunders. This first stage was completed following the merger with the rival College of Dentists in 1863 to form the Odontological Society of Great Britain. Tomes was elected President of the Odontological Society in 1862 and 1875.

Members of the Odontological Society were far-sighted in collecting and displaying specimens to help teaching and research. From small beginnings, in time this collection grew to become the world renowned Odontological Collection as we know it today. The Odontological Society's museum occupied a variety of sites early on, but was eventually transferred to the Royal College of Surgeons in 1909. Unlike the remainder of the College Museum, the Odontological Collection escaped almost unscathed when the College was bombed in 1941. In 1943, as a goodwill gesture, it was transferred on a permanent basis into the ownership of the Royal College of Surgeons. In this context, John Tomes can be considered the first Honorary Curator of the Collection, of which I am the latest incumbent.

The second stage of establishing a dental profession was to provide a training establishment for dentists where students could be taught under supervision. Tomes was again at the forefront of this pursuit and helped establish the Dental Hospital of London in December 1858. It was sited at 32 Soho Square, but moved to more suitable premises at 40-41 Leicester Square in 1874. Acquiring adjacent land, it expanded to finally become The Royal Dental Hospital of London under the patronage of Edward VII in 1901.

The third stage in the transformation of dentistry was to require a dentist to pass an examination before being allowed to practise. Tomes thought it essential that dentistry had to gain credibility and recognition and he felt this was best achieved by associating with the medical profession. To supervise this examination, he helped petition the Royal College of Surgeons to award the Licentiate in Dental Surgery. In this he was successful, the process even requiring the passing of an Act of Parliament in 1859. Tomes was included in the first batch of three examiners.

The fourth stage was to restrict the use of the name "dental surgeon" only to those candidates who had obtained the LDS qualification and whose name was on the Dental Register. Again, Tomes was at the forefront of the campaign that led to the Dentists' Act of Parliament in 1878. In recognition of this, John Tomes' name was the first on the Dental Register.

The fifth and final stage required the establishment of a body to regulate and represent the interests of the dental profession. This was achieved by the establishment of the British Dental Association in 1880. In recognition of all his efforts over the preceding 25 years, it was appropriate that its first President was John Tomes.

While undertaking all his scientific and political work, John Tomes also ran a successful dental practice throughout his career, retiring in 1876. For services to dentistry, in 1886 John Tomes was awarded a knighthood.

Events leading up to the Bicentenary Celebration

Having spent time looking into his achievements, I was lost in admiration over the many different skills Tomes needed in order to achieve all he did, particularly in view of the opposition he would have had to overcome at every stage. With the bicentenary of his birth fast approaching, I decided to look through the Tomes Slide Collection for more background information. The slide collection forms one of our most important historical artefacts and

contains over 1,800 histology slides (mainly as ground sections) prepared by John and Charles S. Tomes during their scientific investigations. I was not aware that this collection had been looked at in detail by anyone since being gifted by Charles Tomes in 1920. As a dental histologist myself, it was a labour of love to be looking at material actually prepared by our two greatest figures in dental histology. I marvelled at the quality and diversity of the material and can state categorically that there is no collection available for study existing anywhere in the world that can approach it in its quality and scope. In addition to these histology slides, the two Tomes' made significant contributions towards the skeletal material in the Odontological Collection, now containing over 11,000 specimens and, again, of world class importance. I shall myself be using material from both the slide and osteological collections in a forthcoming book on Comparative Dental Anatomy.

In 2014, at the bicentenary celebration of the opening of the Hunterian Museum, I was invited to give a lecture on the Odontological Collection and took as my main theme the contributions of Sir John Tomes. In preparing for this, I felt impelled to visit his grave and pay homage. He is buried in St Mary's Church, Caterham. One bright Sunday morning I drove down to the church and entered the graveyard behind it. There was no one around to help me locate Tomes' grave amongst all the others aligned in rows on either side of a narrow central path. I decided to make my way down to the end of the path and walk from the back along each line of graves. This search could potentially have been a very time-consuming task. Having just started my walk down the path, I glanced casually to my right and there, just a few rows down, was his grave, directly by the side of the path. It was a double grave, containing the remains of both John Tomes and his wife Jane. However, my joy at this quick discovery of the grave was short-lived when I saw its dilapidated state. It appeared never to have been tended and the headstone was covered in black grime, so that the wording was difficult to pick out (Fig. 2a, b).

Figure 2A and B. Sir John Tomes' grave at St Mary's Church, Caterham, before restoration.



I was so saddened by this situation that I felt it would be difficult for me to extol his virtues in my lecture knowing how his grave had been so neglected. I immediately resolved to attempt to renovate it. My first task was to contact the appropriate authority, in this case Tandridge District Council, to see if any living relative had responsibility for the grave. As expected, the answer was in the negative. I informed the council that I wished to renovate the

grave and was provided with the names of two local undertakers qualified to carry out the work. After visiting both and stressing the historical importance of the grave, I selected what I thought was the best one and received an estimate, to include a maintenance contract. The money for renovating the grave was principally raised through the great generosity of the Faculty of Dental Surgery, Royal College of Surgeons, involving the then Dean, Kathryn Harley, and the Registrar, John Vandridge-Ames. In addition, generous donations were made by the Faculty of General Dental Practice, the Odontological Section of the Royal Society of Medicine, The Lindsay Society and the British Dental Association.

Figures 3A and B. Sir John Tomes' grave at St Mary's Church, Caterham, after restoration.



At the time I was not sure what material the headstone and surrounding plinths were made of and how good the restoration would turn out to be. The undertakers would need to remove all components, clean and restore them and replace them in correct alignment. To ensure the ease of long-term maintenance and improve the appearance of grass and weeds covering the grave, I decided the earth covering the original grave should be replaced with green polished-glass chippings. Also, the restorers suggested the existing inscription be recut and re-blackened for clarity. It soon became apparent that the various components were made of fine white marble and that the grave could be restored to its original pure white condition (Figs. 3 a, b). As people visiting the graveyard might be curious as to why this grave should have been so well maintained, a QR (Quick Response) code on the back of the headstone was installed that provides access to a biography of Tomes from the RCS website via their mobile phone. A small plaque at the foot of the headstone gives the similar website that can be accessed on the internet.

3rd JUNE 2015 Bicentenary Celebration

On 3rd June 2015 - a fortuitously sunny day - over 30 dignitaries, representing the sources contributing to the cost of restoring Sir John Tomes' grave, met for a buffet luncheon in the Conservatory of the Royal College of Surgeons. At 1 pm the party left by coach for St Mary's Church, Caterham, arriving at 3 p.m.

The new President of the BDA, Professor Nairn Wilson, gave an address by the graveside (Fig. 4) in which he highlighted the achievements of Tomes, who virtually single-handedly changed dentistry from a rough trade into the profession we know today. He extolled the many skills that Tomes had in order to carry out this large body of work, concluding that he was a most remarkable man.



Fig4 Bicentenary celebration June 3rd. From left to right, Mr John Vandridge-Ames, Dr Barry Berkovitz, Professor Nairn Wilson.

The address was followed by afternoon tea in the St Paul's Centre of the Church. As a souvenir of the occasion, a commemorative photograph showing four histology slides from the Tomes Collection was available to the attendees.

During the return journey a stop was made at the house, Upwood Gorse, Caterham, where Sir John Tomes spent the latter years of his life.

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Discussing a Forensic Dental Examination of 1861 – A Scientific and Historic Overview

Scheila Mânica

Abstract

This work is a discussion on a report of dental examination and exclusion made by a British dentist Francis Robertus Lloyd on 30th April 1861. The report entitled: '*Dentistry as a means of Identification*' was published in the '*British Journal of Dental Science*' under the section 'Miscellanea' in 1861; Mr. Lloyd was contacted by the Indian authorities in order to identify a skull. He may well be the first British dentist to officially report a dental examination in an academic journal. The aims of this discussion are to briefly analyze the difficulties of access to scientific techniques in that century and to provide Mr. Lloyd recognition of his report in the history of Forensic Dentistry.

Keywords: Dental examination; History of Forensic Dentistry

Introduction



Establishing a person's identity may require an interdisciplinary approach including dental science^{1,2}. The various resources employed include radiographs, photographs, and dental charts and DNA^{3,4}. Mr. Francis Robertus Lloyd practised dentistry in the East Indies and, on a certain day, he received a skull from the Punjab authorities in order to give an opinion on its probable age and ethnic origin (European or Asian). Speculations indicated that the skull belonged to a German

citizen aged 27 years (Mr. S.) engaged in a geological survey in Northern India and was supposedly killed by one of the native chiefs. A selection of the most relevant findings present in his conclusive report were selected (in italic) followed by the author's discussion.

Past Dental Investigation made by a British dentist in 1800's

Published forensic cases involving the work of British dentists in the 19th century are few: in 1814, the case of Mrs J McAlister which was the first case in Britain where members of the dental profession were cited as expert witnesses – a denture fitting on the deceased resolved the case; in 1831, the case of Mrs Caroline Walsh where two similar women were assumed to be dissimilar by their front teeth therefore convicting a third woman of murder; and in 1850, a double murder in Scotland where the suspect's teeth were found co-mingled with the victim's teeth.⁵

Dental Profiling

It is well known that Forensic Odontology plays an important role in the identification of human remains based on the characteristics of teeth and concordant points between ante- and

post-mortem reconciliation⁶. Dental profiling might provide some predictions about the deceased's habits and ethnicity and it may be used when investigating authorities are unable to supply any ante-mortem dental record to aid the forensic dentists' work⁷⁻⁹.

