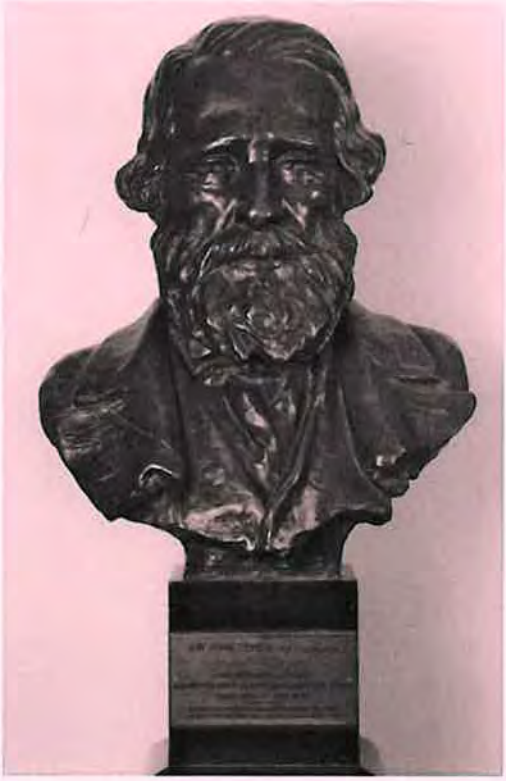
DENTAL HISTORIAN



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EDITORIAL

Once again this issue covers many aspects of dentistry. Included is the 2008 Lilian Lindsay Memorial Lecture on forensic dentistry presented by Dr Howard Moody (see photograph).

We can also read about dentistry provided for soldiers over many years, as well as a personal viewpoint from one army dentist undertaking national service in Africa. One paper covers the story of Edward Angle, a name of an orthodontist well known to all practitioners; another is about some early Afro-American dentists; and a third follows one family of dentists amongst those contributing to care at Great Ormond Street Hospital. All of these contributions are very welcome. Many thanks are due to those colleagues who acted as referees or gave other support to the editor during 2009. They include Rachel Bairsto, Peter Frost, Geoff Garnett, Ian McIntyre, Rufus Ross, Michael Trenouth, Gordon Watkins and Stuart Geddes. There is a special thank you to Wesleyan Medical Sickness for its welcome sponsorship of *Dental Historian*.

COVER ILLUSTRATION

Rachel Bairsto*

The picture shows Sir John Tomes, according to Sir Harry Baldwin: "A great original investigator, a great mechanical inventor and a great operator and a great leader of his profession."

An exhibition about the influential life and work of Tomes is now showing at the BDA Museum until 4 March 2010. The exhibition forms part of the celebrations for the 350th anniversary of the Royal Society of which Tomes was the first dental fellow. On display is Tomes' reclining dental chair, instrument cabinet, many of his inventions and his scrapbook. One learns about the enormous contribution Tomes made to the reform of the profession and the founding of the British Dental Association. The exhibition will then tour to East Surrey Museum in Caterham (where Tomes lived) (13 March-5 June) and to the Hunterian Museum at the Royal College of Surgeons (22 June-25 September).

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A SHORT HISTORY OF FORENSIC DENTISTRY*

G Howard Moody+

In Memorium: Lilian Lindsay

While Lilian Lindsay (Fig 1) holds a unique place in the history of the dental profession in the United Kingdom. She is especially well remembered in Scotland where she qualified and read the first of her many papers. Born in London as Lilian Murray in 1871 she was privately educated at Camden School for Girls and the North London Collegiate School, both founded by the autocratic Frances Mary Buss. The latter intended that Murray should become a teacher of the deaf and dumb but she had other ideas.

Figure 1 Lilian Lindsay

Because of a clash between these formidable personalities Murray was denied a scholarship, left school in 1889 and was apprenticed to a dental practitioner for three years. When she sought entry to a dental school the GMC suggested she try the National Dental Hospital in Great Portland Street. The dean, Henri Weiss, refused to let her enter the Hospital. He referred her to W Bowman Macleod, dean of the Edinburgh Dental Hospital and School and the Royal College of Surgeons of Edinburgh. The English college at that time did not admit women to its examination. On her first day at the Edinburgh school she met Robert Lindsay, her future husband. She gained the LDSRCSEd with honours in 1895. Although not the first female to *practise* dentistry in Britain she did become the first woman to *qualify* as a dentist. In 1905 Lilian married Robert and joined him in his practice in Edinburgh. She retired from clinical practice in 1920 when Robert became secretary of the BDA in London.[1]

Lindsay's literary output was large. Her first paper, 'Superstition and the dental art', was read before the Odonto-Chirurgical Society of Scotland in 1912 and published in the *Dental Record* in January 1913. In the view of some scholars Lindsay's most important contribution is her translation of

* The Lilian Lindsay Memorial Lecture, presented at the BDA Annual Conference in Glasgow, 6 June 2009.

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[1] Ronald A Cohen, Lilian Lindsay 1871–1960, *Brit Dent J* 1971, 131: 121-122.

Fauchard's *Le Chirurgien Dentiste*.[2] For some forty years Murray studied the history of dentistry, publishing many papers as well as a book. Her 1933 *Short history of dentistry* records what Elphinstone wrote in 1911 concerning a 1193 battle:[3]

The taking of towns, the breaking of idols, the acquisition of treasures present so little novelty that we are left at leisure to notice the capture of a white elephant and the incident of the Raja (Chei Chandra Rahtor of Canouj) being recognised by his false teeth, a circumstance which throws light on the state of manners.

The fact that Lindsay included this quotation in her history suggests she would have come to recognise the value of forensic dentistry as it evolved in the twentieth century. Were she here today, my inadequacies and omissions would be noted since her erudition was immense, formidable and international. She would, I am sure, have added some pertinent anecdote from her own experience. This lecture is respectfully dedicated to her memory.

Forensic dentistry

Although the good Raja was recognised by his false teeth in 1193 this is not the earliest dental identification on record. In 229 AD Dio Cassius wrote a Roman History in 80 books. In book 61 he describes how Agrippina paved the way for her son Nero to become Emperor:[4]

She slew Lollia Paulina because she had been the wife of Gaius and had cherished the hope of becoming Claudius' wife. As she did not recognise the woman's head when it was brought to her she opened the mouth with her own hand and inspected the teeth which had certain peculiarities.

This may be true, but it may not be the whole truth and nothing but the truth, since if one delves into this story a little deeper one discovers that Tacitus's account is subtly different. Tacitus tells us that Paulina was forced to commit suicide under the watch of the Praetorian Guard.[5] Such an enforcement could only have been ordered by someone of Agrippina's status. It places Paulina's death one step removed from murder. Agrippina's hands would be clean. (Nothing new about political half truths or, as we say in Scotland "it

[2] Lilian Lindsay, *The surgeon dentist or treatise on the teeth* [translated from Pierre Fauchard's *Le Chirurgien Dentiste*, 2nd edition, 1746] London: Butterworth, 1946.

[3] Lilian Lindsay, *Short History of Dentistry*, London: Bale and Danielsson, 1933.

[4] AD 49 Lollia Paulina, quoted by Soren Keiser-Nielsen, Chapter on 'Historical Cases', in I R Hill et al (eds) *Forensic Odontology. Its scope and history*, Alan Clift Associates, 1984, p. 37.

[5] Cornelius Tacitus, *The Annals of Imperial Rome* [translated by Michael Grant], Penguin Classics, 1973, Chapter 10, p. 261.

wasnae me"). These ancient Romans seem to have had a liking for dental identification because in AD66 Nero's mistress decided enough was enough and literally demanded to see the head of his wife on a plate. Apparently she recognised a black anterior tooth and accepted the trophy as the genuine victim. It is doubtful if either of these quite similar cases would provide grounds for a secure dental identification today.

The Latin *forum is the* derivative of *forensic*. The Forum was a public place and the adjective forensic means 'matters that are dealt with in a public place such as a Court of Law'. Thus we should not say *forensic* when we actually mean *with extreme care* or *in minute detail*.

The correct use of forensic appears in Keisser Nielson's (1967) excellent and internationally accepted definition of forensic dentistry:

That branch of dentistry (odontology) which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of dental findings.

Medieval England came close to this legal understanding of forensic dentistry, although it was not appreciated as such at the time. Illiterate apprentices 'signed' their apprenticeships by biting into a wax seal thereby creating a unique, "Indenture". Later this practice was replaced by "indenting" these and other documents by cutting a copy of the document in half in a tooth-like manner. One half of the document was retained by each of the two parties concerned. This was probably considered more reliable since teeth may be lost over time and the dentition no longer fits the seal. I doubt if matters of hygiene were considered.

Some forensic dental cases

In a presentation such as this it is neither possible nor desirable to give an account of the many historical dental forensic cases. I have therefore made a selection (with perhaps a hint of a Scottish bias), which I trust to some extent at least spans both the centuries and the width of this fascinating discipline.

While the ancient Romans may have inadvertently discovered the value of dental identification in the 1st century AD it surely comes as no surprise to learn that our American cousins lay claim to the 'father of forensic dentistry', Paul Revere (Fig 2), a great American hero. In 1775 he rode through the night to warn the citizens of Lexington and Concord that the British were advancing towards them. Revere was an expert gold and silversmith, an inventor of production methods for copper sheet metal and an engraver – and a dentist. Sometime between 1760 and 1770 he made a silver bridge for Dr Joseph Warren, one of the "sons of liberty". Warren was killed near Bunker Hill. Revere identified his body from the bridge and so American forensic dentistry was born.

Scotland saw the first British case in which members of the dental profession were cited as expert witnesses. Mrs Janet McAlister dies 8 December 1813. Two lecturers and two Glasgow students were accused of violating her grave and taking her for dissection. The trial began on 7 June 1814. For the Prosecution, Dr James Alexander, McAlister's dentist, fitted a

denture obtained from her husband to the corpse and Dr Cleghorn (GP) testified that it fitted perfectly. For the Defence, Dr James Scott witnessed the fitting of the denture and was not convinced. Dr Robert Nasmyth maintained the upper denture did not articulate with the natural teeth of the mandible and that it fitted four others just as well. The jury found the defendants not guilty.

Figure 2 Paul Revere

The first case in which dental evidence was admitted into a trial came in the USA. Professor John Webster (Chemistry, Harvard) was heavily indebted to George Parkman. The latter visited Webster at the Massachusetts Medical College on 23 November 1849 and was never seen again. Body parts were discovered by the police in mud flats adjacent to the college. During a search of Webster's laboratory on 30 November the remains of false teeth, some melted gold and bone fragments were found in an assay furnace. Webster was arrested and charged with murder. Following his trial in March 1850 Webster was found guilty in a unanimous verdict and hanged in August 1850.

The dental evidence was provided by Drs Keep and Noble who demonstrated in Court that two exhibits consisting of a block of "mineral" teeth from the left lower jaw and part of a pattern plate from the right lower jaw were the remains of a partial lower denture manufactured by Keep. They fitted a plaster model of Parkman's mandible which had been kept in their office and was marked in Noble\s handwriting, "Dr Geo, Parkman, Oct. 1846." While Parkman was dentally identified it is not absolutely certain that Webster killed him since it appears the Janitor and other key witnesses were not thoroughly cross-examined.

England and Scotland: Ruxton 1935

Figure 3 Buck Ruxton

The case of Buck Ruxton is famous not so much because of the nature of the crime but because of the innovative new forensic techniques employed in solving it. It deserves to be considered a 'watershed' case in Scotland. Forensic technology came of age and the general public became fascinated with forensic medicine – a fascination that remains undiminished today and is fully exploited by the media. Ruxton (Fig 3) (Buctyar Rustomji Ratanji Hakim) was a Parsi, born in Bombay in 1899. He changed his name by Deed Poll in 1930.

Ruxton practised as a doctor in Lancaster. He became convinced his common law wife Isabella was having an affair. On 15 September 1935 he strangled Isabella and suffocated her maid, Mary Rogerson. He mutilated the bodies and dumped the body parts two miles north of Moffat in "Gardenholme Linn". They were wrapped in parts of the *Sunday Daily Graphic* dated 15 September 1935 and the *Sunday Chronicle*. The parts were found by Susan Haines on 29 September. The original location of the women was relatively easy as the *Sunday Graphic* was a special edition sold only in Morecombe and Lancaster. The bodies were identified by fingerprints, forensic entomology and superimposition. The people involved were Professor Glaister (Glasgow), Dr Gilbert Millar (Edinburgh), Professor Sydney Smith (Edinburgh), Professor A Hutchinson (Edinburgh), Professor T Davies (Glasgow) and Professor J Brash (one of the very first cases where forensic evidence convicted a criminal in the UK).[6]

The trial began on 2 March 1936. Ruxton was found guilty and was hanged on 12 May 1936.

Ruxton's house was gutted in 1980 and converted into a non-residential office. The bath used for cutting up the bodies became a horse trough for mounted police in Preston. A public house 50 yards from his house called 'The Ruxton's' was renamed 'The Square'.

Hitler: 1999 the conclusive evidence

After World War II there was confusion as to whether or not Adolph Hitler was dead. Rumours abounded that he had escaped from the Berlin bunker to south America. In 1968 Lev Bezymenski described some dental remains retained by the Russians. The description matched the testimony of Hugo Blaschke, Hitler's American trained dentist. In 1972 the Americans released radiographs of Hitler's head taken in July 1944. Prof Michel Perrier studied all this evidence and confirmed "very unusual dental work", concluding that the remains were indeed of Hitler. Perrier presented a paper on 25 October 1999 at the University of Lausanne, later published in *Science* in November 1999, confirming his decision.[7] Figures 4 and 5 show his teeth and dentures.

Oscar Amoedo (1863-1945)

In such a short presentation it is not possible to do justice to all those who have contributed so much to forensic dentistry. Accordingly I have confined myself to an appreciation of a very short selection pertinent to a British audience.

[6] J Glaister and J C Brash, *Medico-legal aspects of the Ruxton Case*, Edinburgh: Livingstone, 1937.

[7] Michel Perrier, Forensic human identification in the millennium, in Random Samples, *Science* 1999; 286 (No 5444): 1473.

Figures 4 and 5 Hitler's teeth and dentures

Oscar Amoedo is not as well known in Britain as he should be but on the continent he is regarded by many as the 'father of forensic dentistry'. Amoedo (Fig 6) was born in Cuba in 1863.

Figure 6 Oscar Amoedo

After studying at the University of Havana he went to the New York Dental College, returning to Cuba in 1888. In the following year he attended the International Dental Congress in Paris. The professional life and activity of Paris appealed to him so he decided to stay and became a clinical instructor at the Ecole Odontotechnique de Paris in 1890. He became interested in all aspects of dentistry and published over 120 articles.

In 1897 an event occurred which profoundly influenced the rest of his career. This was a fire in the Bazar de la Charite on 4 May 1897. Although not directly involved himself he studied the experiences of those who were. This, combined with his extensive knowledge of the literature and vast professional experience, enabled him to submit a thesis entitled *L'Art Dentaire en Medecine Legale* to the Faculty of Medicine. It earned him a Doctorate. It was published by Masson et Cie in 1898 and rapidly became the standard work on dental identification: the very first manual on forensic odontology.

Gosta Gustafson and Warren Harvey

Gosta Gustafson, professor of oral histopathology at the University of Lund, Sweden, published his seminal book *Forensic Odontology* in 1966.[8] It remained the unrivalled standard reference book for anyone in the UK

[8] Gosta Gustafson, *Forensic odontology*, London: Staples Press, 1966.

interested in any aspect of forensic dentistry for approximately 10 years. Page 121 reproduces an illustration of 'Gustafson's method', first described in 1947 for the estimation of age from the permanent dentition at the time of death (Fig 7). Although much modified it remains the basis of many age estimating systems.

In 1976 Warren Harvey edited the book *Dental Identification and forensic odontology*.[9] This text is more of a complement than rival to Gustafson's book. Amongst the contributors there is a veritable roll call of well-known Glasgow dental teachers: Josie Beeley, Dorothy Lunt, Gordon Macdonald, Wallace MacFarlane, Henry Noble and David Sutherland. There is something slightly disturbing about this book in that the chapters discuss problems we are still grappling with 33 years later. The estimation of age at death from the dentition dealt with by Henry Noble is a major consideration in archaeology as well as in current 'suspicious' deaths. Beeley described the pink teeth seen at

Figure 7 The original 'Gustafsen's method'

post mortem. The origin of the pigment is now better understood but the circumstances which permit it to happen remain controversial.

Identification in mass disasters as described by Harvey remains highly dependent upon dental methods. In the recent Tsunami the original presumption that most of the identification would be achieved via DNA proved unfounded: by far the most effective method proved to be dental. According to Graham Ritchie[10] the proportion of data obtained for in Thailand by a single ID method was: dental 55%, fingerprints 25% and DNA 2%. The balance of the 2600+ identifications were achieved by a combination of these methods. In the aftermath of the London bombing Freddie Martin and Phil Marsden achieved some 70% dental success in identification in 6 days.[11] Of great interest is the fact that while DNA in the London Bombing was very useful in matching body parts, not a single id was achieved with it.

An obvious uncontaminated and well preserved source of DNA is a tooth pulp but I have yet to be asked to extract a tooth from an unidentified body for DNA analysis.

Bite marks are dealt with in some depth by Warren Harvey. Chapter 14 is most illuminating. Gordon Macdonald describes a serious attempt to bring statistical probability into this arcane area and quotes a case which he won in

[9] Warren Harvey, *Dental identification and forensic odontology*, London: Henry Kimpton Publishers, 1976.
[10] Gordon Ritchie, Personal communication, 2009.
[11] Ibid.

1973 based upon this approach. Today, 36 years later, there are still few scientific research papers devoted to bite marks and there is a desperate need for controlled studies. Sadly there is no ready funding for such projects.

The only two UK professors with part of their chair title indicating forensic dentistry are David Whittaker (Cardiff) and Geoff Craig (Sheffield).[12] Both are now retired from academic life and there is no indication they will be replaced in this capacity.

In 1989 Whittaker and Macdonald produced *A Colour Atlas of Forensic Dentistry*. In the preface to this excellent atlas the authors state their desire to provide "a handy reference manual to the basic principles of our craft". They achieved much more than that.

The 1992 *Practical forensic odontology* edited by Derek Clark[13] is an excellent primer for anyone wanting to undertake forensic dentistry.

2005 witnessed the publication of the first comprehensive text devoted solely to bite marks: *Bitemark evidence* edited by Robert Dorion.[14] I believe this book is destined to become the standard text on bite marks and will run to several editions. That said, it is remarkable that none of the previously mentioned textbooks have run to a second edition. The foreword to Dorion's book contains these words:

The field is evolving from its origins in "consensus of experts" and moving into an era of true scientific standards. It is also a signpost pointing in directions still to be pursued.

Dorion points to a future where bitemark evidence will come under close scrutiny. While both photographic and postural distortion have been examined in some depth in recent years the interpretation of marks made by teeth remains highly subjective. Bite marks are unique and so are dentitions but this does not mean that a unique dentition produces a correspondingly unique mark. In a viscious attack there may be multiple lacerations accompanied by bruising and oedema with distortion caused by both the ferocitiy of the attack and the response of the victim. It may then be impossible to distniguish of two similar dentitions casued the injuries. Current methods of measurement and evaluation remain inadequate and much research is required if anything like a scientific analysis of a bite mark is to be achieved.

Identification

Simple but meticulous "wall paper" matching will continue as a swift and cheap means of identification wherever dental records are readily available. Dental records have improved over the years but errors in charting still occur. Common errors include transposition of left for right, first and second molars

[12] David K Whittaker and D G MacDonald, *A colour atlas of forensic dentistry*, London: Wolfe Publishing Ltd.,1989.
[13] *Derek H Clark (1992) Practical forensic odontology*, Oxford: Wright, 1992.
[14] R B J Dorion, *Bitemark evidence*, New York: Marcel Dekker, 2005.

being recorded as second and third molars. And a failure to keep charts updated as simple restorations are replaced by more complex ones. The requirement under the National health Service to only have to chart work either being undertaken or planned sometimes results in incomplete charts as previous work goes unrecorded. In the mortuary lighting is seldom optimal for a dental examination and it is easy to miss a small tooth coloured restoration. All experienced forensic dentists can recollect when they have compared ante and post mortem charts, noticed such a discrepancy and returned to the post mortem table only to now find the restoration they missed at the first examination. Radiographs taken in the Mortuary would be a great assistance but this is seldom possible in practice. We all know teeth are very well preserved in fires and here dental identification remains the identification method of choice although extra care is required since in these circumstances teeth may be very brittle and cleaning off carbon may be required. The discretionary use of "super glue" to stable the dentition can be helpful.

Teeth are also very much better preserved over the centuries than even mitochondrial DNA. The coffin of William Rufus (killed in the New Forest by a stray arrow in 1089) was opened in Winchester Cathedral in August 1868. It was noted that while the long bones collapsed to dust whilst being measured several teeth present were "in as good condition as if the King had died only yesterday".[15]

Mass disasters will continue to occur. While DNA will be massively important it cannot assist without comparison with blood relatives and in some disasters massive body fragmentation may make contamination a real issue. With the average age of the population rising accompanied by a trend towards smaller families (at least in the West) it is anticipated that there will be a rise in the number of persons dying with no blood relations thereby rendering DNA identification impossible and dental records will continue to be invaluable.

Close collaboration with other scientists is frequently necessary in assisting in the solving of a crime. In an Edinburgh assault and murder case a fragment of material barely 1mm in maximum diameter was removed from the alleged assailants hand. We were able to demonstrate that is was dental ceramic which matched the dental ceramic of a bridge derived from the dead victims mouth. The alleged assailant was found guilty.[16]

From past to future.

I have illustrated one case in which close collaboration with other scientists produced a satisfactory result and that case points towards the future of our discipline. Hitherto much as been written that is anecdotal but the Courts are increasingly less impressed by "consensus opinions" and want to see hard evidence.

[15] '1868 - William Rufus', quoted by Soren Keisser-Nielson from 'Historical cases', in I R Hill et al (ed) *Forensic odontology. Its scope and history*, Alan Clift Associates, 1984, p. 52.

[16] G Howard Moody, A Busuttil and P Hill, A common origin for dental porcelain derived from an accused's hand and the deceased victim of an assault, *Int J Legal Medicine* 1992; 105: 179–183.

Archaeology and forensic dentistry have come together in recent years through the study of racemisation of dentine and enamel proteins. Racemisation is one of those processes which is readily understood but extremely challenging when it comes to measurement. Basically there is an increase in proportion of the (D-) isomer of aspartic acid, present in dentine, relative to the (L-) isomer throughout life. The rate of conversion is, for all practical purposes, directly proportional to age. It is temperature dependent in that at body temperature the conversion continues but ceases when the body temperature drops significantly at death. The rate of conversion may be accelerated a fraction with increased temperature and there is some evidence to suggest that in bodies buried superficially in hot climates the process may continue slowly. More recently the process has been analysed in enamel proteins and minute quantise of enamel are yielding positive results. In time it may be possible to estimate the age of both the living and the dead from enamel scrapings.

A group of serious scientists at York University have been working on racemisation of enamel and dentine proteins. They are meticulous workers and enjoy an enviable reputation in their field. I wish to pay tribute to Matthew Collins and Rebecca Griffin who have generously involved me in their studies on age estimation. They are progressing towards a +/- 6/12 age estimation in adult teeth and have developed their techniques to be of value in archaeology as well as in current cases. Their techniques will probably become the gold standard wherever accurate age estimation is required.[17,18]

The limitations of DNA need to be further investigated. Environmental and microbial factors which may possibly degrade DNA need to be further evaluated and the ever increasing sensitivity of the analytical procedures is placing a premium upon "non-contamination".

Tightly controlled studies of bite mark analysis have yet to be undertaken. The disturbing variation in conclusions between forensic dental experts is alarming. It only requires one high profile case to go badly wrong for bite mark evidence to become inadmissible in Britain. It would be tragic if forensic dentistry was reduced only to identification. But how such research can be undertaken and funded in the UK is not at all clear.

Epilogue

Lilian Lindsay overcame prejudice, a lack of funding and a host of other difficulties and she is an inspiration to all interested in forensic dentistry. Maybe, if alive today, she would quote President Obama to those of us who believe that forensic dentistry is still relevant and worth undertaking: "Yes we can."

[17] R C Griffin et al., A new approach to amino acid racemization in enamel: testing of a less destructive sampling methodology, *J Forensic Science* 2008; 53: 910-16.

[18] Ibid., The application of amino acid racemization in the acid soluble fraction of enamel to the estimation of the age of human teeth, *Forensic Science Int* 2008; 175: 11-16.

E H ANGLE – A BRITISH PERSPECTIVE.

G Stuart Taylor* +

Introduction

Edward Hartley Angle's name has provided dentistry with probably its most widely known eponym, Angle's Classification of Malocclusion. His influence on the development of orthodontics over the last century was tremendous but it would be wrong to assume Angle's importance rested solely with this classification. His contribution manifested itself in a number ways. He was a great enthusiast for orthodontics; strongly believing it should be a speciality distinct from dentistry. The classification bearing Angle's name turned a chaotic situation into an orderly system. His dogmatic assertion that the extraction of teeth in order to correct malocclusion was unnecessary, and even criminal, is perhaps the most controversial of the reasons for which he is remembered. Lastly he originated not just one appliance system, but four: the Expansion Arch, the Pin and Tube, the Ribbon Arch and finally the Edgewise System. The latter, in modified form, is today the main treatment method in use throughout the world. His name is further remembered by its incorporation into the title of one of the world's foremost orthodontic journals, the *Angle Orthodontist*. North American dental literature is replete with references to Angle's work but in Britain there seems to have been less appreciation of his importance, even amongst the orthodontic fraternity, and many of the references are often of a sceptical nature. This paper reviews Angle's life and work, assesses his overall contribution to the development of orthodontics and examines his reputation in Britain.

Angle's life

Angle was born on 1 June 1855 in Herrick, Pennsylvania, where his parents farmed. He disliked school, did not distinguish himself and showed no aptitude for farming but was inventive and keen on making things. He is reputed, as a youth, to have designed and constructed a mechanical horse-rake, widely used for many years, on farms in the United States. A chance visit to a local dental practitioner awakened an interest in dentistry as a possible career and for a short while he was apprenticed to a dentist. In 1876 he enrolled in the Pennsylvania College of Dental Surgery and graduated in 1878. He set up in practice in Pennsylvania but due to ill heath left shortly afterward to travel to the west. He returned to dental practice, this time in Minneapolis. Angle became particularly interested in the management of displaced teeth and contributed on this topic at local dental society meetings.

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His interest in orthodontics led to an appointment, in 1885, to the chair of orthodontics at the University of Minnesota.

On the strength of his growing reputation he was asked in September 1887 to read a paper at the 9th International Medical Congress in Washington.[1] Unlike the favourable comments received at earlier meetings the ensuing discussion featured a furious battle to establish the priority for when and by whom certain discoveries had been made; no attention was paid to his treatment methods. The final contributor to the discussion, J C Storey, was so incensed as to ask:

> if the object of this gathering was to establish the principles which should govern dental practice or to settle conflicting claims as to who first made this or the other appliance... [The claimants should have said] Gentlemen, if I got it first, it is all the same free to you.

Strang explained that Angle felt ridiculed and that he had been treated as an upstart; this may account some way to the testy relationship he had with his peers later in life.[2] His paper was eventually published, in pamphlet form, under the title 'The Angle System of Regulating and Retention', and is regarded as the first edition of what later became his famous textbook, *Malocclusion of the Teeth*. He was disenchanted and resigned his position at the University of Minnesota in 1892. He then moved to Chicago, where he accepted the position as teacher of orthodontics within the prosthetics department, at what is now Northwestern University Dental School. In 1895 he shifted his orthodontic practice to St Louis Missouri, still retaining the Northwestern post. Orthodontics did not enthuse the dental students and they were reluctant to spend much time in pursuit of its study. The school did not require them to buy either books or orthodontic instruments but Angle insisted each student should equip himself with both and to bring them along to their examination. The students sought to economise and bought one book and set of instruments between them. Angle suspected he was seeing the same book frequently and therefore inscribed the student's name in the book when it next appeared. There was a rumpus in the school and Angle resigned from the faculty.[3]

In St Louis Angle held teaching appointments at Marion Simms College of Medicine (where he graduated MD in 1897). He founded the first truly independent university orthodontic department at Washington University. By 1899 he had resigned both these appointments, feeling frustrated in his academic efforts. For some time he was in negotiations with the University of Pennsylvania to found an orthodontic school to be run according to his beliefs but this fell through because of his insistence in appointing the staff. He wrote:

[1] E H Angle, Notes on orthodontia with a new system of regulating and retention, *Dent Cos* 1887; 29: 757-759.
[2] R H Strang, Obituary: Dr E H Angle, *Dent Cos* 1930; 72: 1107-1111.
[3] B W Weinberger, Dr Edward Hartley Angle – His influence on orthodontics, *Am J Ortho* 1950; 36: 596-607

I became filled with the belief that if orthodontia was to make any material progress, a separate school, entirely independent of dental schools must be formed, which would amply provide opportunity for those with aptitude and liking for the subject to study in a broad, thorough and comprehensive manner ... giving after the second year, their entire time to its study and practice, the answer was always the same: 'This is too Utopian' or' It is too early'.[4]

His classification

As Angle's orthodontic experience expanded he looked, beyond the purely mechanical means of moving teeth, to the underlying principles of malocclusion. Having access to a series of skulls with full dentitions, all evenly aligned, and such that when the arches were brought together into juxtaposition he decided that this was the model of efficiency and should be regarded as the 'normal' relationship of teeth and arches. What Angle failed to emphasise was that his 'so called normal' was in fact an 'ideal' relationship and was very infrequently found in nature; the concepts of his 'normal' and 'ideal' have recently been explained by Trenouth and Gelbier.[5] However he believed this 'normal or ideal' relationship should be the treatment objective although there was no scientific justification for this assumption and it took no account of any natural variation.

Classification seems to have exerted a fascination for orthodontists. Weinberger's book on orthodontic history, dealing with the period up to 1900, lists no less than thirty-one entries under, 'classification of malocclusion'.[6] In 1889 Angle published his contribution, now known universally as Angle's Classification of Malocclusion.[7] His classification is based primarily upon the mesio-distal relationship of the maxilla and mandible and their respective dental arches to each other and to the skull; the eruptive position of the permanent first molars being the key indicators. The classification is simple, points towards a diagnosis and gives some idea of treatment objectives. Angle's strict criteria are not always followed and the classification is sometimes misinterpreted.

Angle's concern went beyond the dentition and its relationships. It encompassed total facial appearance, realising the dentition played a role in its determination. He believed the profile found in the Apollo Belvedere statue to meet his concept of the ideal and considered the aim of making faces of people with malocclusion conform to this standard. He overlooked the fact that even individuals without malocclusion did not necessarily meet his facial ideal. He sought the advice of E H Wuerple, Professor of Fine Arts at Washington University St Louis and they became fast friends. Wuerple has

[4] B W Weinberger, *Orthodontics, An historical review of its origin and evolution,* St Louis: The C V Mosby Company, 1926, vol 2, pp. 676-677.
[5] M J Trenouth and S Gelbier, Classification and measurement of malocclusion in the 19th century, *Dental Historian* 2008; 47: 4-16.
[6] Weinberger, op. cit., fn. 4 above, p. 1000.
[7] E H Angle, Classification of malocclusion, *Dent Cos* 1899; 41: 248-264, 350-357.

described their first meeting.[8] Angle was looking for a formula to follow to produce an ideal. Wuerple explained what was "noble and splendid" to the classical Greeks was not necessarily so for other racial groups. In the Seventh Edition of his book Angle asserted that:

The study of orthodontia is indissolubly connected with that of art as related to the human face ... the mouth is a most potent factor in making or marring the beauty and character of the face, and the form and beauty of the mouth largely depend on the occlusal relations of the teeth...we should be able to detect whether the features of each individual ... [are] in harmonious relations with other features, and if not, what is necessary to establish its balance.[9]

Non-extraction *versus* extraction

Speaking in 1902, at the 2nd meeting of the American Society of Orthodontists, Angle said he did not believe heredity would produce teeth too large to be accommodated in the alveolus and consequently he saw no need for extraction to create space for alignment. He declared the most satisfactory results could only be obtained by retaining all the teeth and putting them in their proper occlusal relations and harmonising them with all the other features of the face.[10] Angle went on to demonstrate his opinion with illustrated cases in which teeth were moved forward or brought back into favourable positions. Controversy over the need for extractions was not new but his talk inflamed the situation. Angle used Wolff's law to justify that bone could be grown around teeth even if they were moved off their bony bases. He then thought proper function would follow correction and in turn maintain stability.[11] Once again a can of worms had been opened and this culminated at a meeting of the National Dental Association in 1911.[12] Wahl described the ensuing debate as a precursor of the Scopes trial in 1925.[13] One side, that for extraction, relied on Darwin's theory of evolution; and their opponents argued for special creation.[14] He goes on to say that Angle's supporters won the day and held sway for the next thirty years. In another paper Wahl says Angle's

[8] H E Wuerple, The lengthening shadow of man, *Angle Ortho* 1947; 17: 3-9.
[9] E H Angle, *Malocclusion of the teeth*, SS White Mfg Co: Philadelphia, 7th ed, 1907, p. 60.
[10] E H Angle, Art in relation to orthodontia, *Dental Items of Interest*, 1903; 25: 646-658.
[10] E H Angle, Bone-growing, *Dent Cos* 1910; 52: 261-267.
[12] C S Case, The question of extraction in orthodontia, Dent Cos 1911; 53: 276-284.
[13] In 1925 John Thomas Scopes, a biology teacher in Dayton, Tennessee, was arrested for violating an act of the state legislature which prohibited the teaching of evolution in schools. The jury found Scopes guilty and the judge fined him $100.
[14] N Wahl, Orthodontics in 3 millennia: More early 20th century appliances and the extraction controversy, *Am J Orthod Dentofacial Orthop*, 2005; 128: 795-800.

adherence to non-extraction was perhaps not as absolute as he would want his followers to believe.[15]

Specialisation

In America there had already been talk of specialisation in the 1890s, and Angle himself specialised exclusively in orthodontics after 1892.[16] This trend was intensified following a paper given by Angle in 1902.[17] He asked: "Shall orthodontia be divorced from the general practice of dentistry?" He went on to explain the field of dentistry had become so large that it was impossible to be proficient in everything. He said: "Michael Angelos are few, and the all-round dental expert now lives only in history." He claimed the dental curriculum was too full and orthodontics was squeezed out. Most students were only interested in acquiring skills in operative dentistry: most would not even have heard of orthodontics before starting their training. His final argument was that the majority of students would not have the ability or aptitude ever to become proficient at orthodontics. The suggested remedy was to teach and practice it as a specialty. Furthermore he thought no prior training in general dentistry was necessary.

Angle concluded his paper by remarking that in Europe there were thousands of the most wealthy and cultured people in the world, willing and anxious for the best, but not a single specialist orthodontist existed. "Think of Chicago, with two specialists to two millions of people ... every city of 20,000 inhabitants should have at least one able specialist profitably occupied."

Training

Having become the first dentist to exclusively practise orthodontics the next logical task was to consider their training. This was addressed when, at the 1899 meeting of the National Dental Association he was approached by four dentists who requested that he train them privately.[18] He agreed and they attended his practice for an intensive three weeks instruction. In the following year the original four returned plus an additional seven, to spend five weeks in his practice in St Louis. This was the first Angle's School. Courses continued annually and increased in length until, by 1911, they lasted for nine weeks. In addition to technical instruction and clinical management visiting staff lectured on a variety of subjects. Weuple discussed facial aesthetics. In addition comparative anatomy, histology, ear, nose and throat diseases and palaeontology were just some of the topics offered. Previous course members returned and assisted in the tuition. There were intermediate quizzes to keep the candidates up to scratch. For their final examination they

[15] N Wahl, The last graduate, *Pacific Coast Society of Orthodontists Bulletin* 1988: 60; 37-42.
[16] H Chapman, Orthodontics: fifty years in retrospect. *Trans British Society for the Study of Orthodontics* 1954; 40: 100-116.
[17] E H Angle, Orthodontia as a speciality, *Dent Cos* 1902; 44: 905-910.
[18] B W Weinberger, The Angle School of Orthodontia, *Angle Orthod* 1949; 35: 298-308.

had to achieve 80% of the marks to graduate. By 1914 Angle thought he had made the case for both specialist practice and tuition. Coupled with ill health he decided to discontinue his courses and move to California.

Shortly after his move to California he again received an appeal for training. It led, in 1917, to a second phase of teaching known as the Angle College of Orthodontia.[19] Initially only small numbers came, but in 1922 his former graduates donated funds to build and equip a facility enabling a larger number of students to attend. In 1924 a charter was granted by the State of California recognising the E H Angle College of Orthodontia. Classes continued until 1927 when, once again, Angle's poor health forced closure.

The graduates of the 1900 class, together with a carefully selected few others, combined to form the world's first orthodontic society, the Society of Orthodontists. Angle was its first president. In 1901 the name was changed to the American Society of Orthodontists. Its deliberations were published as *Transactions*. In 1905 there was a split and Angle and many of his graduates left the society to form their own alumnus. The remaining members eventually formed what is now the American Association of Orthodontists. For a short while their journal was the *American Orthodontist*. In 1931 graduates of Angle published the *Angle Orthodontist*.

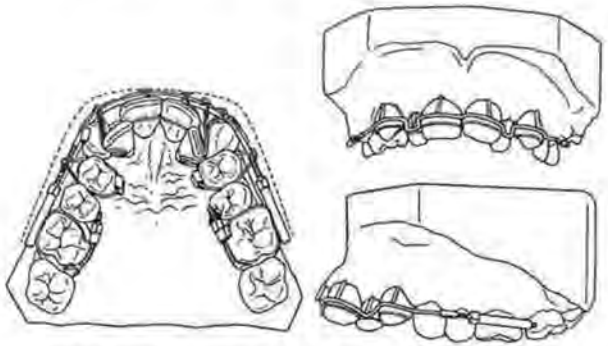
Appliances

Inevitably an orthodontist is judged on his ability to move teeth; Angle's skills developed well beyond the design and construction of the horse rakes of his childhood as he turned his attention to the construction of orthodontic appliances. In a series of papers and successive editions of his 'Angle's System of Regulation and Retention of the Teeth', throughout the 1890s, he refined and introduced components to make what became known as Angle's E-arch (the E standing for expansion).[20] Many of the features of this system are illustrated in Figure 1. First molars carry 'clamp bands' which proved very retentive when the screw device on the palatal side was tightened. The buccal surfaces of the bands bore sleeves, which carried quite heavy gauge wire arches. The distal ends of the arches were threaded and a nut placed where the arches entered the sleeves could be turned to produce anterior expansion. The arch could also be expanded laterally as indicated by the dotted line in the diagram. Individual tooth movements were achieved by tying the teeth to the buccal arch by ligatures. Angle replaced ineffective thread and elastic ligatures with fine annealed brass wires. He also described a method of making bands, from tape, to fit other teeth. Angle soldered attachments to these bands allowing the ligatures to be secured and enabling the displaced teeth to be brought into line. Although the E-arch appliance was an improvement the teeth were still moved by a tipping rather than bodily movement and tooth inclination was not controlled.

[19] G W Hahn, Edward Hartley Angle (1855-1930), *Am J Orthod* 1965; 51: 529-535.
[20] E H Angle, Orthodontia – new combinations of well-known forms of appliances, *Dent Cos* 1899; 41: 836-841.