Mr. Lloyd's report was a dental profiling because he was unable to compare the post-mortem dentition to an ante-mortem record. Radiographs, particularly, can be used to predict the age, however, the X-ray would only be discovered accidentally by a German scientist, Dr. Wilhelm Conrad Röntgen, in 1895^{9,10}. The conclusions were based solely on the dental examination since studies on anthropometric measurements had not yet been performed; for instance, the work of Alphonse Bertillon, a French criminologist who first developed a system of physical description of head and face, in 1879¹¹. It should also be noted that the skull can be used to assess the ageing process through closure of skulls sutures in adulthood, which is not a reliable method. Additionally, the shape of the skull and mandible may offer distinctive features that aid the prediction of the sex of the individual¹². Modern skull analysis is the basis of facial reconstruction which constructs a model of the face using the skull as a base like the use of a photographic image of the skull superimposed on an ante-mortem photo of the person¹².

Findings and discussions of Mr. Lloyd's report

"The teeth of the superior maxilla are fourteen in number. The two missing ones are the second and third molars of the left side..."

While the number of teeth present and features of their size, shape and arrangement may be sufficiently distinctive to allow identification, it is more often the dental treatment such as restorative work which leads to identification¹¹. It is anticipated that restorative treatments were not present in the teeth of the skull being analyzed. Mention should be made that, in the 1800's, new dental materials quickly followed the rhythm of the recognition of dentistry as practice. By this time, the most widely used dental filling material was silver amalgam followed by porcelain, whereas composite resins only came onto the scene in the 20th century¹³.

It is worth pointing out that developmental stages of the teeth are accurate in determining sub-adult ages, and, third molar development is used to predict age to young adults even though it might present variability⁴. After the emergence of the second permanent molar teeth at around 11-13 years of age with a further period of about 2 years of root development, the only remaining teeth to develop are the third molars which, if present, may emerge between the ages of 17-21 years followed by subsequent root completion¹⁴.

Mr. Lloyd also did not mention any tooth notation code or nomenclature. The first official method for recording the positions of the teeth in the oral cavity was developed by an Austrian dentist named Adolph Zsigmondy, in 1861. He numbered the eight permanent teeth with Arabic numbers 1 to 8 from the midline backwards in each quadrant, therefore breaking the tradition of writing lengthy Latin names^{9, 15, and 16}.

"...the sockets of which are partially obliterated by the deposition of osseous matter from the deep parts, and the loss of substance by absorption of the alveolar margins. These teeth appear to have been lost some time prior to the person's death."

An important biological phenomena should be considered regarding ante-mortem tooth loss. Tooth loss is manifested by alveolar ridges and sockets with rounded and smooth edges, however, postmortem tooth loss presents sharp socket edges.¹⁸ This distinction is paramount in the reconciliation of dental chartings. Nevertheless, it is scientifically difficult to time the process of socket healing and most of the studies were performed on animals; however, a

study on human single-rooted teeth showed that, after extraction, a blood clot filled the socket, and after 7 days, the clot is replaced with granulation tissue. After 20 days, the granulation tissue is replaced by collagen and bone began forming. At 5 weeks on average, two thirds of the socket had filled with soft tissue and it takes 24-35 days to completely cover the socket. All stages of bone regeneration progress from the apex and periphery and proceeded to the center of the socket¹⁷. Empty dental sockets can be used in a technique of post-mortem reconstruction where they are filled with radiopaque material that shows white on radiographs delimiting the shapes of the individual roots to compare with dental records; yet, the relative individualizing value of the roots is low (to peri- and post- mortem tooth loss)^{18,19}.

"...there are fifteen inferior teeth; the missing tooth is the right central incisor...the vacant space is nearly as large as the width of the remaining central incisor of the left side which leads to the inference that it was lost after the eruption of the wisdom teeth, which rarely make their appearance before the 18 year...the pressure exercised would have tended to close or greatly diminish the space left by the missing incisor."

Third molar mesial pressure has been studied since 1859 and even though a few studies support the late anterior teeth crowding association with mesial movement of posterior teeth, long term studies do not suggest evidence of this effect^{20,21}. In short, the crowding might be caused by interaction of factors such as: facial growth pattern, continuing late growth rotations and parafunctional soft tissue pressures²². Surprisingly, in 1920, a formula that estimates physical stature was created from the proportion of the lateral dimensions of the crowns of the lower incisors and canines²³. Moreover, an analysis of mandibular canine dimensions was thought to show the presence of sex dimorphism²⁴.

"...it is most probable that the two missing molar teeth of the upper jaw and the front tooth of the lower jaw were at some period extracted by a professional man, and might be useful as a means of identification;"

The quote of 'professional man' might show the lack of women working in Dentistry. In Britain, before the 19th century there was a marked increase in the number of practicing dentists but there was no control of the standards of apprenticeship. By the year of 1860, teaching schools in Dentistry began followed by Dental Reform Committee which regulated dentistry through the Dentists Act of 1878²⁵. The first woman to qualify as a dentist in the United Kingdom was Lilian Lindsay who received her Licentiate in Dental Surgery (LDS) from Edinburgh in 1895²⁶. The other finding is that the dentist was aware that the advent of tooth extraction could be used to differentiate the dental state of the individual.

"...it is most improbable that in a mouth in which the teeth are so remarkably developed and so firm in their sockets they should have been lost by any other means...for their loss if we presume the deceased to have been much older, as the diminished vitality of the surrounding tissues of the tooth, as age advances..."

In a young person the crests of the bone supporting the teeth usually lie within about 2 mm of the cervical margin of the teeth, so that usually only this length of the root of a tooth is exposed in the young skeleton. With ageing, more of the root is exposed attributable to inflammation of the junction of the tooth and gum or not¹². Further, post mortem tooth loss is common in cases where decomposition is advanced and anterior teeth, having only one root, are more frequently lost than posterior teeth (premolars and molars)¹⁹.

"...and the partial and sometimes complete ossification of the pulp, as it recedes before the encroachment made upon its containing cavity from loss of substance on the masticating surface, may each or both cause alveolar abscess and loosening and ultimate ejection of the tooth so affected...there is not the slightest appearance of caries or defective development..."

Severe attrition of the teeth may be caused by unusual occlusions, grinding of the teeth (bruxism) or type of diet. Men usually exhibit more attrition than women at a given age and so the phenomenon may aid in sex estimation, but this is a very poor discriminant¹². Pulpal response to trauma is characterized by deposition of hard tissue in the root canal space and the affected crown is darker in colour because of a decrease in dentine translucency²⁷. Moreover, failure to protect the pulp can lead to infection caused by remaining bacteria. In any case, the vitality of the dental pulp of an older person appears to be weaker than that of a young person²⁸. Discussing caries, it is important to note that just in the 1870s, a foot-powered drill and a fully adjustable chair were created by an innovator called James Beall Morrison in order to treat caries more effectively²⁹. In the early 1900s (1908-1912), Greene Vardiman Black standardizes cavity preparation³⁰, which means that those events happened years after this case of dental investigation.

"...the right superior central incisor is one eighth broader on its labial aspect than its fellow on the left side of the median line....not only diseases but peculiarities of development in different parts of the human frame, and in members of the same family, are frequently so strongly pronounced that the relationship cannot be doubted.....one at least of the surviving brothers would exhibit the same peculiarity."

The statement referred to this tooth could be interpreted as macrodontia which is a rare shape anomaly where the tooth is physically larger than normal and it is usually associated with systemic disturbances or syndromes³¹. The isolated form of macrodontia has been rarely reported and the prevalence in permanent teeth is 0.03–1.9% with a higher frequency in males³². The teeth most frequently affected by this type of macrodontia are the maxillary first incisor and canine, and has been rarely reported to involve premolar and third molar. The incidence is rare enough to be useful in identification procedures¹². Mr Lloyd's comment is noteworthy when considered the possible genetic relation.

"...the structure of the teeth is perfect regards thickness of enamel, soundness and development, leads me to conclude, from experience, that such considerable loss of substance could not have taken place in a person less than forty or forty-five years of age."

Age estimation in adults may be possible through the analysis of: the amount of secondary dentine deposited around the pulp chamber, the level of attachment of the periodontal tissues, the extent of secondary cementum deposition, the extent of sclerotic¹⁰ or translucent dentine spreading from the apex of the tooth examining⁷, the amount of tooth wear and the colour of the teeth (teeth tend to darken with age).⁸

"I strongly suspect, from the teeth, that this is the head of a native of India who subsist chiefly on grain of various descriptions.....This gritty substances would naturally wear away the gridding surfaces of the teeth, much sooner ...than where the food consisted chiefly of animal and vegetable substances, as in the case of Europeans.... and their teeth are generally much incrustated with salivary calculus, which I observe is freely deposited on the teeth of the head I am describing."

Rustic means of grain production produced very abrasive foodstuffs due to the incorporation of fine grit, accelerating attrition and subsequent fracture of child and adult teeth¹⁹. Interestingly, a grade system of molar wear for age estimation was created by Miles³³ followed by Brothwell³⁴ who assessed pre-medieval British skulls (17 – 45+yrs) and thus appropriate to archaeological specimens. More recently, because of the processed food present in industrialised countries, the occlusal attrition has been reduced³⁰.

"Captain H, who was intimately acquainted with Mr. S., informs me that the gentleman had a regular set of teeth, whereas the teeth in the head submitted to me for examination are far from being regular, as the cutting edges of the incisors and the grinding surfaces of the

molars present several curved lines...trusting my remarks may be of some use in deciding the question as to whether this is or is not the head of Mr. S."