In an attempt to obtain greater control of tooth Angle introduced his 'Pin and Tube' appliance.[21] The anterior teeth were banded and a vertical tube was soldered to the labial surface (Fig 2). A round wire labial arch was closely adapted to the outside contours or the dentition and a small pin was accurately soldered to this arch coinciding with each vertical tube so it could be slotted in. Gradually ironing-out the irregularity in the basic arch shape and then inserting the pin in the tube effected tooth movement with it now being possible to move root tip or crown either mesially or distally or buccally or palatally. The pins could also be individually adjusted to refine movement. Only small adjustments were possible but very high forces were generated unless careful. The appliance was effective but demanded great skill in both its construction and manipulation.

Figure 1 Angle's E-arch appliance Figure 2 Pin and tube appliance



In Angle's previous appliances round arch wires were used but he discovered that if such a wire was flattened to resemble a ribbon it became more flexible in one plane. This increased flexibility meant the wire could be more easily attached to displaced teeth, it would deliver lighter forces over longer distances and was much easier to manage. The previously used vertical tubes were modified as shown in Figure 3, the wire now being slotted into the bracket and retained by a special brass pin. Angle called it the Ribbon Arch appliance.[22]

In a series of papers, starting in 1928, Angle published under the title 'The latest and best in orthodontic mechanism' details of his next appliance.[23] He simply took the flattened wire formerly developed for the Ribbon Arch, turned it through 90 degrees and slotted it into a new bracket with a labially opening slot, hence its name the Edgewise system The arch wire was securely held in

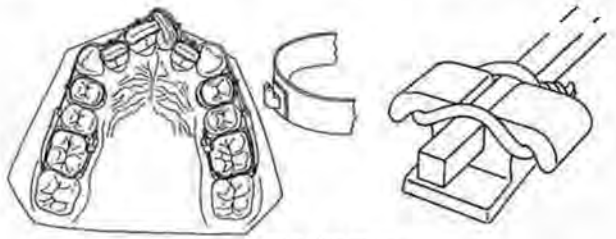
[21] E H Angle, Evolution of Orthodontia – recent developments, *Dent Cos* 1912; 54: 853- 867.

[22] E H Angle, Some new forms of orthodontic mechanism, and the reason for their introduction, *Dent Cos* 1916; 58: 969-994.

[23] E H Angle, The latest and best in orthodontic mechanism, *Dent Cos* 1928; 70: 1143-1158; 1929; 71: 164-174, 260-270, 407-421.

place by a stainless steel ligature (Fig 4). In the final stages of treatment the wire completely filled the slot. When horizontal and vertical bends, together with twist (torque), were placed in the wire a much improved control of tooth movement was achieved.

Figure 3 The ribbon arch appliance Figure 4 Edgewise bracket system



Angle the man

The above account clearly demonstrates Angle had a finger in all the orthodontic pies; he is surely worthy of his sobriquet ' father of orthodontics'. However it is difficult from the literature to establish much about his character. He seems to have had the ability to engender either staunch admiration, in some cases idolatry, or fierce antagonism. Several images of Angle are available. In Figure 5, the usual picture shown of him, he looks stern and foreboding. However Figure 6 shows a more relaxed Angle, this time accompanied by his wife, Anna Hopkins Angle. The latter, formerly his secretary, qualified as a dentist at Iowa University and was then trained in orthodontics by her husband. She took part in the instruction at the Angle Schools and spoke at orthodontic meetings. She was known affectionately by the students as 'Mother Angle'.

A British perspective.

The 6th International Medical Congress staged in London in 1881, for the first time included a Dental Section. It attracted speakers on orthodontics from both sides of the Atlantic and kindled British interest. The turn of the 20th century was an active period in the development of orthodontics in North America and Europe. Mention was made above of the 9th International Medical Congress, held in 1887 in Washington D C. In the same year the Annual General Meeting of the British Dental Association in Dublin attracted several orthodontists, including Angle.[24]

[24] E H Angle, An apparatus for correcting irregularities in position of the teeth. *Br Dent Assoc J* 1887; 18: 625.

Figure 5 Edward Hartley Angle

Figure 6 Edward and Anna Hopkins Angle

The *Index of Dental Periodical Literature* for the decades before and after the start of the 20th century reveals the number of pages listing topics classified as orthodontia grew from twenty three to thirty nine between 1890 and 1910.[25] In 1896, Ottolengui, then editor of the dental periodical *Items of Interest,* (the word *Dental* was not incorporated into the title until much later), and himself a very active orthodontist, instituted a special orthodontic section in his journal which became the forerunner of specialist journals. In the United Kingdom, the *British Dental Association Journal*, (renamed the *British Dental Journal* in 1903), the *British Journal of Dental Science* and the *Dental Record* regularly carried orthodontic papers. Orthodontic topics were also discussed regularly at meetings and there is every reason to believe that many British practitioners were abreast of orthodontic developments on both sides of the Atlantic.

The first session of the Angle's School was held in 1900 and its success must have quickly come to the attention of British dentists. Leighton, in his paper dealing with the history of the British Society for the Study of Orthodontics, lists both Chapman and Lockett as having attended the Angle School in 1905.[26] Visick attended in 1906 and Friel in 1909. Visick's name is not given in the list of Angle graduates in Weinberger's 1949 paper: Trenouth quotes Graber's explanation that Visick was thrown out for questioning Angle.[27] -Chapman and Friel became presidents of the BSSO and Lockett and Visick were secretary and treasurer respectively. A further graduate of the Angle School was David Fyffe (1911) from Glasgow who, although he

[25] *Indices of periodical dental literature*, London: Henry Kimpton, 1891-1910.
[26] B C Leighton, The British Society for the Study of Orthodontics, *Br Dent J* 1968; 124: 425-428.
[27] M J Trenouth, Book Review, *Dent Hist* 2006; 43: 75-79.

obtained many additional qualifications, does not appear to have had a continuing interest in orthodontics.

Knowledge of the turbulent state of orthodontic affairs in America at the turn of the century, could be gleaned both from comments in the orthodontic literature and the personal experiences of those who had gone there. Controversy, in particular, surrounded Angle and the exclusive formation of the American Society of Orthodontists in 1900. This was the background for the desire to establish, what could be described as a 'broad church', when the British Society for the Study of Orthodontics was founded in 1907.[28] This objective was illustrated by appeals contained in the early presidential addresses of Badcock, Sim Wallace and Rushton. [29] Badcock was critical of the strict adherence to the need for an occlusion consisting of a full complement of teeth and the rigid opposition to any idea of extracting teeth to facilitate tooth alignment. He took exception to the charge "that anyone extracting a tooth for purposes of regulation ...was guilty of malpractice and a criminal". Wallace spoke about "the curse of specialism" and argued that specialisation 'confined its practitioners into a narrow rut, distorted their sense of proportion and limited the large and liberal outlook which should be a characteristic of a learned profession". Rushton had similar criticism of Angle's work.

At a meeting to discuss proposed rules for the BSSO the interesting proposition was made that no member should have any interest in any patents relating to the requirements of dental practice.[30] The background to this suggestion arose because in the United States several orthodontists had described mechanisms for the correction of malocclusion, and then tried to protect their commercial interests. Angle is reputed to have held thirty-seven patents.[31] One speaker thought this proposition was rather sweeping, and would have an inhibiting effect upon future developments in dentistry. It was generally felt the proposal was acceptable and the rule was confirmed. This rule was eventually invoked and secured the resignation of a Society member.[32]

The first significant occasion when Angle and his work were discussed at a meeting of the BSSO was in 1912, in a paper by Friel on Angle's

[28] G S Taylor and M Nicolson, The emergence of orthodontics as a specialty in Britain: The role of the British Society of Orthodontics, *Med Hist* 2007; 51: 379-398
[29] J H Badcock, Presidential address - The study of orthodontia, *Trans BSSO* 1908; 1: 1-5; Sim Wallace J. Presidential address - Specialism in relation to the study of orthodontics, *Trans BSSO* 1910; 3: 2-6; W Rushton, Presidential address, *Trans BSSO* 1911; 4: 2-4.
[30] Editorial. Reports of societies: the BSSO, *Br Dent J* 1907; 28: 1339-1340.
[31] N Wahl, Orthodontics in three millennia - Entering the modern era, *Am J Orthod and Dento Fac Orthopaed* 2005; 127: 510-515.
[32] G S Taylor, *A review of the transactions of the British Society for the Study of orthodontics 1907-1971,* Unpublished DDS Thesis, University Glasgow 2004, p. 223.

Classification.[33] Friel's opening sentence conveyed his apprehension: "In reading the papers dealing with orthodontics published in the different English journals, the extent to which Angle's Classification is mutilated is remarkable." Friel said he was prompted to give his paper because sometime previously the BSSO had set up a working party to consider orthodontic classification. Anticipating a new classification Friel thought such an idea would be regrettable. He believed Angle's classification, "if intelligently understood, meets all the requirements ... and is used all over the civilised world".

Discussion of Friel's paper was postponed until discussion of the report of the committee on classification.[34] Predictably the BSSO report was critical of Angle. Sim Wallace opened with a resounding attack on Angle's classification; he was critical of all aspects. Details of Wallace's own recommendations for a classification were published later in the first volume of the *International Journal of Orthodontia*.[35] The author of this paper has come to the conclusion that Friel and Sim Wallace were somewhat irascible, and perhaps not unlike Angle himself in temperament.

Friel, in 1914, gave a paper on Angle's new appliance, the Pin and Tube.[36] This was well received, as judged from the discussion. Even if the appliance was not fully accepted, the idea, at least, lent itself to modification by British orthodontists and was still in use until comparatively recently.[37]

In a paper titled 'Orthodontics and common sense', Rushton considered the concepts of the so-called American School of Orthodontics, but by this he really meant the teaching of Angle.[38] Rushton took the view, expressed earlier by Bennett, that the jaws of man were becoming smaller and are no longer, in every case, capable of accommodating the full complement of thirty-two teeth. Rushton clearly saw extractions as inevitable in some cases and this flew in the face of Angle's teaching. Rushton also pointed out the iatrogenic damage that could arise from the prolonged use of complicated fixed appliances. He argued the prime function of the teeth was for mastication and pointed out that it could be efficiently carried out with far less than the full complement. Likewise he said facial aesthetics did not depend upon the ideal occlusion of the teeth, all being contradictions of Angle's teaching.

Rushton, in 1932, nearly twenty years after his first paper attacking the New Orthodontics, took up the cudgels once again in a paper called 'Is Dr Angle's teaching sound?'[39] Rushton stated his belief that as long as Angle's book was regarded as the standard text and he continued to view extraction in

[33] S Friel, Angle's Classification, *Trans BSSO* 1912; 5: 15-19.
[34] N G Bennett, Report of the committee on orthodontic classification, *Trans BSSO* 1912; 5: 22-32.
[35] J S Wallace, A short note, Classification, *Intl J Ortho* 1915; 1: 126-132.
[36] S Friel, Angle's new appliance. Some points in construction, *Trans BSSO* 1914; 7: 46-47.
[37] H Chapman, Uses for vertical tube in minor tooth movements, *Trans BSSO* 1915; 8: 7-11.
[38] W. Rushton, Orthodontics and common sense, *Trans BSSO* 1926; 15: 109-125.
[39] W Rushton, Is Dr. Angle's teaching sound? *Trans BSSO* 1932; 21: 28-37.

all cases as a criminal offence, then his teaching could be considered as unsound. Rushton, apparently, failed to take into consideration a succession of orthodontic texts published by other orthodontists since the last edition of Angle's book in 1907, and Angle's extremely dogmatic views were no longer so rigorously held even in North America. In the concluding paragraphs of his article Rushton praised a more pragmatic approach, calling for further simplification in treatment and intimating that this approach was superior to that of Angle.

On 6 October 1930 the Council Minutes briefly recorded the death of Angle. They stated: "Council is undecided as to whom a letter of condolence should be sent" so took no further action. Speaking at the General Meeting later that same day the president, H E Marsh, referred to the "great loss, which the world of orthodontics had just sustained". He promised that at a future meeting he would make further reference to the occasion. The members then upstood *[sic]* on hearing the announcement of the death.

In his later, 'President's appreciation of E H Angle' Marsh paid tribute to his work and worldwide recognition. His following paragraph is particularly relevant to the BSSO:

It may be that the very foundation of our own Society, twenty-two years ago, arose from the interest aroused by his early work, characterised as it was by strong conviction and dogmatic statement such as to arouse in the minds of others the desire to examine his assertions and to test his appliances for themselves. [40]

During Marsh's Presidential Address in January 1930 he made the first British reference to Angle's recent papers introducing the Edgewise technique.[41] Recalling the opinion of his former teacher, Montagu Hopson, that the simplest method was frequently the best method, he went on to say about the Edgewise technique:

[It] may be capable of producing the results, but at the same time it seems to me to be out of accord with the principle of orthodontic treatment, that appliances should be instruments to assist natural development of growing tissues, or to impede developing deformities, rather than engines of great force which either translate teeth bodily and in large numbers from A to B or else lock them immobile in the grip of a bracket band.

He was obviously not impressed by what he had read in Angle's papers. It is likely that even the wording of the title 'The latest and best ...' would irritate British readers.

During the course of a world tour, Thornton Taylor, a respected orthodontist from Sydney, spent time in England and read a paper to the BSSO in 1934.[42] In his talk on 'The last teaching phase of Edward Angle' he

[40] H E Marsh, Appreciation of Dr E H Angle, *Trans BSSO* 1930; 19: 75-76.
[41] H E Marsh, Orthodontics in general practice, *Trans BSSO* 1930; 19: 1-9; Angle, op.cit., fn, 22, p. 70.
[42] T A Taylor, The last teaching phase of Edward H Angle, *Trans BSSO* 1934; 23: 105-107.

claimed to have been impressed by the British interest in overseas orthodontic activity, particularly in relation to Edward Angle. He explained he had attended Angle's last course, held in Pasadena, California, in 1927, just prior to the publication of Angle's papers on the edgewise mechanism. Taylor went on to say he had:

Been interested, though dismayed, at the amount of misconception that existed concerning the life and work of Dr Angle, particularly concerning his activities in the later and perhaps most productive years of his life.

Taylor provided a sympathetic and fascinating account of Angle's School. By the time he attended, the course had been extended to a whole year. Taylor remarked on the enthusiasm, lack of commercialism, discipline and perfectionism he found there. Before acceptance applicants underwent vigorous testing and examination. They paid no fees which strengthened Angle's hand in the selection of his students. Likewise the patients under treatment paid no fees, the costs being borne by the students themselves. They even carried out the cleaning and other chores. The visiting lecturers were all former Angle students, working gratuitously. Angle and his helpers were patient teachers, prepared to spend unlimited time instructing their students. The lack of commercialism was in stark contrast to some of the other postgraduate schools currently then operating in the USA. Usually six students were accepted, but at this last course only four attended.

Taylor's paper was short, but his final paragraphs indicated he had been deeply surprised by the adverse views expressed about Angle by some of the orthodontists he met whilst in Britain.

In a joint paper given by Chapman and Marsh on 'Failures in orthodontic practice', Chapman's submission announced the failures he intended to talk about were in cases where arch expansion had taken place. [43] He launched into the now familiar refrain 'Angle taught every case of malocclusion should be made normal, etc ...', but his arguments are based on Angle's opinions, once again, expressed in 1907 and appear to take little or no account of any changes occurring since.

Marsh, speaking in 1946, recalled how the pendulum swings and fashions change, even in the field of orthodontics.[44] The great extraction debate is an example. Both sides take extreme views, but invariably the answer lies somewhere between. Followers of Angle were easily identified in the extraction debate and Marsh gave Angle's followers the appellation, the 'Complete Anglers'.

McKeag's 1946 BSSO presidential address chose to look back on orthodontics throughout his career.[45] Angle had already achieved a position of domination by the time McKeag entered orthodontics. He selected the usual quotations from the 7th edition as evidence of disagreement. Whereas

[43] H Chapman and L R Marsh, Failures in orthodontic practice, *Trans BSSO* 1937; 26: 84-103.

[44] L R Marsh, Orthodontics and common sense: Part 2, *Trans BSSO* 1946; 2: 49-74.

[45] H T A McKeag, Orthodontics in my time, *Trans BSSO* 1950; 36: 13-18.

other denigrators cited no factual evidence in their attacks McKeag did, at least, describe the work of Lundstrom, himself a former product of the Angle School, who emphasised instability following expansion.[46] Similarly the work of Brash was cited in the *Transactions*, to refute the theory of an environmental explanation as a cause of malocclusion.

Prior to the cessation of hostilities in 1945, planning was already under way for the new national health service, and this included orthodontics. Two reports were commissioned by the BSSO, one published in 1942 and an expanded version of 1944.[47] The reports were not unanimous which provoked further discussion. Angle was adamant that only those who had undergone specialist training and whose practice was limited to orthodontics should carry out orthodontic treatment. He found a strong supporter in Britain's Sheldon Friel. The latter, one of the signatories of the Majority Report, spoke out strongly for his views in the discussion after the reports were read at the BSSO and also in a paper published the *British Dental Journal*.[48] He called for a raising of orthodontic standards to the level expected in the United States of America stating that the standard of treatment in Britain was deplorable. He was of the opinion that the vast majority of treatment currently undertaken was by, at the best, "skilled amateurs", and attempts to expand treatment without the introduction of proper training programmes would only prolong this "amateurism". He pointed out there were only eight specialists in Britain in exclusive orthodontic practice: six in England and two in Ireland. They had either trained abroad or had been trained by orthodontists in their private practices. He stated the current number of specialists in the United States, for 1939, to be in excess of one thousand. Friel was scathing about attempts to provide a compromise service. He went on to say the idea "it is better than nothing" was an apology; and the opinion, 'it is better to do something for many than the best for a few", severely limited our ideals. That type of attitude, he claimed, led to no progress.

Hovell, in a paper in 1956, reiterated once again the accusation of dogmatic teaching and the need to produce an ideal occlusion in every treated case laying the blame at Angle's feet.[49]

In 1957 Halden read the first ever paper describing experiences using the Edgewise technique.[50] Of particular interest is his description of how he made

[46] A F Lundstrom, Malocclusion regarded as a problem in connection with the apical base, *Int J Ortho Oral Surg* 1925; 6: 591-602; A F Lundstrom, The responsibility of the operator for relapses after orthodontic treatment executed in full accord with the directions of leading authorities, *Trans BSSO* 1927; 16: 65-80.

[47] Report of the special committee on orthodontic treatment of elementary school children and postgraduate orthodontic teaching (with comments) and undergraduate education in orthodontics, *Trans BSSO* 1942-43; 30: 114-133; Report of the Special Committee appointed by the Council of the Society to consider the orthodontic treatment of elementary school children and postgraduate orthodontic teaching, *Trans BSSO* 1944-45; 31: 28-34.

[48] S Friel, Postgraduate school for the training of orthodontists, *Br Dent J* 1945; 79: 157-160.

[49] J H Hovell, The new look in orthodontics, *Trans BSSO* 1956; 42: 15-22.

many of the components himself from stainless steel strips, because due to post-war restrictions, they were not available. Ballard, in the subsequent discussion, made his assertion that the Edgewise appliance was so complicated and time-consuming, that it was unsuitable, for use in Britain, on the grounds of economy.