Smile photographs may be of some use of information with the potential to help solve certain cases of human identification³⁵, therefore, the inclusion of this information regarding the visual memory of Captain H was of some value.

Conclusion

Despite the fact that Mr. Lloyd was not able to make use of forensic tools and techniques in order to accomplish a complete dental profiling, his final conclusion excluding the possibility of the skull being of Mr. S can also be merit simply as an exclusion and could not be classed as an identification, since the identity of the skull is not determined.

About the author of the report

According to the Dental Register Archive of the British Dental Association Museum, Mr. Francis Robertus Lloyd was first registered in the British Dental Register on 20th January 1879. He held no qualifications but he was registered as he had been in practice before 22nd July 1878. In 1879 he practised in Agra, East Indies and he was last registered in 1890.

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I would like to express my gratitude to Mr. Roland Hopwood and Mr. Mehzebin Adam, volunteer and museum assistant of the British Dental Association Museum, respectively, for providing the information about Mr. Lloyd in the Dental Register Archive. This paper is dedicated to the memory of Mr. F. R. Lloyd.

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Author Biography: Scheila Mânica qualified as a dentist from the Federal University of Santa Catarina (Florianópolis – Brazil), in 1999. She had a dream to become a forensic dentist studying abroad. In order to start her career as researcher, she went to Italy, because of her Italian descent. After one year, she moved to the United Kingdom where she has been living for the past 9 years. The author holds a M.Sc. degree in Forensic Odontology from the University of Glamorgan (Wales) and a PhD degree from the Queen Mary University of London, UK. Her interests are: history of forensic dentistry, dental anthropology, dental age assessment, child abuse, bite mark analysis, failures in forensic science, and, mostly, disaster victim identification. At present, she has been working in the latest disasters worldwide and looking forward to becoming a postdoctoral researcher.

Sair teeth-the hell o'a' diseases

John Craig

Abstract: A discussion of a poem about toothache, written in Scots and published in 1917 and a comparing it to Robert Burns' Address to the Toothache.

Key words: Toothache, poetry, Robert Burns and Dainty Davie.

Background information

Some time ago Stanley Gelbier sent me this poem and asked me if I could "translate" it. It had been sent to him by Julie Papworth, a fellow member of the Lindsay Society, with an accompanying note, which is reproduced below.

Julie Papworth's Note

"I discovered this poem many years ago when going through some old family papers. It was tucked inside an old wallet that had belonged to one of my husband's grandfathers. It had been torn out of a newspaper. Just enough information remained to show it to be The Edinburgh Post of 1917. The poem was prefaced with the sentence that "we have received the following excellent poem from 'Dainty Davie' whose worth is highly appreciated by readers of The Post". I have no idea how it came to be in the wallet as the grandfather in question was a farmer in Lincoln: maybe he had bad toothache and it struck a chord.

Mindful of copyright laws I made a few enquiries. The Edinburgh and Scottish Department of the Edinburgh Library advised that The Post is no longer in existence and there is no possibility of establishing the identity of 'Dainty Davie'. Therefore I should have no concerns about using the poem."

Scottish Research

I looked on-line in the British Newspaper Archive and searched in the National Library of Scotland and could not find any record of any Edinburgh Post or anyone called Dainty Davie. There was an Edinburgh Evening Post and Scottish Standard but I can find no records beyond 1849. The name comes from a poem by Robert Burns and has almost certainly been used as a pseudonym by more than this individual. I think there may even have been racehorses or greyhounds with that name.

The Robert Burns Connections

The best known words and music to Dainty Davie are by Robert Burns. They appear in his collection of bawdy songs, *The Merry Muses of Caledonia*. It is normally sung, and was probably one he collected from folk sources and polished up. His version in *The Merry Muses* is sexually explicit and, as Burns himself said of the words, "were their delicacy equal to their humour, they would merit a place in any collection". The version used in later editions of his collected poems was considerably altered by him to suit more delicate sensibilities.

As far as this new poem is concerned, it is clearly not a very good or original poem. It's written in a sort of sub-Burnsian style and has definite echoes of Burns' own "Address to the Toothache" but with none of its rhythm, style or descriptive verve. There are suggestions that Burns wrote his poem in 1795, when he wrote that he was suffering "the delightful sensations of an omnipotent Toothache, while fifty troops of infernal spirits are riding past from ear to ear along my jawbones".

Typically Burnsian, in the Dainty Davie poem, is the use of the word “man” at the end of a line, as if directly addressing the reader.

The use of Lowland Scottish Vernacular

I have translated the Scots words directly into English. None of these words was unknown to me except for the word “spain” in the second line of the second verse. After consulting various Scots Dictionaries, the only definition I can find is “to wean” from Chambers Scots Dictionary and the on-line Scots Dictionary. Aberdeen University Press’s Concise Scots Dictionary does not list the word “spain”.

To say that the face of someone suffering from toothache would wean a growing foal is a bit of a stretch, and I suspect that the author used it in a desperate attempt to find a rhyme for “thole”.

Another awkward line is “The Devil with his scythe blade”, which seems to me to be a mistaken conflation of the Devil and Old Father Time.

Although Burns is thought of as writing in Scots, a large part of his work is in Standard English e.g. My Love is Like a Red, Red Rose. Many people have heard about the Scots language but aren't sure what it is. Scots has been spoken in Scotland for several centuries and is found today throughout the Lowlands and Northern Isles. The name Scots is the national name for Scottish dialects sometimes also known as ‘Doric’, ‘Lallans’ and ‘Scotch’, or by more local names such as ‘Buchan’, ‘Dundonian’, ‘Glesca’ or ‘Shetland’. Taken altogether, Scottish dialects are known collectively as the Scots language. Scots is one of three native languages spoken in Scotland today, the other two being English and Scottish Gaelic. Many people also mistakenly think that Scots is a bastardised or slovenly form of English. However, it is a distinct language with the same roots as English. It originated with the tongue of the Angles who arrived in Scotland about AD 600. During the Middle Ages this language developed and grew apart from its sister tongue in England, until a distinct Scots language had evolved. At one time Scots was the national language of Scotland, spoken by Scottish kings, and was used to write the official records of the country. Scots was displaced as a national language after the political union with England, in 1707, but it has continued to be spoken and written in a number of regional varieties since that time.

The original and the “Translation by John Craig”

The Toothache (by Dainty Davie)	The Toothache (translation)
Of a' the ills an' racks an' pains Tae which puir mortal flesh fa's heir, Frae heart disease tae broken banes, There's naething nearly half sae sair' Nae won'er that blithe Rab himsel' Was fairly driven frantic with it; An' what he says I durna tell' Aboot that sair, infernal toothache.	Of all the ills and racks and pains To which poor mortal flesh falls heir From heart disease to broken bones There's nothing nearly half so sore No wonder that blithe Rab himself <i>Rab: Robert Burns</i> Was fairly driven frantic with it; And what he says I dare not tell About that sore, infernal toothache.
Here by the fire wi' heid rowed up, And face wid spain a growin' foal, I crouch as sick's a poisoned pup,	Here by the fire with head rolled up And face would wean a growing foal, I crouch as sick's a poisoned pup,

For oh! It's unco hard tae thole. Oh! Oh! It's sair; I canna see Why teeth were gi'en tae folk ava, man; Unless tae furnish them a wee For Father Adam's early fa'man. Try this an that, the neibours say, Wi something like a wish tae smile; But naething that I try'll dae; Nae saut, or alum, or pills or ile, I feel as I could clim' the wa,' Or hunt the auld cat wi' the poker; An noo and then I tak' a draw- The only cure for't – Johnny Walker. I gang tae bed, but no' tae dream. I lie, and kick, and toss, and groan- Auld Clootie, wi' his scythe blade seems Among my back stumps busy mowin' I jump out tae the cauld hearth stane, Wi' nocht on but my cotton goonie, And rin aboot the floor my lane, As wild as any helpless loonie. The auld clock herds the lazy night, An gleams o' the daylight come at last; The moon grows clear wi' early licht, Thak God the lang, lang nicht is past; I canna face the mornin' feed, O' ham and eggs and maybe kippers; The landlady jist shakes her heid, 'The only cure for't is the nippers.' It's little pity that ye get Nae matter though it be sae sair Though e'en your cheek wi' tears is wat, Or you are pooin' at your hair; Then, come what may, I dinna care; E'en drown me in the deep Pacific, But Heavenly Powers just hear my prayer, And keep me from this blasted toothache.	For oh! It's very hard to bear Oh! Oh! It's sore; I cannot see Why teeth were given to folk at all, man; Unless to furnish them a bit For Father Adam's early fall, man. Try this and that, the neighbours say, With something like a wish to smile; But nothing that I try will do; No salt, or alum, or pills or oil, I feel as I could climb the wall, Or hunt the old cat with the poker; And now and then I take a draw- The only cure for't – Johnny Walker. <i>Johnny Walker whisky</i> I go to bed but not to dream. I lie, and kick, and toss, and groan – The Devil, with his scythe blade seems Among my back stumps busy mowin' I jump out to the cold hearth stone, With nought on but my cotton nightie, And run about the floor alone, As wild as any helpless loony. The old clock herds the lazy night, And gleams o' the daylight come at last; The moon grows clear with early light, Thank God the long, long night is past; I cannot face the morning feed, O' ham and eggs and maybe kippers; The landlady just shakes her head, "The only cure for't is the nippers" It's little pity that you get No matter though it be so sore Though e'en your cheek with tears is wet, Or you are pulling at your hair; Then, come what may, I do not care; E'en drown me in the deep Pacific, But Heavenly Powers just hear my prayer, And keep me from this blasted toothache.
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Author Biography: *John Craig is a retired GDP who has always been a strong supporter of the BDA Museum and Library, particularly during his time a BDA President when it was under financial threat. He joined the Lindsay Society and the Henry Noble Society a few years before his retirement.*

A short account of forensic dentistry in France

Xavier Riaud

Abstract: The earliest records and more recent cases where forensic dentistry has been used to identify bodies in France are described. The establishment of the French Society of Forensic Odontology is detailed.