Ballard, in 1952, described his recent trip to North America. He considered Tweed to be the "greatest contemporary clinical orthodontist".[51] By supporting Tweed he committed himself to the view that extraction was inevitable in many cases, an idea he was to reiterate some years later.[52] Ballard then said:

The majority of Class II Division 1 malocclusions would probably fit into the category of being easy to treat with simple removable appliances; however, the more extreme, but fewer, cases, ... would undoubtedly require multi-band techniques. There is an increasing interest in this country in such techniques, one hopes, because, in fact, they are essential for the treatment of certain types of cases. In my view it would be disastrous for the future of the service in this country if the fashion became the exclusive use of multi-band appliances, because such change would most probably be related to the philosophies current at the moment in which genetic individuality is almost completely ignored. The main aim of such philosophies being the elaboration of techniques so that every individual can be reduced to a subjectively assessed norm,... it is my view that many people who have had such treatment, either by orthodontics, oral rehabilitation, or prosthetics, have poor facial aesthetics because the 'normal occlusion' does not fit the resting position and expressive behaviour of the soft tissues,... Opponents of social services would probably criticise this as compromise treatment necessitated by our health service. Such criticism is almost as ridiculous as the assumption that all individuals outside two standard deviations from the mean for height are pathological and should be treated. I think we can say that we are looking at the problem biologically and ignore such criticisms. However, we shall not be able to ignore criticisms if we allow our health service to force compromise treatments on us because multi-band techniques are too time-consuming even when required, and therefore it is essential for the future of the service that all graduate teaching includes instruction in techniques which permit complete control of tooth position as required by genetic individuality.

[50] J R Halden, Reports on the edgewise appliance, *Trans BSSO* 1957; 43: 28-39.

[51] C F Ballard, Recent work in North America as it effects diagnosis and treatment, *Trans BSSO* 1952; 38: 75-96. Charles Tweed, a graduate of Angle's carefully followed his teaching but when faced with many relapses after treatment recognised the case for extraction. He ran courses, similar to Angle, at his practice in Arizona and the present author was a student there in 1975.

[52] C F Ballard, The morphological basis of prognosis and treatment planning, *Trans BSSO* 1966/67; 53: 28-39.

Ballard, as head of the largest postgraduate orthodontic training programme in the UK at the Eastman Dental Hospital with many political contacts, occupied a very influential position in British orthodontics. The fact that many of his former trainees held positions in other orthodontic training centres meant his views, even if not completely supported, were widely expressed and must indicate why there was such a delay in the acceptance of techniques that had been available elsewhere for so long.

Two visiting American orthodontists, Moyers and Brodie, made substantial references to Angle in their papers published in the *Transactions* in 1964.[53] Moyers, by no means a dogmatist when it came to extracting teeth, recognised Angle's great contributions. Brodie, himself a former student of Angle and director of the Angle College of Orthodontia at the University of Illinois, admitted he had initially stuck to the rigid non-extraction philosophy, but in the light of his own experience, coupled with Lundstrom's work, came to revise Angle's original teaching.

Conclusion.

George Hahn wrote: "To Angle there were no greys in orthodontia; almost everything pertaining to it was black or white ... there was 'only one best way' and anything less was unforgivable."[54] It was no surprise that such an uncompromising individual should antagonise so many people and this reputation dwarfed his many achievements. He, nevertheless, pioneered specialisation, teaching, described a lasting classification, formed the first specialist journal, devised an effective treatment mechanism and had a society named after him. In the face of all these achievements he made little impact here. Orthodontics seemed comparable in Britain and the USA at the turn of the 20th century; why by mid-century did we seem so far behind? There must surely have been a small group of patients who could have afforded the fees for such complicated treatment and this would have encouraged orthodontists to master the techniques. Were they all just not interested or was the desire, to do a little for many rather than ideal treatment for a few, the reason? In the period of austerity immediately after World War II travel was difficult and the special supplies hard to get. Ballard, and many others still saw no reason for the British to follow the Americans. Scandinavian orthodontics progressed dramatically in this period and multi-band treatment became widespread. In 1949 Adams described his eponymous clasp.[55] It proved so effective in retaining removable appliances that we shouldered on for another twenty years with a form of 'camouflage' orthodontics.

[53] R E Moyers, An American view of removable appliances, *Trans BSSO* 1964; 50: 43-48; A G Brodie, Muscles, growth and apical base, *Trans BSSO* 1964; 50: 131-145.

[54] Hahn, op. cit., fn.18, p. 529.

[55] C P Adams, A modified arrow-head clasp, *Trans BSSO* 1949; 35: 50-51.

An homage to the first African-American dentists

Xavier Riaud*

Historical context

On 9 April 1865 the American Civil War ended, slavery was abolished and African-Americans were afforded civil rights. They were free, but their situation was extremely precarious. In the south, xenophobic sentiment manifested against them in the form of significant acts of violence. In the north, society was so disinterested in their cause that they encountered great trouble accessing voting booths. There was a lurking undercurrent of racism, evident by the army who continued to propagate discrimination that ostracized and marginalized men of colour.[1] These men had become free but were not free to find work which was refused to them, or to seek shelter outside of the unsanitary housing conditions they were forced to live in because they could not afford to move into decent accommodation. Some of them came to regret their new-found freedom[2] but even in such a terrible context others achieved greatness despite their grim situation. Thanks to their courage, willpower, perseverance and self-sacrifice, despite the adversity they encountered they managed to embark on remarkable careers. The stories of three of these men who became dentists are related here.

Robert Tanner Freeman (1846-1873)

Robert T Freeman was an African-American born in Washington DC, the son of a slave family. As a young man he was hired as an employee by a local dentist, Dr Henry Bliss Noble. Freeman rose to be his dental assistant, after which Noble encouraged him to pursue a career in dentistry to help alleviate the suffering of his co-religionists. After several attempts to enter two dental schools to pursue his studies Freeman went to Boston to ask for a meeting with the dean, Nathan Cooley Keep (1800-1875).[3] On Keep's recommendation Harvard University decided colour should not be a barrier for the admission of a student. Freeman was accepted in 1867at the age of 22 years as one of sixteen students in the first class of a new dental school at

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1 John Hyson Jr, *African-American Dental Surgeons and the U.S. Army Dental Corps: a struggle for acceptance*, 1901-1919, Office of the chief of the U.S. Army Dental Corps, Virginia, date unknown.

2 Andre Kaspi, *La guerre de Secession, Les Etats desunis* [The Civil War, the Disunited States], Découvertes Gallimard (ed.) Paris, 1992

3 Http://www.countaway.harvard.edu, Harvard Medical School, Boston, personal communication, 2006.

Harvard, the fifth school listed in the territory.[4]

Freeman gained his diploma in 1869[5] to become the first African American to graduate from a dental school.[6] With his Doctorate in Dental Surgery in hand, he returned to Washington to open his own dental office in the same building as his mentor. Robert Tanner Freeman died four years later, at the age of 28 years.[7]

George Franklin Grant (1846-1910)

George F Grant (Fig 1) was born on 15 September 1846 in Oswego, New York. His parents were former slaves. At the age of 15 years a local dentist, Dr Albert Smith, engaged his services as a delivery boy. He quickly became a laboratory assistant and Smith encouraged him to pursue a career as a dentist. Grant entered the Harvard Dental School in 1868 and graduated in 1870.

In 1871 Grant became the first African American to teach at the Harvard school. He spent 19 years there, specializing in the treatment of cleft palates. His first patient was 14-years-old. In 1889 he treated around 115 cases. Grant patented a 'shortened palate', a prosthetic device which allowed patients to talk much more easily. He was the founder and president of the Dental Society of Harvard; and a member of the Student Association of the Harvard Dental School, being elected president in 1881. A passionate golfer, he patented[8] a tee carved from wood and covered in gutta-percha. George Franklin Grant died in 1910 from a liver disease.[9]

William Thomas Jefferson (1864-1925)

William T Jefferson was born in Washington DC in 1864. In 1886 he began his dental studies under the direction of Dr Frederick B Mill in Bermingham, Connecticut. In autumn 1889 Jefferson entered the dental department of Howard University in Washington DC. However, in March 1890

4 Xavier Riaud, *L'influence des dentistes Americains pendant la Guerre de Sécession (1861-1865)* [The influence of dentists during the Civil War (1861-1865)], L'Harmattan (ed.) Collection Médecine à travers les siècles [Medicine throughout history Collection], Paris, 2006. There is the Baltimore College of Dental Surgery founded in 1839, that of Ohio in Cincinnati founded in 1846, and that of Pennsylvania in Philadelphia opened in 1853 and finally, the Dental College of Philadelphia founded in 1864

5 Http://www.answers.com, *Nathan Cooley Keep*, 2006, pp. 1-2.

6 Xavier Riaud, *Les dentistes, détectives de l'Histoire* [The dental detectives of history], L'Harmattan (ed.), Collection Médecine à travers les siècles [Medicine throughout history Collection], Paris, 2007.

7 Chris Ott, "Freeman, Robert Tanner (1846-1873)", in http://www.ada.org, 2007-2008, p.1

8 US Patent 638, 920, 12December 1899.

9 Chris Ott, "Grant, George Franklin (1847-1910)", in http://www.ada.org, 2007-2008, p.1.

he requested a transfer to the dental school in Chicago where he earned his diploma on 24 March 1891. He then settled in Chicago. After joining the Knights of Pythias[10] he became a member of D company of the 9th Battalion on 1 April 1895. In May he was unanimously elected 2nd lieutenant, becoming a full lieutenant on 4 November. During the American-Hispanic war, which broke out in 1898, Jefferson was promoted to captain of the D Company on 21 July. Unfortunately, two months later he contracted malaria and was hospitalized.[11] However he continued to serve with his regiment in Cuba, then in San Luis in February 1899.

Figure 1 George Franklin Grant in 1870[12]

In addition to his duties as a line officer Jefferson occupied himself with the dental hygiene of the men of his regiment. He wrote of his experience during the war: "During my service, I realized the necessity for a dentist and gave my services to the hospital for officers and soldiers of the 8th Illinois regiment, the 23rd Kansas and the 9th Louisiana." Jefferson was probably the first black dentist to practise dentistry in the American army. He was discharged from his regiment in Chicago on 3 April 1899. Jefferson continued his military career with the Illinois National Guard until 1916 and was named inspector of training for light infantry in the rank of Lieutenant.[13]

On 3 September 1899 Jefferson returned to his dental surgery on State Street, Chicago, where the sign on the read "Golden crown and bridge specialist". He tried very hard to contact members of government at the time

10 The Knights of Pythias is a fraternal society with the same function as the Masons. It has rituals, codes and organizes ceremonies of a religious vocation. Louis Armstrong was one notable member.

11 Hyson, op cit., fn. 1.

12 *George Franklin Grant, Harvard student annual,* Http://en.wikipedia.org, *2009, p.1.*

13 Hyson, op cit., fn. 1.

to create a regiment for coloured men, but without success. William Thomas Jefferson died in Chicago on 26 October 1925.[14]

Epilogue

Following the American-Hispanic war (1898), in the light of the gravity of dental problems encountered by the soldiers, a decree was announced on 11 February 1901. It made Dr John Sayre Marshall a superior officer and the first dentist under contract in the American army. On 20 April 1906 Dr Leonie von Meusebach-Zasch became the first female dentist to work for the army. However, it was not until 3 March 1911 that a Dental Corps was officially established in the American army.[15]

If Jefferson was not in fact *the* first black dentist to practise dentistry in the American army, he was certainly among the first few, well before the 1901 statute that officially sanctioned dentists within the army.

With the election of Barack Obama there was worldwide applause that American society had evolved and seemed to have changed. Although praiseworthy this evolution over two centuries has been long and progressive. It was only possible thanks to the self-sacrifice, courage and perseverance of people like these three dentists, despite facing adversity at every turn. An *homage* to their memory is, therefore, undeniable.

14 Hyson, op cit., fn. 1.

15 John E King, *Highlights in the History of the US Army Dentistry,* Virginia: Office of the chief of the US Army Dental Corps, 2002.

PAINTED FACES*

John Davenport+

The author as painter

Figure 1 Portrait of author by his mother

My special interest in portraiture sneaked up on me quite suddenly when I retired from a career in restorative dentistry about ten years ago. In my more introspective moments I have wondered what triggered this sudden change of direction. A couple of possibilities occurred to me. It could have been a bit of nature and nurture as I came from an artistic family. Both my parents were artists. Figure 1 shows a watercolour sketch by my mother of a young me. My father who was a lecturer at Norwich Art School forbad me to follow in his footsteps and so was a significant influence on my choice of dentistry as a career. It could also have been because of transferrable skills that I had acquired over many years of practising prosthodontics which are equally useful when doing portraits. For example, the Willis Bite Gauge, so helpful for measuring the facial proportions of edentulous patients, is equally useful for measuring facial proportions when painting portraits (Fig 2). However, some clinical habits don't transfer quite so well. I sometimes inadvertently refer to the person having their portrait painted as 'the patient', rather than 'the sitter', which can cause a bit of confusion, often amusement but sometimes alarm.

Whatever the reason for my switch to portraiture I shall try to share my enthusiasm for the subject with readers. I will consider a fairly broad mix of portraits and related historical anecdotes which have caught my interest over the years, several with a dental or medical connection.

A nice dental story is associated with the colourful and expressive portrait by the French Fauve[1] artist André Derain (1880-1954) (No 1[2]) which hangs in a wonderful gallery at the Barber Institute of Fine Arts at the University of

* Based on a lecture to the annual meeting of the Lindsay Society for the History of Dentistry, Iron Gorge, Shropshire, 4 October 2009.

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[1] *Les Fauve* or the Wild Beasts.

[2] From this point on 'No' refers to the painting number on p 45.

Figure 2 Use of Willis Gauge.

Birmingham. At the beginning of the 20th century Derain was lodging in Holland Park, London when he developed toothache. As his English was not up to negotiating with a local dentist a Sicilian fellow-lodger, Bartolomeo Savona, acted as his interpreter. The toothache was successfully treated so a grateful Derain painted a portrait of Savona as a gift. Apparently it took three sittings, each of about twenty minutes, to complete.

Another remarkable example of an artist painting a portrait to thank his carer is a dramatic self-portrait (No 2) by the Spanish artist Goya (1746-1828) painted in 1821. The artist looks as though he is at death's door: he was probably suffering from the plague. Goya is shown being cared for by his doctor, Dr Arrieta, who is administering some medicine. He certainly believed Arrieta saved his life so he painted the portrait for the doctor in gratitude. It is a very original work and a remarkable technical achievement.

My interest in portraiture is primarily in works from the Renaissance to the present day. However, I cannot resist including a striking earlier Gothic painting (13th Century) (No 3) hanging in the Hermitage Museum in St Petersburg; a detail from a larger panel called 'The Trials of St George'. It clearly has strong medical connections, appearing to show that one of the trials of St George was to have a pre-frontal lobotomy carried out without anaesthetic. St George appears to be remarkably relaxed about it. This lack of expression combined with a general lack of realism and a flat stylised treatment sets portraits of this period apart from those of the Renaissance and later. There is a nice observation of a skeletal class 2 jaw relationship in the chap on the left.

The early Renaissance

The first truly international portraitist was Albrecht Dürer (1471-1528). In No 4, at 27 years of age, he promotes the status of the artist, presenting him as a member of high society rather than as a mere craftsman. He is dressed as a dandy in the cutting-edge fashion of the day, his hair style would have been considered outlandish for the time and there is no sign of the tools of his trade, such as brushes and palette. Instead, on his hands are very expensive looking soft grey leather gloves. So this is an early example of our contemporary celebrity culture.

Dürer was immensely successful and his work was much in demand. Extensive pirating of his etchings drove him to become the first artist to have to launch a law suite to defend his intellectual copyright. No 5 shows his most

famous self-portrait painted in 1500 when he was 29-years-old: it became the accepted image of Christ. To bring in a kind of 'surgical' reference, it has a very penetrating stare that can be very disturbing. While the portrait was hanging in a Munich Museum in 1905 it had its eyes put out by a man with a hat pin.[3]

Ground-breaking self-portraits, such as Dürer's, were made possible by a revolution in mirror technology. Before then mirrors were quite small and very expensive. They were made by pouring lead into a blown glass sphere so the resulting mirrors were hemispherical and caused a lot of distortion; or were made by polishing a sheet of metal. A secret process for making large flat glass mirrors was developed in Murano, Venice. The French then cunningly invited the craftsmen responsible for the mirrors to Paris where they threatened to beat the details of the secret process out of them in order to make the large mirrors at Versailles.

Dürer seems to have been responsible for the first recorded example of an early form of tele-medicine. In No 6 the self-portrait shows him pointing to a yellow circle on his abdomen just below the last rib on the left. Dürer had picked up an illness while hunting whales in the Baltic Sea (so he was a man of diverse interests!). Unable to get to his medical practitioner he sent him this drawing on which he wrote, "There, where the yellow spot is located, and where I point my finger, there it hurts."[4] It would be very interesting to learn the outcome of this communication.

There is an interesting possible complication here as self-portrait images are usually reversed because of the use of a mirror – a situation known to dentists. Artists doing self-portraits often adopt compensatory strategies. For example, if right-handed they will often paint themselves with the brushes held in the left hand so that in the painting they appear correctly as right-handed. An example of this is seen in a self portrait (one of my favourites) by the remarkable woman artist Artemesia Gentileschi (1593-1653) (No 7). She was one of the most accomplished followers of Caravaggio with an international reputation at a time when it was extremely rare for a woman to achieve any recognition as an artist at all.

Could it be possible in the sketch of Dürer that he forgot about this mirror reversal so the lesion was in fact on his right side rather than his left? If he did make this mistake there could have been some unfortunate medical consequences! Perhaps we can assume he did the drawing from memory and dispensed with the use of a mirror in this instance, so that there was no reversal of the image to complicate matters.

There is a kind of surgical connection in the case of Artemesia Gentilleschi. Her painting of 'Judith beheading Holofernes' is the most graphic depiction of this beheading in the history of art. The tremendous emotional intensity of this work with blood spurting in all directions can be explained by Artemesia's

[3] Cumming L, *A face to the world*, London, Harper Press, 2009, p. 44.
[4] *Renaissance faces: Van Eyck to Titian*, London: National Gallery, 2009, p. 254.

understandable fury and frustration with men due to the fact that she had been raped by one of her father's colleagues. When she took him to court Artemesia was tortured with thumbscrews to make sure her evidence was truthful. To cap it all, in spite of the man being found guilty, he was just given a token sentence.

While on the subject of female artists of around the 16th and 17th centuries I cannot resist deviating briefly from the medical and dental theme to mention Sofonisba Anguissola (1532-1625) who predated Artemesia by 50 years or so. She was the first woman artist to achieve international fame. In her nineties Sofonisba was honoured by a visit from Van Dyck. Even the great Michelangelo was interested in her work and once challenged her to depict someone weeping – so, unphased by the great man, she drew a boy crying because he had been pinched by a crab that he had stolen. She had a tutor called Bernadino Campi. No 8 shows a picture of him painting Sofonisba. It looks as though it could be a work by him, but in fact it is a witty and highly original self-portrait by her. She has placed herself centre stage, above Bernadino and more brightly lit to suggest that she has outgrown his tuition and skills. However, she appears to still fancy him somewhat because she has painted his right hand in a rather suggestive and indelicate position.

Tele-porting and aids to romance

I will now move on to the Renaissance form of tele-porting.[5] Startreck fans will know all about this form of rapid transport and will be familiar with Captain Kirk's frequent command to "Beam me up Scottie". This, in a sense, was also an important function of Renaissance portraits. Ghirlandaio (1449-1494), an Italian artist, drew the corpse of a man with rhynophyma (a granulomatous infiltration of the skin of the nose). He used it to paint a beautifully tender posthumous portrait (No 9), known in the portrait trade as a 'Deader'. It presumably shows the man as a grandfather with a loving grandchild. The grandfather's eyes have been opened slightly compared with the drawing of the corpse and the nasal enlargement has been toned down a bit. This portrait would have been used by the family both as a memorial to the grandfather and as a focus for their prayers intended to help him pass from purgatory into heaven (ie be tele-ported or beamed up).

Sometimes portraits were planned in advance to act as a family memorial. A self portrait (No 10) by the remarkable Spanish artist Murillo (1617-1682) hangs in the National Gallery, London. It is his only self-portrait. Murillo painted it very grudgingly and only because of persistent pleading by his children. In his time he was more successful than the great Velasquez. Murillo was the highest paid artist in Seville, but he gave most of his money to charity. He was absolutely devoted to his 12 children. Murillo raised them as a single parent after his wife

[5] Transfer of matter from one point to another, more or less instantaneously, either by paranormal means or through technological means. Teleportation has been widely utilized in works of science fiction.

died, presumably as a result of the multiple births. The plaque at the base of the picture explains the portrait was painted "to fulfil the wishes and prayers of his children". The hand overlapping the painted frame is an effective device for creating the illusion he is still very much alive and kicking and even about to enter the room.

So far I've shown examples of the Renaissance equivalents of tele-medicine and tele-porting. But at the time they were also heavily into a fore-runner of internet dating. As travelling was very hazardous the nobility would commission artists to travel around Europe on their behalf to produce so-called 'proxy portraits' of prospective spouses. Henry VIII was an enthusiastic subscriber to this form of courtship. His first minister, Thomas Cromwell, sent the court painter Holbein (1497-1543) to produce a portrait of Anne of Cleves who was a potential candidate for Queen. No 11 shows the portrait Holbein produced of Anne when she was 27-years-old. She seems quite an attractive young lady, although it is said her nickname was the 'Flanders Mare'. Henry was sufficiently impressed by how she looked in the portrait to agree to marry her. However, he was disillusioned when they met and promptly divorced her. His not ungenerous settlement to her provided a considerable personal fortune, property including Richmond Palace and Hever Castle, together with the title of the 'King's Beloved Sister'; and they remained close friends.

Henry was not so generous to Thomas Cromwell who had organised the marriage: he beheaded him. Holbein, who on the face of it misled Henry with the portrait, got off scot free, possibly because there were many prospective first ministers but only one Holbein. Personally, I think it highly unlikely that Holbein flattered to deceive Henry. The portrait was approved by several ambassadors who would not have dared to mislead Henry. Also it is widely accepted that Holbein's portraits are amongst the most lifelike ever produced. This is supported by a contemporary comment by Erasmus on Holbein's portrait drawing of his friend Thomas Moore. Erasmus wrote to Moore: "The portrait is so completely successful that I should scarcely be able to see you better if I were with you." It has been suggested, also, that when starting a portrait Holbein actually traced the initial image onto a sheet of glass to ensure accuracy and then transferred it to the paper or canvas. I think Henry VIII was not misled by the portrait but changed his mind about Anne of Cleves for other reasons. The political motivation for the marriage had changed, it is recorded there was no 'chemistry' between them and it is noted neither was impressed by the other's physique. My 12-year-old granddaughter learned at school that while the marriage was being planned and before Anne met Henry she was given a portrait of him painted when he was a strapping, handsome young man of 25. So to see in fact that he was 49, obese and suffering from gout must have been a bit of a turn off.

Portraiture has had a long and close association with flattery. It has been described as "the art of telling lies palatably". It has also been said: "There is nothing that tells porkies about the human condition so efficiently as portraiture." Although today flattery in portraiture is generally frowned on and did help to bring

portraiture into disrepute, in the Renaissance it tended to be the norm because beauty was regarded as equivalent to virtue. So harsh reality had to be subject to decorum. In his portrait (No 12) of Frederico da Montefeltro (1475), Piero della Francesca (1410-1492) chose to do a left profile as this was Frederico's 'best' side: even that reveals there is a substantial chunk of nasal bone missing. However, the hidden right side of his face was far worse because Frederico had been seriously disfigured in a jousting accident in which he had lost his right eye and a fair amount of the surrounding tissue. So Piero della Francesca has skilfully subjected reality to decorum in this portrait.

Charles V of Spain had a major developmental dental problem, the infamous 'Hapsburg jaw'. Artists would have needed to tread extremely carefully when deciding how to depict Charles in their paintings. No 13 shows the artist Sebastiano del Piombo's (1485-1547) very frank sketch in which the King's mandibular protrusion and anterior open bite are quite obvious in spite of the beard grown in a forlorn attempt to disguise these features. It was said at the time by the Imperial Chronicler, Alonzo de Santa Cruz:

Charles's most unattractive feature was his mouth as his lower jaw was so out of proportion to his upper one that they never met. It resulted in two defects – one of speaking in a very harsh manner and the other of having very great difficulty in eating.

Because of this problem Charles tended to eat alone.

Del Piombo's drawing is almost certainly too honest and accurate for the time. I don't know how he got on at Charles V's court but I doubt that he was invited back or got any commissions. Toning down physical defects was obligatory with high ranking sitters. Del Piombo's contemporary, Titian (1490-1576), was much better at it (No 14): Charles V looks quite respectable. It is not surprising that Titian became Charles's favourite portrait artist. He was made a count and a member of the imperial court and he was promised an annual pension (although it was seldom paid).

Van Dyck (1599-1641), perhaps one of the greatest flatterers in portraiture, if not *the* greatest, also skilfully glossed over Charles's deformity in his impressive posthumous 1620 portrait of the King on horseback. He looks a very dashing and handsome figure which must have pleased the royal family no end.

However, Van Dyck's portraits of Queen Henrietta of the Netherlands perhaps went too far in disguising the sitter's facial imperfections. He tended to show her as a pretty young woman. But one contemporary description of the Queen suggests she had extremely unsightly teeth. It states graphically: "Her teeth stuck out of her face like canons." Another royal, Sophie of Bavaria, specifically commented when meeting Queen Henrietta for the first time in 1641 on the obvious discrepancy between Van Dyck's portraits of Henrietta and reality. Sophie records: "I was surprised to find that the Queen, who looked so fine in Van Dyck's painting, was a small woman with long skinny arms and teeth like defence works protruding from her mouth." There is little sign of this bizarre

dental appearance in either full face or profile portraits (No 15). In the profile the posture of the lips possibly suggests a Class II division 1 incisal relationship, but no hint of the extreme malocclusion that was described.

Van Dyck's skill at flattering made him very much in demand. To reduce his work load he cleverly invented these informal décolleté female portraits with loosened bodices because by so doing he dispensed with the usual lace ruff, which took such a long time to paint and speeded up his production considerably. His output was immense. He produced over 400 portraits in seven years (roughly one per week without a break). It was said that when he died at the early age of 42 it was from exhaustion.

The 18th century

The 18th century was when the flowering of British painting took place, particularly in portraiture, led by artists such as Gainsborough and Reynolds. Sir Joshua Reynolds (1723-1792), who founded the Royal Academy, was not a modest man. He enhanced his status in this work (No 16) by copying a pose for his portrait previously used by Titian and Rembrandt, thus demonstrating his knowledge of the great old masters. He also placed a bust of his hero Michelangelo in the background with its head bowed in reverence to the great Reynolds. This self portrait was attacked by a contemporary critic for "using shadows and a dignified pose to conceal coarse features, a slovenly outward appearance, a broad plane face and a blunt nose". Reynolds clearly was not universally popular. The artist William Blake *hated* him. He said:

Reynolds epitomises success in the fatuous field of portraiture. I have spent the vigour of my youth and genius under the oppression of Sir Joshua and his gang of cunning hired knaves without employment and as much as can possibly be without bread.

Blake's resentment of Reynolds is in part a reflection of the intense competition for work amongst portrait painters in London. At that time there were over 2,000 in the city fighting for work.

However, not all portrait painters succumb to the temptation to flatter their clients. The Russian composer Mussorgski was 26-years-old in 1865, the year in which he began to go badly down hill: he had turned to drink in a big way following the death of his mother. Sixteen years later the Russian artist Ilya Repin (1844-1930) painted a brutally honest portrait (No 17) of Mussorgski when he was in hospital as a result of his alcoholism. A contemporary description of Mussorgski's state at that time matches the portrait remarkably closely. It records: "Friends would often rescue Mussorgsky from some disreputable place, nearly in rags, his hair dishevelled and his face swollen with alcohol." He died only a few days later.

Other artists set their faces against flattery in portraiture. The contemporary British painter, Stuart Pearson Wright, holds the view that to flatter the sitter is to

insult the sitter. He has painted a number of British celebrities including the Duke of Edinburgh, the Presidents of the British Academy (who are shown sitting round an uncooked dead chicken) and the author J K Rowling. In his portrait of the Duke he chose to inject a strong dose of caricature. The famous French neo-classical painter, Ingres, insisted that all good portraits should have an element of caricature but in this case some would argue that the caricature has been overdone for what was after all an official portrait. There is a tenuous dental connection with the Duke because in 1960 he addressed the General Dental Council where he unfortunately cracked a joke The Duke explained to the Council that "Dentopedology is the science of opening your mouth and putting your foot in it, and I have been practising it for years." He was honorary president of the BDA in 1980. When Pearson Wright was commissioned to do the portrait he asked for 20 sittings, but the Duke agreed to only four; so the artist was under a lot of pressure. At the end of the first sitting the Duke peered over the artist's shoulder and simply spluttered, "Godzooks!" After the final session Pearson Wright nervously asked the Duke if he'd caught a likeness and the Duke promptly responded, "I bloody well hope not!."

Pearson Wright had a few attempts at the portrait. The first attempt was titled 'Homo sapiens, Lepidium sativum and Calliphoria vomitoria' (i.e. 'Man, cress and bluebottle') (No 18, © S Pearson Wright). Portraits often have coded references to the life of the sitter. In this case four sprigs of cress growing from the tip of his right index finger are a metaphor for the Duke's role as seed-bearer to the royal household and represent the four heirs. The bluebottle is a traditional symbol of death and decay to remind us we are mortal and only have a limited time on this earth.

Because in portraiture there has been this pressure to flatter the sitter, or at least exercise discretion, it has always had a difficult relationship with facial deformity and injury. Ingres (1780-1867) manages it with skill in a portrait (No 19) of Count Nikolai Guryer. He shows the Count's exophthalmus and mandibular protrusion convincingly, while giving the impression that the Count has a dignified, attractive and strong personality. Ingres was a pupil of the French painter David (1748-1825), a major political figure in the French Revolution and whose masterpiece was the painting of the 'Assassination of Marat'.

David's self-portrait on the left in No 20 was painted while he was in jail in solitary confinement after the downfall of his 'partner in crime', Robespierre. The portrait effectively disguises the fact that when he was duelling he received a rapier wound to his left cheek which appears to have severed a buccal branch of the facial nerve and left him with some facial paralysis and swelling. [6] This disfigurement is recorded more clearly in the sculpture by Francois Rude and in the portrait on the right of the figure by another artist.

Rembrandt (1609-1669) was one of the most prolific self-portraitists ruthlessly charting the ravages of time on his own facial appearance. A cheerful self-

[6] H Ashrafian, *Journal Royal Society of Medicine* 2007; 100: 341-2.

portrait (No 21) as a relatively young man does not show any obvious facial abnormality and his benign appearance gives the impression that Rembrandt was a rather benevolent individual. So I was surprised to read a character assassination of him from contemporary documents that said:

He was litiginous, careless, vain, abusive, conniving and underhand. He was habitually late, wayward and defiant. He had one mistress locked up in a house of correction while taking up with a much younger lover.[7]

So even a portrait genius like Rembrandt does not always truthfully reveal the character of the sitter. He was obviously not an easy person to get along with and a number of potential sitters were also put off him because he expected them to pose for 2-3 months, while his contemporary, Van Dyck, could knock off a likeness in one morning,

Fairly recently a study of Rembrandt's self portrait paintings and etchings has suggested that he did, in fact, have a mild facial deformity – a divergent squint.[8] The right eye looks straight ahead while the left deviates outwards. It is likely that Rembrandt was stereo-blind, only seeing the world in 2 dimensions. In fact this disability is thought to be an advantage for an artist as it can help him or her convert a 3-dimensional scene into an image on the flat 2-dimensional surface of the canvas. It is for the same reason that some art teachers encourage their pupils to draw with one eye closed.

Figure 3 Henry Tonks

The subject of facial deformity as a result of trauma was an important one for Henry Tonks (1862-1937) (Fig 3) during the First World War. Tonks was born in Birmingham and qualified in medicine, but he had a career change in 1893. When he was 31-years-old he left medicine to become an art teacher at the Slade School of Art in London. However with the outbreak of war he again took up plastic surgery, working with Harold Gillies to treat soldiers returning from the trenches with terrible facial injuries. Tonks produced an extensive series of watercolours (No 22) of these patients as a record of the conditions before and after treatment. Having done his bit in the war he returned to the Slade in 1918 as a professor of fine art. He became the most renowned art teacher of his generation, teaching well known and successful artists such as Augustus John and his sister Gwen, Stanley Spencer, David

[7] Cumming, op cit., fn. 2, p. 97.
[8] Marmore, M F et al., Deconstructing the gaze of Rembrandt, *New England Journal of Medicine* 2004; 351: 1264-5.

Bomberg and many others. As a result of his efforts the Slade became the dominant art school of the time.

Henry Tonks was a true Brummy whereas the remarkable Victorian surgeon, Sampson Gamgee was an adopted Brummy. In my portrait I have included several pictorial references to Gamgee's life distributed round his head rather in the style of a Victorian trade union banner (No 23) and which are referred to below. He was born in Italy and travelled to England on horseback which was no mean feat in itself. He qualified first as a vetinary surgeon and then trained in medicine with Joseph Lister in London and later with Louis Pasteur while doing postgraduate studies in Paris. Gamgee eventually got a surgical job at the Queen's Hospital, Birmingham (1857) where he introduced the then innovative technique of washing one's hands before operating. He encouraged his surgical colleagues to do the same and to go even further by not blowing their noses or scratching their heads while treating patients. He invented the wound dressing Gamgee Tissue which is still in use today. He founded, and was the first president of the Birmingham Medical Institute - the only medical postgraduate facility in Birmingham at the time, and which is still going strong today. He established the Birmingham Saturday Hospital Fund , which raised money for local hospitals, including the Birmingham Dental Hospital, by persuading Birmingham workers to donate their overtime pay on nominated so-called 'Hospital Saturdays'. One of the Fund's projects financed four bicycle ambulances, each consisting of two bikes with a stretcher suspended between them – which might not be a bad idea for helping to cope with the cuts in NHS funding expected over the next few years. When Gamgee died at a relatively early age after falling while on holiday and breaking his leg the streets of Birmingham were lined with tens of thousands of local residents to honour him as his funeral passed by.

Gamgee's name might be familiar because of the Hobbit character, Sam Gamgee, who was Frodo Baggins faithful sidekick in Tolkein's *'The Lord of the Rings'*. Whether or not Tolkein consciously borrowed the surgeon's name is debated, but I think that there is irrefutable circumstantial evidence that he did because the young Tolkein went to King Edward's School in Birmingham at the same time as Sampson Gamgee's grandson so Tolkein must have been aware of such an unusual name. This likely connection with the *'Lord of the Rings'* is indicated in the portrait by the two towers in the background which are still standing in Birmingham and which are thought to have given Tolkein the idea for the two towers in the Lord of the Rings.

Postscript

To bring things up to date, strange things are happening in the world of portraiture which have a strong medical connection. The artist Marc Quinn has produced a series of casts of his head called 'Self', made from his own congealed blood. The head has to be kept refrigerated and there is a story that one evening a cleaner turned off the freezer by mistake which resulted in a bit of

a mess. Quinn produces a new 'blood head' every five years and the most recent one has been bought this year by the National Portrait Gallery for £300,000. So it is a nice little earner!

Another modern 'portrait' by Quinn, which is in the National Portrait Gallery, is a culture plate of bacteria containing DNA derived from the sperm of Sir John Sulston, the British chairman of the human genome project. It is said the concept behind this is "to challenge the viewer to consider the accuracy of different forms of portraiture, and it underlines the complexity of our understanding of personal identity and descent".

Yet another conceptual approach to portraiture, this time by the American artist Robert Morris is called 'Self Portrait Electro-encephalograph' It consists of an electro-encephalograph (EEG) of the artist thinking about himself, run until the trace is as long as the artist is tall.

These modern so-called 'portraits' are primarily conceptual. Their visual content is often so minimal and the concept so slight that I generally remain unmoved by them. I regret this is the way things seem to be going and agree with the Turner Prize-winning artist, Grayson Perry, who said recently that, "a work of art is not just a stage set for an idea".

Finally, to return to a more conventional work with a strong dental connection, I refer to a portrait of Hew Mathewson, the last president of the General Dental Council (the coming reorganisation will replace that post with one of chairman) (Fig 4, No 24, © General Dental Council).

Figure 4 Hugh Mathewson, final president of the GDC

This portrait, painted in 2008 by Alastair Adams, president of the Royal Society of Portrait Painters, is carefully done. It tends to convince those of us who have not met the sitter that we are looking at a good likeness. However, one of the hazards of contemporary portraiture is that the painting can be compared with a photograph or even the sitter himself. If we look at the recent photograph of Hew in Figure 27 there are clearly differences between it and the painting, but which version is the truth? It is not necessarily the photograph because we know that cameras can lie.

List of Figures and Numbers

Acknowledgements

Thanks are due to the General Dental Council for permission to reproduce the portrait of Hugh Mathewson and to Stuart Pearson Wright for permission to reproduce his portrait of Homo sapiens.

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24 © General Dental Council

GREAT ORMOND STREET HOSPITAL, ITS DENTAL SURGEONS (1856-1946) AND THE CARTWRIGHT FAMILY

Stanley Gelbier*

Origins of the hospital

London's Great Ormond Street Hospital for Children (GOSH) clearly is now a national centre of excellence, delivering the widest range of specialist health care of any UK children's hospital.[1] It holds the only specialist paediatric Biomedical Research Centre, the largest centre in the country for children with heart or brain problems and the largest European centre for children with cancer. Although primarily providing a nation-wide service it also works with the local Primary Care Trust to improve the health of local children. But how did it all start?

It was founded by Dr Charles West in 1852 as the Hospital for Sick Children, the first in the English-speaking world to provide in-patient beds specifically for children. Apart from its outstanding provision of care it is famous for receiving the copyrights to 'Peter Pan', or the 'Boy Who Wouldn't Grow Up', from [Sir] James M Barrie, the author. Over the years this action provided GOSH with substantial financial support every time 'Peter Pan' was performed on stage or in the cinema. For years it was a Christmas favourite on the London stage. This copyright ran out in 2007, seventy years after Barrie's death. However a 'Royalties in perpetuity' deal was negotiated as part of the 1988 Copyright Act, largely through the endeavours of Lord and Lady Callaghan; and the USA copyright lasts until about 2025.[2]

At first the Hospital for Sick Children had two wards in a converted town house.[3] Only in 1875 did it gain a purpose-built building. The original ten beds were later increased to twenty. In the early days patients came from the surrounding "teeming slums of nearby Clerkenwell, Holborn and St Pancras".[4]

There were initially two doctors, Charles West and William Jenner, plus a surgeon. Jenner was a Physician to the Royal Family and an expert on infectious diseases such a typhoid and diphtheria. By 1856 the hospital had a pharmacist and a surgeon-dentist, long before there were other specialists. It was 1880 before the hospital gained an ophthalmologist; and the hospital had to wait until 1890 for an anaesthetist.

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[1] Great Ormond Street Hospital, www.ich.ucl.ac.uk/about_gosh
[2] Nick Baldwin, Archivist, GOS NHS Trust, Personal communication, 17 March 2009.
[3] Great Ormond Street Hospital Archives.
[4] History of GOSH: the whole story, www.ich.ucl.ac.uk/about_gosh/history/story/whole_story2.

Around the same time dentistry was taking off as a profession: the [later Royal[5]] Dental Hospital of London opened in 1858, followed in 1859 by its London School of Dental Surgery. Some enthusiastics worked both there and at the children's hospital.

Other children's hospitals waited another forty years to appoint a dentist. In 1896 Hackney Hospital staff and the committee of management decided that attendance by a dental surgeon of half-an-hour once or twice a week had not been enough so resolved to spend £100 per annum.[6] In the archives of GOSH there is a photo taken at the North-Eastern (later Queen Elizabeth) Hospital for Children, Hackney Road showing a dentist was working there in 1897. The NEH was subsequently managed by GOSH.