Keywords: History of forensic dentistry, France, French Society of forensic Odontology

The first case of forensic dentistry in France

In 981, Hugues Capet (v. 940-996) who was then Duke of the Franks from 960 to 987 went to Rome to meet Otton II, the German Emperor (955-983) in order to negotiate an alliance between themselves. When Lothair (941-986), who was then King of Franks, was informed of the Duke's action, he considered Capet's conduct as a crime of high treason and decided to intercept him on his return.

For her part, Emma who was Lothair's wife and the Queen of France (v. 948-988), wrote to her mother, the Empress Adelaide (931-999), who was also Otton II's mother, to convince her of the Duke's duplicity and to imprison him in Italy. In the letter to her mother, the Queen had given Hugh Capet's full description. She described with meticulous care his eyes, his lips, his teeth, his nose and even the sound of his voice. Informed in time, and disguised as a groom, Hugh Capet returned to Paris without a hitch¹.

John Talbot (1384 (?) - 1453)

John Talbot was a famous captain of Henry VI of England (1421-1471). Talbot was killed by soldiers of the French army during the battle of Castillon near Bordeaux. His body was found by his adversaries the next morning of the confrontation. The body was so mutilated that it was extremely difficult to identify him. Therefore, the French decided to question the dead soldier's herald, who had previously been captured, to assist with the identification. Unfortunately on superficial examination, he did not recognize his master. Yet, he knelt down and "when he put one of his right hand's fingers into the body's mouth to see if there was a missing molar on the left side that he knew his master had previously lost, he finally found what he was looking for and exclaimed: "Master, it's you!"... With this identification, the debate on the body's identity came to an end². »

Charles the Bold (1433-1477)

In 1467, the Duke of Burgundy was Louis XI's main opponent. Charles died in Nancy on January 5, 1477. His body was only found three days later on the bank of the so-called Saint Jean ponds. The body was naked and partially devoured by wolves. At that time, robbing dead bodies after battles was common practice. Charles was known to be accompanied by an Italian groom called Baptiste and it was he who was called on as a witness and interrogated less than a week after the battle. John of Troyes related: "*And in this place, the next Monday which was following the battle, the groom told us straight that the Duke of Burgundy was dead, totally naked and surrounded by forty men who were also naked and lying on the ground. And the Duke had a gash from the ear to the teeth which had been made by a halberd, two wounds in the thighs made by a spear and a third one on the lower part of one of his legs. Six elements allowed us to clearly recognize*

¹ Bordonove Georges, *Hugues Capet*, Pygmalion (ed.), Paris, 1986 & Gobry Ivan, *Lothaire*, Pygmalion (ed.), Paris, 2008.

² D'Escouchy Mathieu, *Chronique (1444-1467) [Account (1444-1467)]*, Du Fresne de Beaucourt (ed.), Paris (Soc. Hist. France), 1863-1864, vol. 2.

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the Duke of Burgundy. The first and most important element came from his upper teeth which he had lost when he had fallen once³...

Napoleon IV (1856-1879)

Caught in an ambush by the Zulus, the Emperor's son did not manage to escape in time. His body was unrecognizable as he had received 17 blows to his face from Zulu lances. His body was found completely naked. The British authorities thought it important to identify the young prince's body. The description of his corpse was performed by Doctor Scott, and then by Baron Larrey. He was Napoleon III's former surgeon, the son of the illustrious surgeon of Napoleon I, who attended the opening of the coffin on July 11, 1879, at Chislehurst⁴. Doctor



Dr Thomas W. Evans⁶.

Baron Corvisart, the son of Napoleon I's "favourite doctor", joined Larrey for the post mortem examination of the body. One of the 17 wounds, which was less serious than the others, was found on the right side of the upper lip. The lip had been torn open and the trauma had also shattered one of his teeth. Soon after that discovery, a forensic examination of the dentition was carried out by Dr Thomas W. Evans (1823-1897), the imperial family's American dentist, who had been living in Paris since 1847. Prior to his examination and in order to perform an accurate identification of the body, Evans had presented a pre-existing chart of the prince's teeth, which recorded the teeth that he had previously "gold-filled". Those specific fillings were noticeable even if other dentists had worked on the prince's teeth after the American⁵.



Godon, a pioneer?

Charles Godon (1854-1923), was the founder and Dean of the School of Dentistry in Paris (1880). He was chairman of the World Dental Federation from 1901 to 1904, then again from 1909 to 1910.

In 1887 he proposed to the Society of Odontology of Paris: "*When in all cases the exterior features do not help to recognize a body, teeth identification should be carried out; for this, a dentist would be made responsible for drawing up the exact diagram of the state of the dental system indicating all the partial or total restorations which would have been made (dental fillings, gold crowns and restorations and prostheses,*

etc.) or indicating missing teeth or any particularities on present teeth." Dr Charles Godon⁷.

This motion was immediately passed⁸.

³ De Troyes Jean, *Histoire de Loys XI, roi de France, et des choses mémorables advenues de son règne, depuis l'an 1460 iusques à 1481*. Autrement Dicté la Chronique Scandaleuse. Escrite par vn Greffier de l'Hotel de ville de Paris. Imprimée sur le vray Original, M.DC.XX [Account of Louis XI, King of France and of the memorable things that happened during his reign from 1460 to 1481. In other words, the scandalous account written by a clerk of the Town Hall of Paris. True Original Printed] & Riaud Xavier, *Les dentistes, détectives de l'histoire [Dental detectives of history]*, L'Harmattan (ed.), Collection Médecine à travers les siècles [« Medicine throughout centuries » Collection], Paris, 2007.

⁴ Lamendin Henri (b), *Praticiens de l'Art dentaire du XIV^{ème} au XX^{ème} siècle (Recueil d'anecdotes)* [The Practitioners of the Dental Art from XIV to XX centuries (collection of anecdotes)], L'Harmattan (ed.), Collection Médecine à travers les siècles [« Medicine throughout centuries » Collection], Paris, 2006.

⁵ Deranian Martin H., Thomas W. Evans: Pennsylvania's dentist to Europe's royalty, in *J. Hist. Dent.*, Spring 2006; 54 (1): 17-23.

⁶ Collections of the University of Pennsylvania Archives, Philadelphia, 2005.

⁷ S. P. E. I., *Deux écoles dentaires : Ecole odontologique de Paris - Ecole dentaire de Paris*, [Two dental schools: the Odontological School of Paris and the Dental School of Paris] Paris, 1964.

The Bazar de la Charité (1897)

On May 4th 1897, there was a fire in the Bazar de la Charité. The fire had been caused by a mishandling of the projectionist's equipment (using a system of ether and oxygen rather than electricity). As a result of this tragic accident, 124 people died in the fire. Many of the victims were aristocratic women, the most notable of whom was the Duchess of Alençon, Sophie Charlotte of Bavaria, sister of the famous Empress of Austria Sissi. Her body was the most charred. The next morning, around noon, about thirty bodies had still not been identified. The Consul of Paraguay had the idea of seeking the help of the victims' dentists. Dr Isaac Davenport, Sophie-Charlotte's dentist, offered his client's medical record where he had recorded 17 consultations over a two year period. The last entry dating back to December 15th 1897. From his records he was able to identify her body. His identification was ratified by the judiciary. This was a first for France.

In total three dentists carried out the identifications: Dr Charles Godon, Dr Isaac Davenport and Pr Ducourneau, teacher at the Odonto-technical School of Paris. The practitioners' work was reported by Oscar Amoëdo y Valdes.

On July 7, 1898, this Cuban dentist and professor at the Odonto-technical School of Paris defended his thesis in **medicine**: "*The dental art in legal medicine*" and obtained the title of Doctor in Medicine. Professor Brouardel, president of the thesis jury, said of the candidate's work: « *This is not a thesis but a treaty of odontology. It filled in all the great gaps which remained in the field of forensic identification*⁹ ».

This work of 608 pages was published by Masson & Cie Editions. It was acknowledged by the whole dental profession to be the authoritative source on this subject. This established forensic dentistry and opened up a new era for identification of bodies. A great number of pages were devoted to the techniques of identification, to bites, to the abrasion of teeth and to teeth after death. He concluded his study with 52 observations devoted to identification. On August 4, 1899, he presented to the American Dental Society of Europe, a communication entitled "The identification of corpses by a dental expert"¹⁰.



*...The role of the dental expert in carrying out identifications cannot be called into question nowadays. The observations that we bring are sufficient converging arguments. Sometimes, the dentist uses special anomalies as the cornerstone of his conclusions; sometimes, he uses a restoring operation for the same goal. However, even though his observations often required the justice to call upon him, many times he was neglected. (...) His role could not be put into question and we think that in future, dentists will be called up in difficult situations and that it will be no accident; that was though about since the beginning and it will prevent painful surprises*¹¹. »

Dr Oscar Amoëdo y Valdes (1863-1945)¹².