Until establishment of the National Health Service in 1948 senior hospital medical, surgical and dental staff in the UK were unpaid. Most of their money came from private practices. In many ways their hospital work satisfied a social calling, but it also helped their reputations and experience in dealing with huge numbers of patients with very varied conditions.

To give the hospital publicity West drew on his friendship with the famous author Charles Dickens. The latter wrote an article for his popular magazine *Household Words* to publicize the hospital. As a 'voluntary hospital' catering for poor children it was funded by subscriptions, donations and fundraising events Its Annual Festival Dinner attracted eminent speakers such as Dickens, Oscar Wilde, senior clergymen and members of the Royal Family.

Initially the children were treated for a wide variety of serious illnesses such as bronchitis, phthisis and syphilis. The hospital also dealt with relatively minor ailments such as catarrh and diarrhoea, which nowadays would be treated by a general practitioner. Poor medical knowledge in the 1850s meant that many patients could not be properly treated. On the other hand there were advantages in the hospital feeding, washing and keeping children warm, which for many was a rarity.

Appointment of hospital staff

Appointments of medical and surgical staff were initially made by a 'Joint Committee' of 2-3 members of the clinical staff plus a similar number of lay members. It later became the 'Medical Appointments Committee'.[7]

The dental surgeons

So who provided dental care in the early days? Figure 1 lists the dental surgeons treating the child patients between 1856 and 1946. All were medically as well as dentally qualified. Samuel Cartright later joined the staff of the Dental Hospital of London, establishing a link that remained for many years.

[5] In October 1901.
[6] Lists of members, *The School Dentist Society: its aims and objectives*, 2nd ed, London: W Michael and Sons for the SDS, 1913,
[7] N Baldwin, Personal communication, 10 March 2009.

Figure 1 Early dentists at Great Ormond Street Hospital[8]

Dentist	*Started*	*Ended*
Samuel Cartwright Junior	February 1856	Resigned April 1889
Thomas Edgelow	April 1869	July 1875
Alexander Cartwright	July 1875	July 1901
Stanley Colyer	October 1901	July 1904
William Warwick James	July 1904	February 1914
Arthur T Pitts	February 1914	October 1930
H C Apperly	Nov 1930	June 1945
T Craddock Henry (acting)	August 1945	July 1946
Ditto (substantive)	July 1946	1977

These dentists were supported as and when necessary by a number of consulting dental surgeons (senior dentists who gave support after retirement). Warwick James and Pitts were elected to this post in October 1930. The latter stayed until his death in 1939. Apperley followed in October 1945.

Treatment continued over the years except for World War II when, except for casualties, the work of the department virtually ceased. It only resumed normal working in 1948 when, for the first time, a resident house surgeon was appointed. The scope of the department continued to expand in spite of its inadequate accommodation in the old building. In May 1963 it moved to fresh accommodation in the new wing.[9] A floor space of 3,480 square feet made it possible to accommodate six dental units and chairs, a laboratory for three technicians, storage space for patients' records and some 2,000 plaster models of the jaws and teeth.

The nature of the care provided changed over the years. At first it was fairly routine treatment for 'normal' children. With time it became more specialised as the hospital attracted children with unusual and difficult-to-treat conditions.[10] By 1967, two-thirds of the treatment was for orthodontics, including care for patients with hare lips, cleft palates and other congenital facial deformities. The remainder was special care for children with haemophilia, other bleeding disorders, mental or physical handicaps, or who were difficult' or phobic – some of whom needed a general anaesthetic.

A number of the Great Ormond Street dentists are famous in the annals of dentistry for a wide range of activities apart from their work there. This paper examines their professional lives, beginning with the Cartwright family, not all of whom worked at GOSH.

[8] List supplied by N Baldwin, Personal communication, 12 September 2008.
[9] T Craddock Henry, And the dental department, *The Great Ormond Street Gazette*, February 1967, p. 5..
[10] Unfortunately clinical dental records are not available for the early years so precise details cannot be given. There is only a single volume of early treatment provided, that by Warwick James in 1904-05.

The Cartwright family and the professionalisation of dentistry

As Hall[11] points out,[12] the development of dentistry in the mid-19th century owes much to the Cartwright family. He quotes one writer who said[13]: "The old adage that any fool will do for a parson may be applied with still greater force to the profession of dentistry." The Cartwrights did much to improve this image.

The history of the family is very confused. There is even some doubt as to how many dental members there were in the family. Frederick F Cartwright (no relation) told Hall he thought there were three members, all dentists; but others say there were only two. None mentioned Alex as a relative, so there may have been four. All of them are examined below.

Samuel Cartwright senior[14] died in 1864 so could not have been the one providing treatment at GOSH: that person only resigned in 1889. However he is included here as he set the scene for the contributions made by other Cartwrights to the development of UK dentistry. Cartwright senior passed on to his son a great enthusiasm for dentistry and saw him take responsibility for the first steps in making it an academic subject.

The Odontological Society and the Dental Hospital of London

In the 1850s there was a great deal of activity to regularise dentistry. In 1856 a group of fifty surgeons practising dentistry, mostly in London, formed the Odontological Society of London. The driving forces behind this new society were John Tomes, FRS and Samuel Cartwright junior, MRCS. They and Thomas A Rogers, MRCS became the joint honorary secretaries. Samuel Cartwright senior, FRS was elected as the first president (1856-57). His son followed in 1863[15] and 1877.

The group was previously known as 'The 'Memorialists': they presented a memorial or petition to the Royal College of Surgeons (RCS) of England in an attempt to align dentistry with the college. They asked it to recognise dentistry as a branch of surgery and to award a dental qualification (the first step towards professionalisation), there currently being no such thing in Great Britain. In 1858 they succeeded, following passage of the first Medical act. In that year they founded the Dental Hospital of London to treat poor people; and in 1859 they established the London School of Dental Surgery at that hospital to train future dentists. They were just in time. The Medical Act 1858 led to changes in the Royal college's charter which allowed it to award a Licence in Dental Surgery. At last there was a dental qualification. The first 43 candidates gained the LDS in March 1860.

[11] One time dean of King's College School of Medical and Dentistry.
[12] Vernon F Hall, *The history of King's College Hospital Dental School (University of London), 1923-1965*, London: The Council of KCH Medical School, 1973, 116 pp., p. 7.
[13] Ibid., p. 7.
[14] Ibid., p. 12.
[15] *Trans Odont Soc*, vol 3, 1861-63.

From the beginning they published a *Transactions* to allow "the collection and diffusion of professional knowledge",[16] thus enabling people who couldn't get to the meetings to read about the lectures, discussions and society affairs. Within a year there were also members from other countries.

In 1857 a contrary group, the College of Dentists of England, was founded. Many members were non-surgically qualified dentists practising outside London. They wanted to see dentistry develop away from the influence of the surgeons so their college started to award its own membership dental diploma (the MCDE). For this purpose they founded the Metropolitan School of Dental Science, which opened its doors four days after the Dental Hospital of London did so. However it did not make sufficient arrangements for students to get clinical experience until 1861, when the National Dental Hospital was opened at 149 Great Portland Street.[17] Before then limited experience was provided at the Westminster Dispensary in Soho. Once the LDS became a fact of life the members of the College of Dentists realised they had lost the battle and joined with the surgeons to form a new Odontological Society of Great Britain in 1863. The *Transactions* show the society was an important focus for dental science and learning through its meetings and publication, but it remained aloof from dental politics.

However, in 1875 the surgeons still felt they should be regarded as special, so an Association of Surgeons practising Dentistry was formed by Fellows and Members of the Royal College of Surgons.

Two months later a Dental Reform Committee was founded to press for the institution of a register of dental surgeons. They wanted it to be confined to those people with an LDS, who would be the only ones able to use the titles 'dental surgeon', 'surgeon dentist' or 'dental practitioner'. Therefore those surgeons practising dentistry without an LDS resiged.

In the following year Samuel Cartwright junior was president of the Association of Surgeons, the Reform Committee and the Odontological Society. The Reform Committee was disbanded in 1879 following achievement of a Dentists Act in 1878 and publication of a *Dentists Register* in 1879. By then dentistry was under the control of the General Medical Council; through a sub-committee, the Dental Board of the United Kingdom. The British Dental Association was founded in 1880.

In 1901 the Dental Hospital of London gained royal patronage to become the Royal Dental Hospital. The National Dental Hospital merged into University College Hospital in 1914.

In 1907 the society became the dental section of the new Royal Society of Medicine which was formed by merger of fifteen medical and surgical societies.

King's College London and its hospital

Most of London's hospitals were established to provide treatment, often for the poor. Later, students visited them to gain clinical experience. King's

[16] President's Address, *Trans Odont Soc*, vol 1, 1856-57, pp. 7-14.
[17] J Archie Donaldson, *The National Dental Hospital, 1859-1914*. London: British Dental Journal Publications, 1992, p. 14.

College Hospital, on the other hand, was uniquely founded, in 1839, to provide clinical experience for medical students at King's College London. It was thus an academic institution from the beginning. Because of this relationship KCL could elect some senior hospital staff to a chair or professorship.

KCH opened in 1840 in Portugal Street, near to Lincoln's Inn Fields and close to KCL in The Strand. In 1913 it moved south of the River Thames to Denmark Hill, where it remains.

Although originally set up as part of KCL, in 1908 a King's College London (Transfer) Act separated the Corporation of the Hospital from King's College. The Committee of Management of the hospital took over the School of Advanced Medical Studies while the Faculty of Medical Science remained at KCL. In October 1915 the medical school became a recognised school of medicine within the University of London but the hospital continued to be responsible for it until 1948. When the NHS was came into being the university took over responsibility.

When KCH opened in 1840 it had four departments, one of which was dental. Following the move to Denmark Hill it continued to have a small dental department providing routine treatment, run by a part time dental surgeon. It was not until after passage of the 1921 Dentists Act, which made training compulsory for dentists, that King's established a dental school; in 1923. Initially there were five students, with women admitted from the beginning.

The Cartwright family was strongly associated for many years with King's, as well as with the Dental Hospital of London and the Hospital for Sick Children.

Samuel Cartwright Senior FRS (1789-1864)

Samuel Cartwright was born in Northampton in 1789. Initially trained as an ivory turner, he later travelled to London to become a mechanical assistant to Charles Dumergue, dentist to King George IV, at 32 Old Burlington Street, Piccadilly.[18] The latter's practice was prospering greatly so in 1811 he took on the twenty two-year-old Cartwright as an assistant, the first member of what was to become a remarkable dental dynasty. He rapidly demonstrated his skill as an ivory turner in the construction of dentures. Cartwright's extremely painstaking and successful work, which included carving hippopotamus ivory[19] dentures, augured well for his future. At the same time he regularly attended lectures in anatomy and surgery to further his knowledge, but did not attend a set course nor attempt to qualify. Nevertheless he gained enough knowledge and experience to become a dental practitioner.[20]

[18] Peter Beauchamp, Two Mayfair dentists to royalty: 1775-1852, *Dental Historian* 2008; 47: 68-78.
[19] Some people called it '"horn of sea horse".
[20] Hall, op cit., fn. 12, p. 11.

Dumergue was well connected with many rich patients, including royalty. His 28 mile coach trips to Windsor Castle were very time consuming so he charged twenty guineas for each visit.[21] As Dumergue increasingly felt his age and took more holidays in Bath and Christchurch, Cartwright took over some of his patients: many were very rich. It is unclear how many royal patients transferred to Cartwright after Dumergue died on 25 June 1814, but he did become dentist-in-ordinary to George IV.[22]

Over the years Cartwright became established at 32 Old Burlington Street, where he acquired an excellent reputation and an extensive practice. He worked long hours from 7am until 7pm, seeing 40 to 50 patients a day.[23] At one time Cartwright earned £10,000 per year and acquired a lot of money.[24] Hall quotes Carola Oman's book *Ayot Rectory*,[25] where in about 1827 Mary Brown said her daughter Emma would only allow Samuel Cartwright to treat her teeth. As he would only leave his surgery for royalty, Emma had to be sent from Bath for treatment in London.

Cartwright had many interests. He became a fellow of the Linnean Society on 19 November 1833 and a Fellow of the Royal Society on 11 February 1841. In 1856-7 he was president of the Odontological Society of London and was elected an honorary member in the following year. He was also a fellow of the Geological Society but does not seem to have made any contributions to their *Proceedings*. Cartwright had many friends distinguished in science, literature and the arts.

He continued to practise at Old Burlington Street until his retirement in 1857. In the following year he had an apoplectic seizure which resulted in palsy, from which he suffered for the rest of his life. Samuel Cartwright senior died at his residence, Nizell's House in Tonbridge, Kent, on 10 June 1864.

The second Samuel Cartwright FRCS (1815-1891)

Samuel Cartwright junior was certainly associated with Great Ormond Street Hospital (1856-89). He was born in 1815, the year of the Battle of Waterloo.[26] Cartwright junior went to Trinity College Cambridge and then to the London Hospital in Whitechapel, gaining the surgical qualification of MRCS in 1838.[27] Cartwright then joined his father at the Burlington Street practice.

In 1844 Cartwright junior (Fig 1) became surgeon-dentist to the relatively new King's College Hospital, in Portugal Street. At the same time he was a lecturer in dental surgery and pathology to the medical students.

[21] 1 guinea = 1 pound 1 shilling = £1 5p.
[22] G C Boase (rev Patrick Wallis), 'Cartwright, Samuel (1789–1864)', Oxford Dictionary of National Biography, Oxford University Press, 2004 [http://www.oxforddnb.com/view/article/4819, accessed 8 Jan 2009]
[23] Ibid.
[24] Ibid.
[25] Hall, op cit., fn. 12, p. 11.
[26] Ibid., p. 13. The battle was on 18 June 1815.
[27] *Med Dir* 1889, p. 111.

Cartwright was much concerned with the problems of odontology and the future of dentistry, which he felt should be part of surgery. He worked with John Tomes and other colleagues to ensure the English college of surgeons established an LDS qualification. Cartwright was awarded the FRCS in 1859.

Figure 1 Samuel Cartwright Jun

In the following year he was one of the first 43 successful candidates for the new LDS.[28] Also in 1860 he was appointed by King's College to a specially-founded chair in dental surgery, the first holder of such a professorial post in the United Kingdom. He was founder and first president of the hospital's dental students society and first chairman of the 1st anniversary dinner of 'past and present students'. After he retired from the chair in 1875 Carwright was awarded the fellowship of KCL.

Whilst a student Cartwright was awarded the Associate of King's College London.[29] The AKC is unique. King's was founded in 1829 as part of the emerging University of London[30] as a religious college as opposed to the non-religious University College. The AKC is its original award, first given in 1833.

The course is open to all students and staff, giving them an opportunity to study aspects of ethics, philosophical theology, biblical studies, religious studies and Christian doctrine in a contemporary context.[31] It reflects King's lively and intelligent religious tradition from its foundation. There are a series of open academic lectures which students attend at the same time as reading for their degree. After completion of the course and examinations students are eligible for election as an associate and can use the letters AKC after their name.

Cartwright was an examiner for the Royal college's Dental Board from 1865 to 1875.

During his career Cartwright was also surgeon–dentist to the Dental Hospital of London[32] (by 1865 consulting dental surgeon) and the Hospital for Sick Children (1856-1889). At one time he was lecturer in dental surgery and pathology at the London School of Dental Surgery.[33]

[28] On 13 March 1860 in the presence Messrs Lawrence, Bell, Tomes and Rogers, the examiners, Louise King, Assistant Archivist, Royal College of Surgeons of England, Personal communication, 16 March 2009.
[29] *Med Dir*, 1889, p. 111.
[30] Stanley Gelbier, Dentistry and the University of London, *Medical History* 2005; 49: 445-462.
[31] www.kcl.ac.uk/about/structure/dean/akc/index.html
[32] Plarr's lives of the Fellows of the Royal College of Surgeons of England, Vol I, 1930, pp. 203-204, p. 203.
[33] *Med Dir*, 1879, p. 73.

Cartwright wrote on 'Causes irregularities of teeth' (in the *Transactions of the Odontological Society*), 'Lectures on Dental Surgery' (*Br J Dent Sci*), 'Treatment of the pulp' and ' Remarks on the causes of irregularities of the teeth' (*Trans Od Soc*).

In many ways Cartwright junior was a break with the past, helping to introduce and develop dental education and dental legislation. He was very involved in dental politics. In 1877 Cartwright was president of the Association of Surgeons, the Reform Committee and the Odontological Society. A son of the first president of the Odontological Society, Cartwright was a founder-member, first (joint) honorary secretary (1856-8), treasurer (for 20 years) and honorary foreign secretary (1859). Most important, he was twice president (in 1863 and 1877). Cartwright was strongly associated with the formation of the Dental Hospital of London at 32 Soho Square in 1858 and was one of the original staff (together with John Tomes, Robert Hepburn, Thomas Underwood and Charles Rogers, two of whom had examined him for the LDS). For many years he was treasurer to the hospital.

Cartwright and his colleagues soon realised the 1878 Dentists Act significantly failed their expectations as a practical measure and fought for something better; but they had no hope of getting it amended or repealed. They wanted a distinct recognition on the register with a separate section for surgeons practising dentistry, rather than single register for them and other people who 'only' had an LDS. There was worry that the LDS could be seen by some people as superior to the MRCS.

KCL introduced a rule that allowed former professors of at least ten years standing to be elected as professors-emeritus. Cartwright junior became a professor-emeritus in 1880 (followed by S Hamilton Cartwright in 1890).

Cartwright was a fellow of the Royal Medical and Chirurgical
Society and the Medical Society of London; and a member of the Anthropological Society.

Even after retirement Cartwright retained an interest in the profession. He was also a keen musician and a member of several music societies.

Samuel Cartwright junior died at his father's house at 32 Old Burlington Street on 23 August 1891.[34] He was interred at Cobham, one of his favourite spots. Present were a number of leading dental practitioners, including Prof Henry Smith, Messrs Underwood, J Smith Turner, Hepburn and Storer Bennett. Cartwright's wife pre-deceased him.

The Cartwright Medal

Cartwright junior was the first chairman of the Association of Surgeons practising Dentistry. In 1884 the association founded a Cartwright prize to commemorate his contribution. With dissolution of the association towards the end of century administration of the prize was entrusted to the Royal College of Surgeons of England. On behalf of a grandson, Lt Col G H M Cartwright, in 1967
C Bowdler Henry presented a portrait of Cartwright to the Royal college. The face on this picture was copied onto the obverse of the medal which

[34] Obit., *J BDA* 1891; 12: 623-4.

accompanies the prize. He mentioned the prize is awarded quinquennially to the author of the best essay on a given subject related to dental surgery. He or she must be engaged in the study or practice of dental surgery and possess a medical qualification. In 1967 the prize consisted of a bronze medal and an honorarium of £105.

Samuel Hamilton Cartwright (1842-1891[35])

By at least 1868 a third Cartwright worked at the Old Burlington Street practice.[36] Grandson S Hamilton was born on 27 December 1842. He attended Islington Preparatory Grammar School. Cartwright became a medical student at King's in 1859, at the age of 17 years.[37] Whilst there he lived with Samuel Cartwright at Old Burlington Street. Hamilton Cartwright did not register his name with the General Medical Council until 1887 but gained the MRCS in 1867.[38] He gained an LDS in 1871. According to the *Medical Directories* Cartwright later studied in Paris, Vienna and New York, where he gained a Doctorate in Dental Surgery degree. He was later awarded an honorary DDS from New Orleans. This information was presumably submitted by Cartwright, but they do not appear in the *Medical Registers*. At some stage he became an AKC.

Hamilton Cartwright became a senior lecturer in dental surgery at the London School of Dental Surgery and assistant dental surgeon to the Dental Hospital of London.