⁸ Berck R., « Etude historique de l'identification par les dents en France » [Historical account of Forensic Dentistry in France], in *Bull Off Ordre Nat Chir Dent*, 1988; 2 : 6-10.

⁹ Georget Charles & Labyt-Leroy Anne-Sophie, « Le Docteur Oscar Amoëdo y Valdes (1863-1945), un praticien éclectique [Doctor Oscar Amoëdo y Valdes (1863-1945), an eclectic practitioner] », in *Actes de la Société Française d'Histoire de l'Art Dentaire* [Acts of the French Society of Dental Art History], <http://www.bium.univ-paris5.fr>, 2005, pp. 1-5

¹⁰ Georget Charles & Labyt-Leroy Anne-Sophie, « Le Docteur Oscar Amoëdo y Valdes (1863-1945), un praticien éclectique [Doctor Oscar Amoëdo y Valdes (1863-1945), an eclectic practitioner] », in *Actes de la Société Française d'Histoire de l'Art Dentaire* [Acts of the French Society of Dental Art History], <http://www.bium.univ-paris5.fr>, 2005, pp. 1-5

¹¹ Amoëdo y Valdes Oscar, *L'Art dentaire en Médecine Légale* [Dental Art in Legal Medicine], Masson et Cie (ed.), Paris, 1898.

¹² Rodriguez Exposito César, « Dr Oscar Amoëdo y Valdes, una figura de la odontología universal [Dr Oscar Amoëdo y Valdes, a major figure of universal odontology], in *Cuadernos de Historia de la Salud Pública* [Notebooks on the History of Public Health], La Habana, Cuba, 1969.

Edmond Locard (1877-1966) and the study of marks

In 1910, in Lyon, Edmond Locard inaugurated the very first police laboratory of scientific techniques. He specialized in the study of residual marks left at crime scenes, he never left out teeth identification in his investigations. Indeed, the laboratory was created during the "Dessort Affair". A theft had been committed on December 21st, 1910 in a bakery located on 159, boulevard de la Croix-Rousse in Lyon. One of the culprits had bitten into some of the little tarts filled with chestnut cream. The marks left by the incisors allowed him to direct his investigations towards a child in the neighbourhood who could be easily identified¹³.



Dr Edmond Locard¹⁴.

First World War (1914-1918)

This war caused the death of 1,350,000 soldiers of the French army. The estimated number of missing soldiers varies between 100,000 and 600,000. *"The issue of the missing was such a problem immediately after the war that different means (anthropometry, photograph albums, oral identifications) were implemented to identify these anonymous corpses without forgetting the amnesic soldiers¹⁵."* *"In all the French churches and town halls, the Ministry of Pensions put up paintings indicating the objects found on the bodies of the French soldiers who still had not been identified in order to give indications on their civil status. Among those objects were found: prosthetic items that people could easily recognize; either by the dentist who had made them or by the missing soldiers' family with dental records given by the practitioner. On these notices were written the precise location*



Pendant la guerre 14-18

of where the body was found and the description of the characteristics of the prosthetic item found on the body: maxillary or mandibular prosthesis, number and type of teeth (ivory teeth, gutta teeth), type of material used for the base (gold, rubber), type and metal of the clasps (gold in general). (...) Those missing notices only mentioned prosthetic items and not the general state of the denture which limited the investigation to those wearing prostheses¹⁶."

Regarding the forensic dentistry in such a murderous context, Henri Lentulo wrote: *"It does not seem necessary to insist further on the absolute accuracy of a process which already proved itself and which will be often used now that it is even in the frequent exhumations of the dead during the First World War even though it is still struggling to be acknowledged¹⁷."*

Henri Lentulo (1889-1981), military dentist during the First World War¹⁸.

¹³ Mazévet Michel, Edmond Locard, le Sherlock Holmes français [Edmond Locard, the French Sherlock Holmes], Des Traboules (ed.), Brignais, 2006 & Riaud Xavier, Quand la dent mène l'enquête... [When teeth investigate], L'Harmattan (ed.), Collection Médecine à travers les siècles [« Medicine throughout centuries » Collection], Paris, 2008.

¹⁴ Stagnara Denise, private collection, Odenas, 2007.

¹⁵ Dussourt Eric, « Identification bucco-dentaire et Guerre 14-18 » [Forensic Dentistry and the First World War], in *Actes de la Société Française d'Histoire de l'Art Dentaire* [Acts of the French Society of Dental Art History], Rouen, <http://www.bium.univ-paris5.fr>, 2006, pp. 43-45.

¹⁶ Dussourt Eric, « Identification bucco-dentaire et Guerre 14-18 » [Forensic Dentistry and the First World War], in *Actes de la Société Française d'Histoire de l'Art Dentaire* [Acts of the French Society of Dental Art History], Rouen, <http://www.bium.univ-paris5.fr>, 2006, pp. 43-45 & Morizot Jean, *L'identification par les dents* [Teeth identification], Phd thesis Lyon, 1923, Observation XVI.

¹⁷ Lentulo Henri, « Identification des cadavres par la fiche dentaire » [Identification of corpses via dental cards], in *L'Odontologie*, 28/11/1921.

¹⁸ Deville Jacqueline, private collection, Gap, 2007.

Ginette Neveu (1919-1949)

Ginette Neveu was a violinist travelling on board an Air France flight, the « *Constellation* », for a series of concerts. On October 27, 1949, the plane crashed into a mountain in the Azores. Ginette was lying next to her Stradivarius. A body was returned to her family. However, her relatives wondered about her death. They were concerned about a number of inconsistencies. The body returned to them had a chain with an Egyptian medallion; the fingers had long pointed nails which was unusual for a violinist. The body was dressed in clothes that they did not remember at all. The parents decided to question her death. Her coffin was carried to the Forensic Institute where finally, no doubts remained. The body was not Ginette's. At the end of November, another body was exhumed in the region of the Haut-Rhin. After a forensic dental examination and observation of the trimmed finger nails needed to play the violin, the body of Neveu was finally identified¹⁹ (Georget & Boutin, 1996).

Other disasters, other dental identifications

Ermenonville

Following the disaster of Ermenonville where a DC10 plane crashed down on March 4, 1974, the method of Gustafson (1947) was used to identify the age of the bodies from the study of their teeth. The forensic investigation was favored. A series of additional dental examination were carried out. A professor of medicine from Poitiers presided.

Los Alfaques

When on July 11, 1978, a truck carrying propylene blew up next to « Los Alfaques » camping, near the town of Alcanar in Spain, post-mortem examinations were entirely carried out on the 217 bodies. Samplings on jawbones and odontograms were systematically carried out. The victims were all identified²⁰.

Motorways of the sun, 1982

In France, during the disaster of the "motorways of the sun" on July 31, 1982, 53 people, among whom 44 children aged from 6 to 15, died charred in the fire of a bus next to Beaune.



A magistrate summoned a dentist from Dijon, Doctor Claude Laborier, an expert of the Court of Appeals. It was the first time that a dentist was called upon to carry out procedures of identification. It was entirely due to forensic odontology that bodies of some adults were identified. The use of radiographic examination of the jaws helped to successfully identify a teenager who had been mistaken for a bus driver²¹ (Laborier, 2008).

Dr Claude Laborier (1941-)²².

¹⁹ Georget Charles & Boutin Emile, *L'inattendue – Les grandes catastrophes* [The unexpected – Great disasters], Siloë (ed.), Nantes, 1996.

²⁰ Georget, Collet & Peton, « Historique de l'Odontologie médico-légale au travers des catastrophes » [« Historical account of forensic dentistry through disasters »], in *Cours du D.U. d'Identification en Odontologie médico-légale*, U.F.R. Odontologie Nancy, college year 2000-2001.

²¹ Laborier Claude, personal communication, Dijon, 2008.

²² Laborier Claude, personal communication, Dijon, 2008.

The French Society of Forensic Odontology

On September 1989, the DC10 of the UTA was the victim of a bomb attack. 159 bodies were found. 105 of them were identified. For the first time, a multidisciplinary team was summoned for the identification. It was made up of doctors, toxicologists, radiologists and dental surgeons²³. Even though a French society of Legal Odonto-Stomatology had previously existed, the immediate consequence of this attack was the creation of the French Society of Forensic Dentistry which was founded in 1990 by: Drs Danjard, Georget, Laborier and Welsch. The first congress of the association occurred in Dijon under the supervision of Professor Weill and Professor Marin, the then chairman of the French Society of Legal Medicine and Criminology²⁴.

Lamendin's formula for the determination of age (1990)

In 1947, Gustafson used six criteria of physiological alterations in order to age teeth. All age changes to the teeth were examined in thin polished sections. In 1988, Lamendin suggested an easier version of Gustafson's formula which only relied on three criteria. However, the young Frenchman thought it was not reliable.



In 1990, he defined a method which only relied on two criteria and which took into account the connections between the height of dentine translucency, the height of periodontium (without obvious pathology) with the length of the root. This was Lamendin's formula. In 1996, Hélène Martin presented the use of dental cement layers as criteria of age. In 1999, Guy Collet studied the colour of dental roots from people of different ages and backgrounds. Therefore, he created a color model which is a benchmark today²⁵.

Dr Henri Lamendin²⁶.

Forensic odontology continues to make history

On January 20, 1992, an Airbus A320 from Lyon-Satolas crashed upon the Mount Sainte-Odile of 800 meters high (France). There were 87 victims. The IRCGN (the Institute of Criminal Research of the National Gendarmerie) got involved for the first time. A team of dental surgeons also got actively involved in the identification of corpses²⁷.