By 1874 he was an assistant dental surgeon at KCH, where he helped his father,[39] but did not follow Cartwright junior as dental surgeon to Great Ormond Street. However Hamilton Cartwright did became dental surgeon and professor of dental surgery at King's College in 1875.[40] He was president of KC medical society in 1883-4. By 1890 he was a professor-emeritus, so had left KCL.

There were unproven claims Cartwright was the first professor of dental mechanics in Great Britain.[41] He certainly was lecturer in mechanics in the Department of Engineering at KCL.

Cartwright's publications included 'On surgical disease of the mouth' (*Br J Dent Sc*), 'Lectures on the affects of constitution and climate on the teeth' (*Monthly Rev Dental Surg*), 'On the surgical treatment of cleft palate' (*Harris's*

[35] The exact date of death is uncertain. His name continued in *Medical Directories* beyond 1891, but entries indicated no address had been given, and each year there were decreases in the information recorded. It suggests he was not returning the relevent annnual form, so could well have been dead.
[36] *Med Dir*, 1868, p. 68.
[37] Katherine Godfrey, Archives Assistant, KCL.
[38] *Med Dir*, 1889, p. 14.
[39] Hall, op cit., fn. 12, p. 14.
[40] *Medical Directory* 1876, p. 72.
[41] Hall, op cit., fn. 12,p. 15.

Dental Surg) and numerous contributions to *the Lancet* and *British Medical Journal*.[42]

Cartwright was an honorary secretary to the Association of Surgeons practising Dental Surgery and a Fellow of the Medical Society of London.

Samuel Hamilton Cartwright probably died in 1891 although his name continued to be listed in the *Medical Register* until 1909.

Alexander Cartwright

By 1876 yet another Cartwright was listed at 32 Old Burlington Street.[43] No record has been found of his dates of birth or death. After study at King's Alex Cartwright gained an MRCS (in 1873) and an LDS (1874).

He was a member of the Odontological Society, dental surgeon to Great Ormond Street (1875-1901) and honorary dental surgeon to the Royal Society of Musicians.[44] Cartright was also a fellow of the Medical Society of London.

Thomas Edgelow

After study at St George's Hospital Edgelow, in 1865 gained an LRCP from the Royal College of Physicians of London and an MRCS from the college of surgeons. There is no record on an LDS in the medical or dental directories. By 1868 he was listed at 127 Mount Street;[45] and by 1891 he was at 13 Saville Row.[46]

Edgelow was a medical tutor and demonstrator in anatomy at St George's. By 1868 he was surgeon dentist to the hospital for women in Soho Square, the Victoria (South London) hospital for children and the St George's dispensary in Mount Street. He later became surgeon-dentist to Great Ormond Street Hospital (1869-1875). Edgelow was also dental surgeon and lecturer in dental surgery at St George's Hospital.

Edgelow was a member of the Odontological Society of Great Britain.

He was married with one son, Thomas.

Stanley William Randolph Colyer (1874[47]-1939)

Stanley Colyer came from a brilliant family. His brother was Sir Frank Colyer,[48] a well-known dental practitioner. Stanley Colyer was educated at Dulwich College in south London and gained an entrance scholarship to Charing Cross Hospital and University College London.[49] He studied at the

[42] *Med Dir*, 1889, p. 111
[43] *Med Dir*, 1876, p. 72
[44] *Med Dir*, 1891, p. 111.
[45] *Med Dir* 1869, p. 88.
[46] *Med Dir*, 1891, p. 148.
[47] No record found of his birth but *Times* obituary says he died aged 65 years.
[48] For information on Sir Frank see S Gelbier, Pillars of dental society, *Dental Historian* 2007; 46: 22-24.
[49] Obituary: Stanley Colyer, MD MRCP MRCS DPH DMRE LDSEng *Br Dent J* 1939; 66: 680-1.

Dental Hospital of London and gained an LDS in 1895. Colyer then practised for a while as a dentist. At the same time he studied at KCL and Charing Cross hospital, gaining the LRCP and MRCS in 1898. He studied bacteriology at King's as an occasional student in 1900.[50]

In 1899 Colyer was listed in the *Dentists Register* as at 11 Queen Anne Street, Cavendish Square, W1. The 1903 *Medical Directory* lists him at 4/9 Gloucester Terrace, Onslow Gardens in South Kensington, SW; but by 1923 it showed him at Queen Anne Street.

Colyer was dental surgeon to Great Ormond Street and the Foundling Hospital from October 1901 to July 1904. For a short time he was also an assistant dental surgeon at the National Dental Hospital, near Tottenham Court Road. Colyer was also dental surgeon to the Dental Hospital of London.

He then abandoned dentistry and concentrated again on medical studies. In 1907 Colyer gained the Bachelor of Surgery degree from London University, followed by the MD and MRCP London in 1908. He held residential appointments at Charing Cross and York Lying-in Hospital. Colyer then became a ship's doctor, after which he practised medicine in Kensington.

According to his obituary Colyer gained a Diploma in Public Health in 1904, although it was not recorded in the *Medical Register*. He then became an assistant medical officer of health for Southampton.

In 1910 Colyer went as a medical officer to Northern Rhodesia and then to East Griqualand in South Africa. Whilst there he collected data on the teeth of some native people. His paper on 'Dental caries amongst certain Central African races' appeared in 1916.[51]

Colyer returned to England in 1913 for a tropical medicine course, gaining a Diploma in Tropical Medicine in the following year.

He later joined the South African Medical Corps in German East Africa, but was invalided to the Cape. As he couldn't return to England at the time Colyer practised in the Transkei territory. There he learned more about the teeth of 'the natives'. His paper on caries in some South African tribes appeared in 1919.[52] Colyer' work on the tribes allowed to draw attention to the part played by sugars and the importance of easily fermentable carbohydrates in the production of caries.

Colyer then turned to radiology and medical electricity, gaining the DMRE from Cambridge University in 1921.

He wrote the classic *Chronic infections of the jaws*. Colyer also wrote a work on dental surgery for medical practitioners with his brother, Sir Frank.

Stanley Colyer was married to Mabel. He died on 11 May 1939

[50] Katherine Godfrey, Archives Assistant, KCL.
[51] S Colyer, Dental caries amongst certain Central African races, *Dental Record* 1916; 36: 1-9.
[52] S Colyer, Caries amongst certain S E African tribes, *Dental Record* 1919; 39: 401-5.

William Warwick James OBE (1874-1965)

Warwick James (he was always known by both names together) was born in Wellingborough, Nottinghamshire on 20 September 1874. His father was a "typical self-educated Victorian shopkeeper who built up a considerable library and ensured that his sons were given every incentive to broaden their outlook". After local schooling he was apprenticed to Mr Hope, a Wellingborough dental practitioner.[53] Warwick James was soon assisting in the surgery and actually carried on the practice when Hope was away on holiday. He then went to study in London. Before leaving home his father said:

He would find some of his fellow students would drink too much ...If he could avoid drinking alcohol when he was a young man, when he passed middle age he would be glad he had done so. And he would know the value of his advice.

In fact Warwick James hardly drank and didn't smoke. At the Dental Hospital of London he attended Sir Charles Tomes' last course of lectures which stimulated a lifelong interest in comparative anatomy. Appropriately he was awarded a Tomes Prize by the English surgical college in 1922-24 for research in this field.

In 1898 Warwick James gained the LDS of the Royal College of Surgeons. He then studied medicine at the Middlesex Hospital, receiving the MRCS and LRCP four years later. 1905 saw the award of the FRCS at age 31 years, a year after he joined GOSH. In 1899 he was listed at The Laurels, Wellingborough. From his early days Warwick James had an excellent business sense. In 1905 he bought long leases on 2-3 Park Crescent for a relatively small sum of money: they later became successful surgeries.[54]

During his career Warwick James was dental surgeon (1904-1914) and consulting dental surgeon (1930-39) to the Hospital for Sick Children. He also worked at the Middlesex (1913-39) and the Royal (1907-39). Warwick James was also a successful general practitioner throughout his working life.

Even in the evenings Warwick James did a great deal of research. From 1906 he authored papers on a wide range of topics, including dental caries, cysts, pyorrhoea and fractures. His pioneering work led to a 'Report on odontomes' which appeared in with Gabell and Payne (1914). It remained "the accepted classification for 25 years".

His appointment at GOSH gave Warwick James a chance to examine dental problems in children. He summarised the dental condition of 4,850 children under 12 years and wrote an article on what we would now call community dentistry.[55] Warwick James had a special interest in mouth

[53] For a premium of £100, see Obituary: William Warwick James, hon MCh FRCS hon FDS, *Lancet* 1965; 2: 644-5

[54] B W F, Obituary: William Warwick James, OBE, MCh, FRCS, FDS, *Br Dent J* 1965; 119: 326-27.

[55] Ben W Fickling and John Boyes, 'No end to talk about'. Personal recollections of the late W W James, *Br Dent J* 1975;138: 181-187.

breathing; and also wrote on occlusion, including close bites. He cooperated with Somerville Hastings, his ENT colleague, to write two papers. His own work covered the years 1913 to 1933.

In World War I Warwick James went to Yvetot in France with the Anglo-French Red Cross. There he met such luminaries as Valadier and Kajanijian,[56] remaining friends with the latter throughout his life. Upon returning to England he worked with William Hern from RDH at a maxillofacial unit at the Third London General Hospital in Wandsworth. He was also consultant adviser to the Army. With Zachary Cope he developed techniques for mandibular bone grafting and plastic repair. Warwick James's outstanding work treating facial injuries resulted in the award of an OBE for services to Queen and country.

At the end of the war Warwick James was instructed to transfer his records to a central government depository.[57] Believing it would not be a good way to preserve them he transferred the records and large boxes of radiographs on glass to to a basement at Park Crescent. They formed the basis of his *Injuries of the jaws and face* written with Ben Fickling. What is more, by World War II all other hospital records had been destroyed, so his data was invaluable.

Warwick James was awarded an honorary MCh degree by Birmingham University in 1944 in recognition of his support for their examinations during the war.

After 'retirement' to his country house in Curry Rivel, in Somerset, Warwick James continued his research in London and Birmingham. He was an honorary member of staff in Birmingham. Amongst many publications he wrote a paper on 'Preliminary notes on the eruption of teeth' for the 1909 *Proceedings of the RSM*. He completed *Jaws and teeth of primates* at the age of 86 years. Because of his interest in compatrative anatomy he endowed a William Warwick James fellowship at RDH in 1960. At the same time the Royal instituted an annual Warwick James lecture. He delivered the inaugural address at the age of 87 years. By the age of 65 years Warwick James wrote one book and 42 articles; and he wrote another two books and 21 articles in the next 21 years.[58]

Warwick James was awarded the Tomes Prize by the RCS in 1921-3. He was a fellow of the RSM, as well as a member of the BDA and the BSSO.

His name is well remembered by practitioners for the development of a set of three elevators: straight, right and left curved.[59]

Apart from dentistry and research he had wide interests. As a mountaineer he was a member of the Alpine Club. He was a fellow of the Linnean Society and an active fellow of the Zoological Society; a member of the Anatomical Society and Geological Association; and played the cello.

[56] See Margaret Seward, Book review '*Miracle man of the Western Front: Dr VH Kazanjian*', *Dental Historian* 2008; 48: 101-2.

[57] B W F, op cit., fn. 54, p. 326.

[58] Fickling and Boyes, op cit., fn. 55.

[59] M A Bussel and R M Graham, The history of commonly used dental elevators, *Br Dent J* 2008 205 505-8, p. 507.

Warwick James was an above-average chess player. He was a friend of T E Lawrence the author.

Warwick James was honorary secretary of the Odontological Society until it merged into the Royal Society of Medicine in 1907; and was president of the its Odontological Section in 1936. He disliked committee work. His only important work in this sphere was producing a 'Report to the Army Council on the treatment of maxillofacial injuries'.

William Warwick James had six sons and a daughter. He was pre-deceased by his wife. His death at ;The Limes', Curry Rivel, came on 14 September 1965, six days before his 91st birthday. He was well and mentally alert until the day he died.[60] He was thought by Ben Fickling, the noted maxillofacial surgeon, to be "one of the most inspiring and outstanding dental surgeons of his time".[61]

Arthur Thomas Pitts DSO (1881-1939)

Pitts was the son of A Pitts.[62] Born on 3 March 1881, he was educated at Aske's School in Hatcham, Surrey. He was then articled to a dentist, S E Pedley. From May 1904 Pitts studied dentistry at the Royal Dental Hospital, where he won the Saunders scholarship and the Robert Woodhouse prize. He gained the LDS in 1906. Then came the study of medicine at the Middlesex hospital, gaining the LRCP and MRCS in 1911.

In 1914 he was registered at 26 New Cavendish Street, Portland Place, W; 1918, 64 Lebanon Gardens, Wandsworth, SW; and 1931, 50 Brook Street, W1.[63]

Pitts became a house surgeon and demonstrator at RDH. He worked from 1914 until his death in 1939 at the Hospital for Sick Children, initially as dental surgeon, later (1930-1939) as consulting dental surgeon. However his career was interrupted by World War I, so couldn't have worked much at GOSH in the early days. Pitts served with distinction from 1914 to 1919. He was the Officer in Charge of the 4th Cavalry Field Ambulance, 2nd Cavalry Division of the British Expeditionary Force. Pitts was awarded the Distinguished Service Order:[64]

"The following officer has been awarded the DSO. Captain (Acting Lieut-Col) AT Pitts, RAMC, Special Reserve. For conspicuous gallantry and devotion to duty. He established a dressing station in a forward and very exposed area to shell fire, dressing wounded and evacuating them. His courage and endurance under most trying conditions saved many valuable lives.

Pitts was twice mentioned in despatches, later receiving a Bar to his DSO.

[60] Obituary, op cit., fn. 54.
[61] Fickling and Boyes, op cit., fn. 55.
[62] N G B, Obit: Arthur Thomas Pitts, DSO MRCS Eng LRCP Lond LDS Eng, *Br Dent J* 1939; 67: 468-69.
[63] *Med Dir* 1930, vol 1.
[64] N G B, op cit., fn. 62, p. 469.

By 1919 he was assistant and then full (in 1927) dental surgeon at RDH. Pitts was also lecturer there in dental anatomy, remaining for many years until the end his career.

In 1922 Pitts became assistant and then, in 1930, dental surgeon to the Middlesex. For a time he was also on the staff of the Hospital for Diseases of the Throat in Golden Square.

Pitts was the first person to describe and suggest the pathogenesis of a rare tumour in infancy, the melanotic ameloblastoma.

He was an examiner to the English surgical college and the Universities of London, Birmingham and Liverpool. Pitts was a member of the Board of Studies in Dentistry of the University of London.

Pitts was little interested in dental politics. However he was very involved with many aspects of the British Dental Association. In 1919 he was appointed as the first scientific assistant editor of the *British Dental Journal*, defeating four other applicants.[65] Pitts was paid £100 mostly to deal with abstracts from other journals and for the provision of scientific editorial notes.

He acquired a detailed knowledge of law relevant to dental practice, was a member of the Council of the London and Home Counties Medical Protection Society and was in demand as an expert witness. Pitts was also a member of the dental committee of the MRC.

Arthur Pitts again started to serve his country in World War II. However he died on 17 October 1939 in Northwood hospital[66] whilst on full-time service in the Emergency Medical Service.[67]

He had been an outstanding member of the dental profession. As with many others discussed in this paper Pitts was a fellow of the RSM. At the time of his death Pitts was president-elect of its Odontological Section. He was also a member of the BDA (past-president Metropolitan branch) and BSSO (past-president). Pitts had wide-ranging interests and a shrewd judgement. His research, writing and teaching pinpointed him as the authority on the care of children's teeth.[68] However, according to his obituary,[69] perhaps Pitts' best work was in the domain of dental pathology.

Pitts was married to Alexandra Dorothy McCarthy. They had a son and daughter Barbara. His hobby was fishing.

Herbert Claude Apperly (1894-)

Apperly was born in Hampstead in 1894. After study at the Middlesex Hospital, in 1918 he gained the MRCS and LRCP.[70] Apperly then studied at RDH, the LDS following in 1921. In the 1920s Apperley was at Highwoods in

[65] Florence K Messer, The British Dental Journal and those who guided it, in Ronald A Cohen (ed), *The advance of the dental profession. A centenary history 1880-1980*, London: BDA, 1979, pp. 38-62, p. 54.
[66] Obit: *The Times*, 17 October 1939, p. 6.
[67] N G B, Obit, op cit., fn. 62.
[68] Messer, op cit., fn. 65.
[69] N G B, op cit., fn. 62, p. 468.
[70] The College of Physicians of London awarded him a licence to practise physic, *The Times* 1 February 1918, p. 8.

Kingswood, Surrey. By 1930 he was at 12 Chandos Street, Cavendisth Square W1 and 37 Crossways, Sutton, Surrey.[71]

Apperly became house physician and house surgeon at the Middlesex. He was dental surgeon at GOSH from 1930 to 1945, when he became consulting dental surgeon. He was also dental surgeon to the Evalina Children's Hospital in Southwark and the Mildmay Hospital, junior medical officer at Queen Mary's Hospital for Facial Injuries in Sidcup and demonstrator at RDH. In the war he was a temporary surgeon in the Royal Navy[72] which obviously prevented him treating many children at GOSH in the war years.

Apperly was a fellow of the Royal Medical Society of London.

Thomas Craddock Henry (1910-1993)

Craddock Henry (he was always known by both names) was born in Retford on 30 December 1910. After education at the local King Edward VI Grammar School he went to the Middlesex hospital, gaining the MRCS LRCP in 1935. Next he attended the Royal Dental Hospital, obtaining the LDS in 1939.

In April 1939 Craddock Henry enlisted in the RAFVR Medical Branch. He was the medical officer at RAF Cosford for two years. Craddock Henry was then seconded as a surgical registrar to East Grinstead where he was much influenced by Archibald McIndoe. He then returned to Cosford as Squadron Leader in charge of the Burns and Maxillofacial Injuries Unit.

After demobilisation from the RAF in 1945 he became a dental surgeon (later consultant) at GOSH and consultant in maxillofacial surgery at the Royal Surrey County hospital in Guildford, both of which he held until retirement in 1977. He was also consultant to the Italian Hospital in London. Craddock Henry developed the Guildford unit from small beginnings to a unit with a full spectrum of junior and senior staff able to treat both hard and soft tissues. At GOS:

The constructive mirror image possibilities of facial trauma to the benefit of facial deformities was expressed by his pioneering work with segmental surgery in the '60s which was the subject of a number of papers, lectures and a chapter in W H Archer's *Atlas of operative technique*, this work being the springboard for a number of lectures in the '70s in North America.

In 1945 the English college awarded him a Hunterian Professorship in Surgery and Pathology. On 24 April Craddock Henry delivered a lecture on 'Aviation injuries of the face'. Based on his patients at Cosford it mapped the facial trauma patterns of 250 cases. He showed they mirrored aircraft structures. This honour had also gone to his brother, Bowdler Henry, in 1936.

Craddock Henry was particularly interested in the importance of high qualitiy, properly staffed photographic departments and gave positive support to their development. 'The surgical correction of bimaxillary protrusion', his

[71] *Medical Directory*, 1945.
[72] *Dental Surgeons Directory*, 1925, p. 9.

film produced at GOSH, won the Silver Award in the 1971 British Medical Association Film Competition.

The department at GOSH had strong links with Professor David Walther's orthodontic department at RDH, as much of his work on facial deformity interfaced with orthodontics. As a result many budding orthodontists benefited from his knowledge, experience and enthusiam.

Craddock Henry was one of the first fellows in Dental Surgery elected by the RCS in 1948. He was involved with establishment of the British Association of Oral Surgeons; and was president in 1973.

His wife was Claire. They had no children. Tom Craddock Henry died on 15 January 1993.