In December 1996, Dr Charles Danjard and Dr Laborier got involved in the identification of the victims of the Order of the Solar Temple. For this occasion, the sampling of the jawbones was systematically achieved. Likewise, a panoramic X-ray photography was carried out on all the corpses²⁸.

In March 1999, the same experts identified the 39 victims of the fire of the Mont Blanc Tunnel. The two men had to identify extremely charred corpses which totally changed the bibliographical data of the carbonization of teeth and prosthetic items²⁹.

On July 25, 2000, Air France Flight 4590 was a Concorde flight which took off from Charles de Gaulle International Airport and which crashed on the Hotel known as the "Hôtelissimo"

²³ www.afioasso.org, *Historique [Historical account]*, no date, pp. 1-2.

²⁴ Georget Charles, personal communication, Amboise, 2008.

²⁵ Lamendin Henri (a), *Petites histoires de l'art dentaire d'hier et d'aujourd'hui [Small accounts of dental history of yesterday and today]*, L'Harmattan (ed.), Collection Ethique médicale [« Medical Ethics » collection], Paris, 2006.

²⁶ Lamendin Henri, personal communication, Guillestre, 2008.

²⁷ Ménini Patricia, *L'Odontologie médico-légale : son intérêt, ses limites [Forensic dentistry: its purpose and limits]*, Phd thesis in Dental Surgery, Nantes, 1998.

²⁸ Laborier Claude, personal communication, Dijon, 2008.

²⁹ Laborier Claude, personal communication, Dijon, 2008.

in Gonesse, France. The use of photography was systematic³⁰. Therefore, marks were kept and exhumation could be avoided. 450 slides and 250 photographs were taken. Out of 113 corpses, there were 112 dental identifications³¹. Dr Laborier reported that the 113rd victim who was edentulous was identified by default thanks to the list of passengers, since his dentures were never found³².

In April 2005, 26 French dentists including (Dr Rallon, Dr Hutt, Dr Labyt, Dr Berger and Dr Georget,) were sent to Thailand to gather ante-mortem and post-mortem information in order to identify the Tsunami victims³³.

On May 6, 2007, when a plane of the Multinational Force crashed in Egypt's Sinai killing 8 French soldiers, Dr Joly was sent there.

As for the French team of reserve dentists, among which were some members of the French Association of Dental Identification, it was sent to Togo days after the helicopter crash of June 3, 2007 which killed two Frenchwomen.

Likewise, it is Dr Danjard who also got involved in the identifications of the 26 victims of the Polish bus which crashed in a ravine of Vizille in Izère, France, on July 22, 2007.

The Unit of Odontological identification

"The Unit of Forensic Dentistry (l'Unité d'Identification Odontologique (UIO)) is an organization which was created by the National Council of the Order of Dental Surgeons (Conseil National de l'Ordre des Chirurgiens-Dentistes) and whose statutes were approved by the session of April 13, 2002. In the case of disasters, it suggests practitioners who are trained to carry out forensic identifications, who can be mobilized 24 hours a day with a simple call by the authorities, to competent judicial authorities³⁴..."

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³⁰ Georget, Collet & Peton, « Historique de l'Odontologie médico-légale au travers des catastrophes » [« Historical account of forensic dentistry through disasters »], in *Cours du D.U. d'Identification en Odontologie médico-légale*, U.F.R. Odontologie Nancy, college year 2000-2001.

³¹ Laborier Claude, personal communication, Dijon, 2008.

³² Gruhier Fabien, « Les dents de la mort » [« Teeth of death »], in *Le Nouvel Observateur*, 29/03/2001, n° 1899.

³³ Laborier Claude, personal communication, Dijon, 2008.

³⁴ www.ordre-chirurgiens-dentistes.fr, *L'Unité d'Identification Odontologique* [The Unit of Forensic Dentistry], 2009, p. 1 & Conseil National de l'Ordre des Chirurgiens-Dentistes [National Council of the Order of Dental Surgeons], letter of 05/08/2009, Paris.

How visible light curing came into dentistry

N H F Wilson

Abstract: The present paper details the history of the introduction of visible light curing into dentistry. This history provides an excellent example of 'out of the box', lateral thinking translation of innovative scientific technology into dentistry. Visible light curing is an important UK contribution to the recent history and current practice of dentistry, with several million visible light curing procedures being carried out globally on a daily basis.

Key words: Visible light curing, dentistry, history

Introduction

Visible light curing – activation of the polymerisation of a material by means of light included in the visible spectrum, followed in the wake of ultraviolet light activated materials suffering a demise, largely caused by concerns over the hazards of exposure to ultraviolet radiation, Burdell et al., 1976¹ and limited depth of cure, Lee et al., 1976². The motivation to find an acceptable, user friendly means of light-activation in dentistry, stemmed from market appeal for the desirable qualities of photo activated materials, notably a one component formulation, as distinct to two components -base and catalyst, in chemically cured systems, opportunity for extended working time, and 'command set'.

Origins

In the early 1970's two chemists at the ICI Petrochemical and Polymer Laboratory in Runcorn –Edward (Ed) Dart and Joseph (Joe) Nemcek developed a visible light activated (alpha)-diketone/amine catalyst system, an innovation which was granted a patent in 1976 Dart and Nemcek, 1976³. Ed and Joe had been looking for a novel way to cure acrylic resins, specifically acrylic paint to be used to paint car bodies. Subsequent to the approach having been found difficult to apply, in particular in difficult to access, rust-prone areas of car bodies, new applications were sought for the Dart/Nemcek catalyst system. These included the development of resins used in fibre optic systems and in the manufacture of fan blades for jet engines.

Dental origins

The first suggestion of the possible use of visible curing in dentistry is credited to a chemist working in ICI Corporate Laboratories in the late 1970's – Dr Joseph (Joe) Jaworzyn (deceased). It is understood that the idea came to Joe when being treated by his dentist for the placement of a tooth-coloured restoration in one of his upper anterior teeth. Speculative, feasibility studies involved Joe and colleagues in refining the Dart/Nemcek catalyst system – the subject of a patent granted in 1978 patent, Nemcek et al., 1978⁴, and combining it with appropriate biocompatible resins –urethane di-methacrylates being developed by one of Joe's colleagues Dr Mike Knight. The outcome of Joe Jaworzyn's work was a prototype visible light cured resin composite which was considered to have potential for dental applications. Joe's final act in the process was to persuade an Operating Division of



ICI to follow his work with the development and funding of a programme to translate the prototype material into a viable product.

Fig.1 ICI cartoon of the car paint origin of the visible light curing of dental materials.

Evaluation of prototype

Medical Aids in the Pharmaceutical Division of ICI, headed up by Mr Alan Vernon, took on the challenge posed by the Jaworzyn prototype. Dr John Yearn (Fig.2), recently moved to Medical Aids from the ICI Petrochemical and Polymer Laboratory, was tasked to lead the



project. At that time Dr Yearn had no knowledge of dentistry, other than as a patient; however, following bench demonstrations of the handling and 'command set' of the Jaworzyn prototype resin composite (composite), he quickly realised the opportunity to produce novel restorative systems with relatively high filler loadings and favourable mechanical and clinical properties. Impressed by the outcome of subsequent initial evaluations and informal market enquiries, John Yearn undertook, amongst a number of other 'blue sky' responsibilities, to develop a new product proposal to be put to the Pharmaceutical Division Board of Directors.

Fig.2 Dr John Yearn (deceased, 2010)

To develop, or not to develop?

To better understand opportunities for visible light cured resin-based materials in dentistry, John Yearn made contact with the local dental school –The University Dental Hospital of Manchester (UDHM), formerly the Turner Dental School. John Yearn's first point of contact in UDHM was Professor Alan Grant, Professor of Prosthetic Dentistry, including dental materials science. Concurrently, John Yearn spent many hours in libraries learning about various aspects of dentistry, talking to local general dental practitioners (GDPs) and working with the ICI Corporate Laboratory Business Group to develop a business case to create marketable products based on the Jaworzyn prototype. Given considerable enthusiasm for, in particular, the prospect visible light cured restorative systems, with the caveat from GDPs that the proposed new concept products should aim to be 'quicker, easier and cheaper', together with a workable business case, John Yearn's proposal was supported, and he had a new job heading up the project, line managed by John Colville, who replaced Alan Vernon who died in a road traffic accident. Many years later, John Yearn disclosed that the 'to develop, or not develop' decision had been a close run affair, with a number of the Directors

being sceptical about a speculative business venture in the highly specialised world of dentistry.

Development

John Yearn's first action in his new role, which commenced in 1974, was to establish a small research team. The first recruits were Dr Robert (Bob) Denyer and his two assistants Rod Traynor and Geoff Cole from ICI Corporate Laboratories. They were allocated a small ground floor laboratory in ICI Pharmaceuticals Mereside Research Facilities outside Alderley Edge in Cheshire, to await completion of new laboratories on the ICI Macclesfield site.

Next, John Yearn had to recruit an individual capable of developing a light source to cure (polymerise) the proposed visible light cured products. This individual was Ray Jones, again from ICI Corporate Laboratories. Ray worked closely with ICI Pharmaceutical Division instrument engineers to develop a suitable unit, working on experiences in dentistry with ultra-violet photoactivation units. Critically, the unit had to emit light in the range of 440nm–480nm wavelength in sufficient intensity to cure <3mm of material in c.60s.

Another important step for John Yearn was to strengthen links with UDHM. One of Professor Alan Grant's postgraduate students, Dr Mohammed Bassiouny, who had recently completed his MSc by research, was recruited to undertake PhD studies based on the development of visible light cured composite systems. Mohammed Bassiouny was soon joined by Gordon Smith and Nairn Wilson, lecturers in Conservative Dentistry at UDHM, to provide clinical expertise in various aspects of operative dentistry and develop clinical trials of potential products. Dr Bassiouny's research ranged from physical and mechanical testing of prototype materials to determining an optimal finishing technique for use clinically.

What followed was a period of very intense, fast moving product development, including scaling up the production of the resin –work undertaken in conjunction with ICI Organic Division at Blackley, extensive toxicology testing under the auspices of Dr Anne Charlesworth, laboratory, physical properties testing and clinical simulation, not to forget all the electro-engineering development which went into creating the first visible light curing unit. Looking back, the development team was very close knit, efficient and effective, with none of the countless problems encountered ever being allowed to become a barrier to realising the collective goal of creating a novel, single paste formulation, visible light cured, tooth-coloured composite capable of challenging the then market leading two paste, chemically cure composite –Adaptic (Johnson & Johnson, New Jersey, USA). At one and the same time, Dr Robin Davies, who had previously been a senior clinical academic in Periodontology at UDHM, was leading an 'Oral Health Project' team in the Pharmaceutical Division of ICI working on the research and development of Corsodyl mouthwash and related products.

First in man

Being a true team leader, John Yearn, now lined managed by Arthur Mason, volunteered to receive the 'first in man' visible light cured composite restoration. As commemorated by a 25th anniversary plaque in UDHM, this event took place in what was known as 'Side Surgery 1' of the UDHM Department of Conservative Dentistry the late morning of 24th February 1976. The restoration – a replacement of a failing cervical (Class V) acrylic resin restoration in an upper right first premolar, was placed by Mohammed Bassiouny, with Gordon Smith and Nairn Wilson in attendance. The restoration, which was placed without rubber dam isolation, or acid etching and an intermediate resin, let alone dentine bonding, which had not been introduced at that time, was, in John Yearn's words, "acceptably smooth, but flat opaque white in appearance"(Fig.3). The prototype material and light curing unit used in the placement of the 'first in man' visible light cured composite restoration are illustrated in



Figs.4 and 5). While the simple 'scrape testing' indicated restorations of <2.5mm in depth could be cured by a 30s exposure to the prototype light (Yearn, 1985), a 60s exposure was used to ensure polymerisation within the body of the material⁵.

Fig.3a. 'First in man' visible light cured composite in upper right second premolar occlusal-proximal (Class II) restoration in the upper right second premolar was a restoration of Adaptic (Johnson & Johnson, New Jersey, USA) placed one to two years earlier.



Fig. 3b. The restorations illustrated in Fig. 2a 25 years later. The extensive marginal staining affecting all the restorations was attributed to John Yearn being a smoker and regular user of Corsodyl mouthwash.

The material used for the 'first in man' visible light cured composite. Eighty percent by weight of this 'mouldable, putty-like paste' was a radiolucent glass filler with a particle size range of 2-30 microns.



Fig 4 First in man visible light cured composite



Fig. 5 Details of the prototype light curing (activation) unit used in the placement of the 'first in man' visible light cured composite.



The 'control box' included a transformer, a voltage regulator, a timer mechanism, a 12V, 75W quartz-halogen lamp with integral reflector, a fan (cooling) unit and a three-component filter system to remove light of unwanted wavelength. The light emitted by the 'control box' was transmitted to the handpiece by means of a fibre optic cable. The handpiece comprised principally an angled, aluminium coated, quartz rod.

Refinement

Subsequent to the placement of the 'first in man' restoration, a priority was to improve the translucency of the material. This was achieved by switching from a single glass filler to a blend of different glass fillers with a much higher refractive index. In the process, the material benefitted from being rendered radiopaque. As with all composite restorative systems available at the time, a single shade was considered sufficient.

The goals for the further refinement of the material and light curing unit were as follows:

Material

- Greater control over working time and depth of cure. This was achieved by reducing the sensitivity of the material to ambient light, increasing the intensity of the curing

unit output, the use of glass fillers which limited light absorption interference with catalyst activation, and the introduction of the use of orange filters clinically to reduce premature curing by high intensity operating lighting.

- Enhanced filler technology and control of viscosity to improve the homogeneity of the formulation and enhance handling, with an absence of 'slump' when being contoured clinically.
- Improved ease and quality of finish. A key element of this work stream was the reduction of air inclusions in the single paste formulation. (Fig. 5).

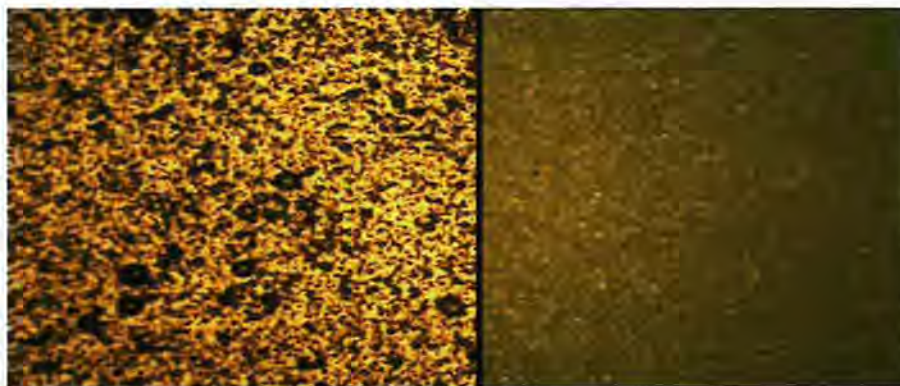


Fig. 5 Photomicrographs of a two-paste- (left) and refined prototype light cured (right) composite surface illustrating the extent to which air inclusions were eliminated in the process of enhancing surface finish, let alone susceptibility to staining in clinical service in the production of ICI Dental restorative systems.

Light curing unit

- Minimum 2.5mm-3.00mm depth of cure to create opportunity for bulk filling. This goal was frustrated by work which indicated that bulk filling could lead to unacceptable polymerisation shrinkage effects. However, good depth of cure (<3mm) remained a goal to help compensate for the tendency of clinicians to allow the distance between the exit portal of the light cure guide and surface of the restoration to exceed the recommended <3mm.
- No warm up time, constant light output and no overheating.
- Compliance with all relevant standards for electrical appliances to be used clinically.
- Minimum purchase and maintenance costs, without compromising reliability and durability.

Launch

Working in partnership with Johnson & Johnson, ICI launched the first commercially available light cured composite –Fotofil and associated light curing unit (Fig.6) at an international symposium held at Guy's Dental Hospital on 27th January 1978. Remarkably, this event took place 23 months only after the 'first in man' placement of a visible light cured composite restoration.



Fig. 6 Fotofil (right) and the Fotofil light curing unit (left). The Fotofil kit included four pots of single shade material, a multiple, single-use sheet, dispensing pad and a bottle of 37% phosphoric acid etching liquid.

The symposium, chaired by Dr Richard Norman, then Director of Clinical Research, Johnson & Johnson Dental Products, included presentations by Drs John Yearn, Bob Denyer, Mohammed Bassiouny, Anne Charlesworth, together with papers by Professor John Bates (University of Cardiff; co-author Dr W (Bill) Douglas) and Harold Wilson (University of Birmingham) who had undertaken academic consultancy work in the development of the Fotofil system. A panel of general dental practitioners (R Moule, W Peberdy and P Skinner), who had undertaken some practice-based evaluations of Fotofil, shared their clinical experiences with Fotofil with the invited audience of c. 200 participants from around the UK and Europe. Proceedings of the symposium were produced and disseminated by Johnson & Johnson (Johnson & Johnson Dental products Division, 1979)⁶. Soon thereafter, Bassiouny and Grant published a paper in the *British Dental Journal* reporting a 'clinical open assessment' of Fotofil (Bassiouny and Grant, 1978)⁷. This paper was followed several months later by a presentation by Nairn Wilson and Gordon Smith at the 1979 General Assembly of the International Association for Dental Research in New Orleans (Wilson and Smith, 1979) and a related paper co-authored by Gordon Smith and Nairn Wilson reporting the initial findings of the first clinical trial of Fotofil (Smith and Wilson, 1979)^{8,9}. Related papers were subsequently published by Nairn Wilson and Gordon Smith between 1980¹⁰ and 1984¹¹ (Smith, 1980¹² and Wilson and Smith 1981, 1984).

Concurrent work was carried out on developing prototype visible light cured fissure sealing systems, both filled and unfilled and a visible light activated orthodontic bracket bonding resin. The clinician in the latter programme of work was Michael (Mike) Read, a consultant orthodontist at UDHM. Neither of these work streams resulted in the production of any commercial products, given a decision to focus available resources on the development of restorative systems.

Springboard

Despite its novel features, favourable independent testing and, by standards of the late 1970's early 1980's, good aesthetic outcomes (Fig. 7), Fotofil, for various, principally commercial reasons, was not a great marketing success, other than in the UK.



Fig.7 An example of upper central incisors restored with incisal-promixal Restorations of Fotofil, two years after placement. The narrow, midline diastema was formed, according to the wishes of the patient.

However, the experience gained and lessons learnt in developing and bringing Fotofil to the market provided a powerful springboard, largely funded by royalties on the ICI photoinitiation catalyst system, for the subsequent development and marketing of series novel restorative systems by what was then known as ICI Dental, which, in 1981, acquired its own marketing team, headed up by Glynn Heselwood. Glynn, in addition to his many, different contributions to the commercialisation of ICI Dental visible light activated restorative systems, took over responsibility for the marketing of ICI's Corsodyl products. Another hugely important addition to John Yearn's team was Tom Roberts who from 1981 lead the innovative, fast-moving, ground breaking, basic research which lead to the development of, amongst other products, Occlusin (ICI Dental, Macclesfield, UK) and subsequently Opalux (ICI Dental, Macclesfield, England) which were successfully marketed, together with the Luxor light (ICI Dental, Macclesfield, England) developed by the ICI Dental light curing unit team, which continued to be led by Ray Jones (Fig. 8). Occlusin was the subject of the most extensive clinical trial programme ever undertaken in the field of dental biomaterials science (Wilson and Norman, 1998)¹³. Notable amongst the related products was Epitex – a composite finishing system, which enjoyed sales which exceeded all expectations.



Fig.8. 'Pack shots' of the Occlusin and Opalux systems, together with an illustration of a Luxor Light.

Looking back, the rate of innovation and pace of development within ICI Dental was very fast. Following the launch of Fotofil, essentially all the major manufactures of dental composite systems sooner or later introduced one or more visible light cured restorative systems. The resultant competition was a major driving force in the development of ICI Dental, which went on to acquire Coe Dental Laboratories, based in Chicago, before itself being acquired by GC Corp., Japan in the late 1980's.

Fast forward

Visible light curing is now integral to the practice of dentistry, with many different applications and certain issues (Price et al., 2014)¹⁴. LED technology has largely replaced the use of filtered halogen lamps in light activation units (Jandt and Mills, 2013)¹⁵, and most of the light activating handpieces are now cordless, rechargeable units. Today, it is estimated that several million visible light curing procedures are carried out globally on a daily basis. Despite such wide spread use, stemming from the 'bright idea' of Joe Zaworzyn, and voluminous research over the last 30-40 years, visible light curing is not without its limitations and drawbacks. The limitations centre on depth and sufficiency of cure, especially when preparations are very deep, and the key drawback relates to shadowing in difficult to access and undercut situations, compromising curing –the basis for the concept of 'soggy bottom' restorations, fuelling the view that "light curing may not be as simple as it seems" (Burke, 2011).

Concluding remarks

Dentistry and countless patients have benefitted greatly from the Joe Jarworzyn's 'bright idea' and the subsequent work of, in particular, the close-knit team lead by Dr John Yearn. Visible light curing is set to continue to play a major role in dentistry for the foreseeable future and may yet find new applications in oral healthcare provision; for example, in 3D photopolymer printing processes. The failed car paint to everyday use in dentistry story provides an excellent example of 'out of the box', lateral thinking translation of innovative, scientific technology into dentistry. Visible light curing is an important UK contribution to the recent history and current practice of dentistry and has found other applications in different fields, for example in false fingernail technology. Hopefully, this article will ensure credit where credit is due to the people behind the inception and initial development of the innovation.

Acknowledgements

The author is most grateful to Dr John Yearn for the notes on the development of visible light curing he provided prior to his untimely death and to former, fellow ICI Dental team members Bob Denyer, Tom Roberts and Glynn Heselwood for having reviewed and commented on this paper prior to its submission for consideration for publication.

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Nairn Wilson, President of the British Dental Association, is honorary Professor of Dentistry at King's College London, where he was Professor of Restorative Dentistry and Dean and Head of the College's internationally renowned Dental Institute between 2001 and 2012, and Deputy Vice Principal (Health) between 2009 and 2012. Nairn's many other positions in dentistry have included Editor of the Journal of Dentistry (1986-2000), Dean of the Faculty of Dental Surgery of the Royal College of Surgeons of Edinburgh (1995-1998), President of the Academy of Operative Dentistry European Section (1998-2000), President of the General Dental Council (1999-2003), Co-chair of the Forum of European Heads and Deans of Dental Schools (2007- 2012) and more recently Registrar of the UK Public Health Register (2012-2015) and Professional Strategic Executive, European Federation of Periodontology (2012 to date). His interests and special expertise include healthcare regulation, international trends in dental education, and future developments in the clinical practice of dentistry. He continues to author and edit many different contributions to the dental literature, while serving as Patron or Trustee of various dental charities. His various honours and awards include a Dentistry Lifetime Contribution Award, the Award of Excellence of the Academy of Operative Dentistry European Section, and the John Tomes Medal of the British Dental Association.

Lindsay Society Meeting in Lincoln October 2015



The Lindsay Society Conference was held in Lincoln and was opened by our President, Rachel Bairsto. This was the best attended meeting in recent years. We are grateful to Andrew Sadler, Stuart Robson and Brian Williams for all the hard work arranging this most successful meeting. There were very interesting

presentations from Roland Hopwood on Waterloo Teeth, and Peter Frost on the dental practice of Ron Gain. Andrew Sadler described the advantages and problems of the world of self-publishing and Stanley Gelbier enthralled us with his encyclopaedic knowledge of famous dentists. Phillip Lumley, the Dean of Birmingham Dental School, gave an informative description of the planning and construction of their new dental school. Margaret Kellett outlined the history of the use of Chlorhexidine in dentistry. Finally, Stuart Anderson outlined the common history of Pharmacists and Dentists and some of the areas where the two professions have overlapped.



There was a tour of Lincoln Castle and the energetic delegates also toured the prison, walked around the walls and explored Lincoln Cathedral. The conference dinner was held in the Judges' Lodgings. Many

thanks are extended to Brian Williams, our Honorary Secretary for all his work preparing for the conference and also to Stuart Geddes for his assistance during the meeting.

One Man's Tortuous Foray Into Oral and Maxillofacial Surgery

The Story Behind the Evolution of
Maxillofacial Surgery from Hospital Dentistry



Laurence Oldham describes his training as a dentist soon after the second world war and his practice in the Royal Air force during national Service. The tedium of General Dental Practice and frustration of an unsatisfying academic job in the north of England is contrasted with the inspiration of a Rotary Foundation Fellowship in the USA and surgical practice in East Africa with committed surgical mentors.

Appointed as a Consultant Dental Surgeon in 1968 Laurence Oldham widened the scope of hospital dental surgery after gaining the confidence of surgical colleagues and inviting friends to help him with operations he had not hitherto been trained to do.

This is just one of many stories from his generation of how Oral and Maxillofacial practice evolved from hospital dentistry and how ambitious young surgeons developed their craft without anything approaching an adequate training by today's standards.

Hot Spots and Hot Seats

An Experience in Practice in
Oral and Maxillofacial Surgery



John Bradley

John Bradley was formerly Consultant Oral and Maxillofacial Surgeon, Council member of the British Association of Oral and Maxillofacial Surgeons and Editor of the British Journal of Oral and Maxillofacial Surgery.

John takes us on his journey from the Hot Spots of the bombing of second world war to the Hot Seat as Chairman of a Health Trust in Lancashire.

The journey is not always smooth. There is confrontation around every corner, with Managers, Politicians, Plastic Surgeons and even Royalty. All are overcome; an arrogant General Surgeon meets his match in the last chapter.

But there is also camaraderie, cooperation, innovation, friendship and humour.

John's story is a part of the history of the development of the speciality of Oral and Maxillofacial Surgery in the second half of the twentieth century in England. Not so many years ago but in many respects a different era when trainees were almost permanently on call and a Consultant could pick up the telephone and speak to the Minister of Health.

A JOURNEY THROUGH A LIFE

FROM DENTISTRY TO MEDICINE THROUGH THE
DAWN OF MAXILLOFACIAL SURGERY TO
HOSPITAL MANAGEMENT



RUSSELL HOPKINS

Russell Hopkins career journey passes from failure in the Higher School Certificate to national recognition for his work as a surgeon, medical manager and politician.

After re-taking A levels the young Russell turned down a place at Medical School and undertook Dental training instead. General Dental Practice in Cambridge and Rhodesia caused disillusionment but Oral Surgery inspired him to medical training as a mature student.

Work for a dishonest dentist led him to a General Dental Council disciplinary committee. Exonerated he remained sceptical of the dental establishment and later of dental academia. He declined invitations to apply for a Chair in Oral Surgery.

Russell describes his adventures in Medicine and Surgery during a time of evolution of his speciality, including regular work as a ship's surgeon. There are frustrations, confrontations and pleasures.

As General Manager of the University Hospital of Wales he engaged in conflict with inefficiency and obstinacy. His third career as a Trust Chairman brought more conflict from both local consultants and politicians.

Escape from Pain

The History of the Discovery of Anaesthesia
as Written by Sir James Paget in 1879



Editor: Andrew Sailer

The fascinating story of the first anaesthetics has not been told better than in this 7000 word essay from 1879 by James Paget.

He takes the reader from the first realization of the analgesic properties of nitrous oxide to the arguments over who used anaesthetics first and who should gain the financial reward and approbation for the discovery. He provides the evidence that it was neither of the dentists Wells or Morton who used anaesthesia first.

To Paget's paper has been added a treatise on the life of this amazing man from his schooling and apprenticeship in Yarmouth through his slow rise to become the premier surgeon and medical opinion in Victorian England.

Further chapters have been added about the first anaesthetics to be used in England, the relative merits of chloroform and ether as anaesthetics agents and examples of surgery before anaesthesia. The principal list of Paget's many writings is in the appendix.