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ARMY DENTISTRY TO THE END OF WORLD WAR II

S Bernard Spencer*

Introduction

Today army dentistry is an integral part of military medicine with male and female dentists serving in front line positions. It has not always been like this. The poor state of oral and dental health of many army recruits in the Boer War reflected that of the poorer sections of society in Victorian times. Passing through the First and Second World War years the general and dental health of the troops slowly improved; and treatment by maxillo-facial surgeons of wounds to the face and jaws gradually evolved. This paper follows the far-reaching changes in the British army.

The Victorian period and the Boer War (1899-1902)

The roots of 20th century military dentistry are associated with the Boer War, when the size of the British army grew to almost 200,000 men.[1] Some 38% of potential recruits in 1898/9 were rejected, many for poor health.[2] This was not surprising bearing in mind their social background: social depriviation, poor living conditions (many came from squalid slums) and lack of food. Of 69,553 men inspected 4,400 were not accepted due to "loss or decay of many teeth".[3] Poor dental health was just one problem. The Army Medical Services were in their infancy and dental treatment was almost non-existent.

Many recruits in the late 1890s were previously unemployed. The army provided regular and more substantial meals than those eaten by manual labourers in London. This diet plus better sanitary conditions, discipline and regular exercise helped to improve the health of soldiers but many suffered from diseases of the mouth and teeth. The situation was considerably worsened by a diet of ox meat or bully beef and hard biscuits, which many could not eat. Several thousand soldiers were hospitalised due to dental problems and many had to be discharged; a considerable loss to the fighting power of the British forces.

In 1900 Frederick Newland Pedley, a dental surgeon, was allowed to travel to South Africa to work with the armed forces provided there was no

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[1] V H Ward, *Dentists at War,* London: Minerva Press, 1996, pp. 12-13.
[2] E M Spiers, *The Late Victorian Army*, Manchester: Manchester University Press, 1992, pp. 124-129.
[3] Report of the Army Medical Department for 1903, quoted by the BDA in its 1905 *Memorandum in regard to the condition of the teeth of school children* submitted to the Committee of the Board of Education on Medical Inspection and Feeding of children attending public elementary schools.

expense to the government. He paid for his travel and took equipment mostly supplied by Claudius Ash & Sons.[4] Treatment was usually extractions without anaesthetics. In June 1901 the *British Journal of Dental Science* reported[5] the Secretary of State for War had granted permission for the army to have the advantage of the services of skilled dental surgeons and four were sent to South Africa. It said:

No doubt the present war has brought matters to a head, especially the fact brought forward in the House of Commons and fairly freely circulated in the press that a large proportion of recruits were rejected on account of the defective state of their teeth.

Army dentists would have civilian surgeons' pay, one pound per day plus captains' allowances; the government to provide equipment other than the dentists' own instruments. The journal hoped the appointments were a preliminary to a larger scheme.

Between 1900 and 1902 the *British Journal of Dental Science* indicated the considerable public concern about the detrimental effects of bad teeth on the soldiers' effectiveness. Pedley reported in March 1901[6] that disease, neglect, tough beef and hard biscuits played havoc with the teeth. One young man had only three useful teeth left. Such people were of no use as fighting men as they could no longer eat service food. He asked: "Can nothing be done to save the teeth of the Army?" Pedley suggested a dental surgeon should be attached to each general hospital.

Most defective teeth were in the "militia and yeomanry of the lower levies".[7] The *British Dental Journal* suggested it was probably due to a relaxation of the rules at medical inspections due to difficulty in finding recruits at the later stages of the war. Many men "were useless as fighting units". On 28 October 1902 W Broderick MP, secretary of state for war, reported to the House that as many as 2,451 were sent home. He said the dental condition of the army's rank and file was receiving urgent attention.

The First World War (1914-1918)

Initially men many men were rejected because of bad teeth. However, if willing to undergo treatment to make themselves dentally fit, the Army would pay for it. Many soldiers had to be evacuated for dental problems which severely affected the efficiency of fighting units. At first there was no dental corps so dentists enrolled as ordinary combattants, serving only as far forwards as casualty clearing stations. As demand for treatment grew

[4] S Gelbier, 125 years of developments in dentistry, 1800-2005. Part 7: War and the dental profession, *Br Dent J* 2005; 199: 794.
[5] *Br J Dent Sci* 1901, XLIV: 549-550.
[6] F Newland Pedley, letter to the editor, 'Dental Surgery with the Field Force in South Africa', *Br Dent J* 15th 1901; XXII: 106.
[7] Miscellaneous, Dentistry in the Army in South Africa, *Br Dent J* 1902; 23: 704-705, p. 704.

dentists began to go to some forward areas in specially fitted ambulance cars, enabling men to stay at the front.[8]

In many ways the United Kingdom lagged behind. American and some Dominion armies considered dental problems as much more important than did the British. Dentists had served in the American Civil War (1861-65) and US army dentists had served since the Spanish-American war of 1898. The Canadian and Australian[9] Army Dental Corps were formed in 1915 so the Canadians and Americans had many more dentists available, *pro rata*, for the treatment of dental problems than did Britain. There was no equivalent British corps in World War I but it did see the early formation of special units to treat maxillo-facial injuires, with specialist surgeons and dental surgeons.[10]

At the outbreak of war the attitudes of the public and the military to dental care were poor. In October 1914 Sir Douglas Haig, the senior British commander in France, developed toothache during the Battle of the Aisne. With no available British dentists he had to be treated by a French dental surgeon from Paris, which accelerated the appointment of dentists by the British army.[11] In November twelve dentists were commissioned and sent to France. If also medically qualified they became lieutenants in the Royal Army Medical Corps. Otherwise they had temporary commissions on the General List and were attached to the RAMC, with the same rates of pay as doctors. Similar conditions were granted to dentists serving the army at home. A number of laboratories were also sent to France for the construction of dentures. Dentists hoped for a separate Army Dental Service, but not everyone was in favour. An article on the dental needs of the army in the *Lancet* in July 1915 stated:[12]

Dentistry is after all only a department of surgery, and the efforts that are being made in some quarters to advocate the formation of a Royal Army Dental Corps analogous to, but distinct from, the Royal Army Medical Corps are hardly judicious.

It went on to suggest that on similar grounds it would be necessary to have Royal Army Lanygological or Ophthalmological Corps:

There is no reason why every member of the Royal Army Medical Corps should not be called upon to possess a knowledge of dental surgery in addition to his knowledge of other surgical specialities, and this could be done as was pointed out in our columns, by Mr Morton Smale, as far back as March 12th 1910 if the help of experienced dental teachers was sought.

[8] A J Michelson and J C Muston, *History of the Army Dental Service*, London: War Office, 1959, p. 2-3.
[9] N T Wright, The Original Six, *Australian Dent J* 1977; 22: 251-259.
[10] Michelson and Muston, op cit., fn. 8, pp. 3-4.
[11] V H Ward and M J Newell, *A History of the Army Dental Service*, Aldershot: R A D C Historical Museum, 1997, pp. 13-21.
[12] Anon., The War: dental needs of the army, *Lancet* 1915, 2: 43.

A reply soon came. In no uncertain terms A Sherwood Anderson, a dentist, wrote on 31 July[13] that dental surgeons were trained for years to treat dental disease. However skilled a doctor was he could not possibly reach the same expertise.

On 18 December 1915 the *Lancet* reported that Sir Kinlock-Cooke had asked the under-secretary whether, in view of the importance to officers and men at the front of having their teeth properly attended to, he could see his way to appoint some consulting dental surgeons to ensure greater efficiency of the army. Mr Tennant answered:[14] "I assume the honourable gentleman is referring to the troops in France and the Mediterranean and not to troops at home." He said a considerable number of full-time dentists had already been appointed to go with Canadian, Australian and New Zealand contingents and to voluntary hospitals. Kinlock-Cooke then asked if Tennant was aware of the increasing numbers of men being invalided home on account of bad teeth. There were eight Red Cross hospitals in France without a dentist. In view of the need to maintain an efficient army, "could he consider making more dentists available to accompany the troops".

By the time the war was reaching it final phases the situation had changed dramatically. The secretary of state reported in January 1918 that qualified dentists were supplied on demand by the commanders in the field. He said:[15] "I have no reason to suppose that they have asked for less than they thought necessary. Also specifically qualified dental surgeons for the treatment of jaws and facilal injuries are being supplied."

Maxillo-facial surgery

The Americans led the new field of maxillo-facial surgery. It was a direct consequence of having to deal with the terrible war wounds, mostly due to trench warfare where the head and face were much more exposed than in previous wars. Professor Martin Kazanjian, head of prosthetics at Harvard Dental School, was sent to France in 1915 to treat face and jaw injuries.[16] Kazanjian[17] found many untreated facial wounds so he and some colleagues built up maxillo-facial services, treating over 3,000 wounds.

In Britain William Kelsey Fry was attached to the Welsh Fusileers. On the Western Front he was injured, awarded a Military Cross and invalided home. He then reported to the Cambridge Hospital in Aldershot, joining two other RAMC officers, McGill and Rowbotham, in charge of the dentists and technicians.

In 1915 Harold Gillies, an ear, nose and throat surgeon, joined Auguste Charles Valadier, a French-American medically-qualified dentist and the first dental surgeon to be given an honorary commission in the RAMC. Having

[13] A Sherwood Anderson, letter to editor, *Lancet* 1915; 2: 431.
[14] Parliamentary Matters: Dentists and the army, *Lancet* 1915; 2: 251.
[15] Parliamentary Matters: Dentists and the army, *Lancet* 1918; 1: 199.
[16] E K Curtis, Dentists at war, *J Amer College Dentists* 1996; 63: 31-2.
[17] See Margaret H Seward, Book Review of Hagop Martin Deranian, *Miracle man of the Western Front. Dr Varaztad H Kazanjian, pioneer plastic surgeon*, *Dental Historian* 2008;.48: 102.

learned a great deal from Valadier Gillies returned to England as a plastic surgeon. He joined Fry to create the first specialist unit. In 1917 they transferred to Queen Mary's Hospital, Sidcup, where they treated many soldiers with facial injuries, frequently from gunshot wounds. It became a training centre for plastic and oral surgery.

The inter-war years (1918-1939)

Much time was spent in the inter-war years on improving the dental health of the armed forces.[18] Because of unemployment, in the early years there were plenty of potential recruits, but many required extensive dental treatment. Poor dental health was again the main factor for rejection. Their bad dental condition was mainly due to the socio-economic environment from which they came. There was massive unemployment, often not enough food and sanitary conditions were poor. Oral hygiene and dental treatment were way down any list of priorities: most households did not have a toothbrush; and dental visits were mainly for acute emergencies.[19] The school dental service was in its infancy. Dentists were very much the butt of music hall jokes and a visit was to be feared. Many recruits needed ten or more fillings. If going overseas they often needed treatment in a short space of time. After any necessary treatment at their own expense rejects could re-present themselves to the services.

From 1921 minor treatment could be provided by the new Army Dental Corps. Towards the end of the 1920s the number of recruits fell, so lower dental standards were accepted. However men had to agree to being made dentally fit as soon as possible: they could not proceed overseas unless this was done. It required a considerable increase in the number of dental officers needed, so recruitment of dentists was stepped up in 1928 and 1929.[20]

Aware of a possible war, in 1932 the Army Council asked John Percival Helliwell to chair a group consisting of [later Sir] Harold Gillies, [later Sir] William Kelsey Fry and William Warwick James, plus Samuel Hamilton Woods as secretary, to prepare a report on the expected maxillo-facial injuries in the event of modem warfare. They considered knowledge of experiences from World War I and Spanish and German sources. Their report advised on injuries to the face and jaws and the necessary training of dentists to provide preliminary and later treatment. They recommended: [21] a special hospital for the treatment of maxillofacial injuries rather than special departments of general hospitals; cases should be treated by surgeons or dental surgeons; unless needing plastic surgery patients should be looked after by a dental surgeon. The report was accepted by the army and the Ministry of Health. The ministry's principal dental officer, Henry Alvin Mahoney, identified

[18] Lesley J Godden, *History of the Royal Army Dental Corps*, Aldershot: Gale and Polden, 1971, pp. 22-23.
[19] Ward and Newell, op cit., fn. 12, pp. 49-50.
[20] Godden, op cit., fn. 19, pp. 22-23.
[21] H Gillies, *Report to the Army Council on maxillo-facial injuries*. London: HMSO, 1936, quoted by B W Fickling,The marches of dentistry, *Annals Roy Coll Surgs England* 1978, 60: 187.

hospitals for potential use; including Basingstoke, East Grinstead, Hill End and Roehampton. When the war started dental surgeons were allocated to them on a full-time basis.

Formation of the army and other dental services

Clearly the war had made its mark on the need for dental care. On 11 January 1921 the secretary of state for war, Winston Churchill, signed Special Army Order No 4 to announce King George V had agreed to formation of an Army Dental Corps, ten years after formation of the American Corps. It had 107 dental officers, 107 dental clerk-assistants and 25 dental technicians.[22] On 28 November 1946 another Special Army Order from The War Office announced that King George VI had agreed to the title 'Royal' being bestowed on the corps. Dental services were established by the navy in 1921 and the RAF in 1930.

The Second World War (1939-1945)

Because of the small size of the peacetime army dental standards for recruits were kept high. In 1937 98.3 per cent of recruits needed treatment. After the Munich crisis in September 1938, when war seemed likely, the standards were relaxed to take in more recruits: all had to be made dentally fit as quickly as possible. Given the requirements of active service, where soldiers must stay at their post, dental fitness had to be maintained. From the formation of the Army Dental Corps in 1921 it was recognised that a soldier who could not eat his field rations was not fit for active service so must be made dentally fit to carry out his duties. It considerably raised the standard of dental health of the troops.

With the advent of war in September 1939 the army dramatically increased in size, with an urgent need for treatment. The number of dentists with the British Expeditionary Force in France and Belgium was under-strength so many civilian dentists were called up. Military dentists served wherever the troops went: most to France with the BEF, others to the Middle East and India,. Mobile dental units were at the North African and Italian campaigns and dental officers served at the various front lines.

The war with Germany was the first major campaign since formation of the ADC. Dental officers and their staff were sent to field ambulances, casualty clearing stations and large hospitals in Europe. The daily sick parades were well attended. Many soldiers in France urgently needed dentures. There was an overall shortage of dentists: one dentist to 4,585 troops was not enough.

By December the serious waste of fighting men due to dental disease was being taken seriously. Most recruits were in poor dental condition. The Army tripled its peacetime size. Few of the dentists sent to the BEF in France had much military experience but were told to ensure the soldiers' dental fitness.

In July 1940 orders were given for 60 mobile dental caravans to serve in frontline areas, preventing many wasted man-hours as the troops could stay

[22] Godden, op cit., fn. 19, p. 11.

during urgent treatment.[23] By then administration was in the hands of senior dental officers independent from the Medical Corps.[24]

All dental officers were given short courses by senior ADC consultant oral surgeons on the treatment of maxillo-facial injuries. It enabled initial treatment to be given in the forward areas before the soldiers were moved to a base hospital, dramatically improving the end results.

By the time the evacuation of the British Army from Dunkirk began in May, many major hospitals, including Dieppe, had been overrun by the Germans. Several officers and men of the Dental Corps were killed in action; a considerable number remained behind as prisoners of war to care for the wounded; and sixty-three were evacuated from the Dunkirk beach.

To compensate for a serious shortage of dentists, in 1941 the age limit was lifted to 40 years: it raised the numbers from 1,647 to 2,050 by 1945. From 1943 a number of women dentists were accepted into the Corps.[25] At first only males were dental orderlies (chairside assistants and clerks) but by October 1942 many women began to take over these tasks.

Some dental officers attached to medical units received instruction in general anaesthesia so they could be used as anaesthetists if required.

It was abundantly clear efficient dental treatment had a high priority in keeping the troops in good fighting order. Special training of dental personnel began in earnest towards the end of 1942. Prior to the invasion of Europe in June 1944 every effort was made to keep soldiers dentally fit. By April treatment had been carried out on all personnel in the Home Commands: only 4% still required care.[26] The High Command was aware there could be many wasted man-hours, as in previous campaigns, if soldiers left the front line due to dental problems. It was determined to have dentists serving at the front to relieve any dental emergencies, especially where there were rapid changes and advances in front line positions.[27]

In May, all the troops went into sealed camps. Dental surgeons and attached personnel were dropped with the first airborne and commando troops during the early hours of D-Day, 6 June, north-east of Caen in Normandy. They were with the 6th Airborne Division as part of the field ambulances. The divison was to seize bridgeheads for advancing troops, so emergency treatment had to be immediately available. For the first time in its history the Corps had sufficient personnel and equipment to carry out its duties. It was instrumental in preventing many wasted man-hours of front line troops due to dental disease. Many captured prisoners also received treatment from the Corps, as laid down by the Geneva Convention: no mean feat when one thought of its other commitments. By the end of D-Day 20 dental officers and support staff had arrived, with various field ambulances and casualty clearing stations. The dentists also did valuable work giving anaesthetics and assisting with minor operations; the men often acted as stretcher bearers.

[23] Ward and Newell, op cit., fn. 12, pp. 69-70.
[24] Michelson and Muston, fn. 8, pp. 7-10.
[25] Ward and Newell, op cit., fn. 12, pp. 61-62.
[26] Godden, op cit., fn. 19, pp. 68-69.
[27] Godden, op cit., fn. 19, pp. 70-71.

In the early days of the invasion most demand for treatment was for the repair of dentures broken during the assault and for maxillo-facial wounds. Because of improved oral hygiene and the use of penicillin there was little incidence of acute ulcerative gingivitis ('trench mouth'), a major cause of pain and infection in World War I.[28]

Maxilo-facial surgery in World War II

In 1939 the Civilian Emergency Medical Service and RAF set up several combined plastic surgery and maxillo-facial surgery units at different centres in England. Maxillo-facial teams were formed in 1940 and sent to France. A senior dental consultant was appointed at the main medical base in Dieppe. He worked with a consulting RAMC surgeon to give preliminary treatment to maxillo-facial injuries before the patients were evacuated to the UK. The units in Dieppe and Boulogne were overrun by the Germans. Much experience was later gained in the Middle East and North Africa. Gillies and his guinea pigs (many of whom were badly burnt RAF officers) became famous. The early high-quality specialist treatment in these specialised units was of enormous benefit to casualties suffering from distressing injuries. More than 15,000 patients received treatment in these units.[29]

The number of maxillo-facial injuries was initially lower than anticipated but began to increase during the prolonged battle for Caen. There was then a large increase in the number of mobile dental units available for the expected rapid movement across the Rhine and onwards across Northern Germany: three were allocated to each infantry division.

In World War II, That dental surgeons could treat maxillo-facial injuries much more successfully than previously greatly raised the morale of soldiers wounded with disfiguring injuries.[30] Ward and Newell discussed their treatment in the Western Desert,[31] pointing out the importance of initial treatment of casualties in the field by dental officers prior to their evacuation to Egypt.

Deaths, honours and awards

Many dental personnel were taken prisoner during the rapid German advance in May/June 1940. In Hong Kong and Singapore dentists captured by the Japanese spent several years in prison camps. They helped to provide dental treatment, often with great ingenuity. The materials required for treatment were extremely limited, if available at all.

In addition to the expected D-Day hazards there were heavy seas, underwater obstacles and obstructions. Dental personnel ran the same risks as their comrades. The dental officer to have the dubious honour of being the first to die was Capt J A R Jameson, killed at Dunkirk on 1 June 1940.[32]

[28] Godden, op cit., fn. 19, pp. 71-73.
[29] Godden, op cit., fn. 19, pp. 153-154.
[30] Michelson and Muston, op cit., fn. 8, pp. 11-12.
[31] Ward and Newell, op cit., fn. 12, pp. 84-66.
[32] 'Roll of Honour (1939-1945) The Army Dental Corps', in Godden, op cit.,

Private R Harris was the first 'other ranks' soldier to die and be buried at sea on 25 May 1940. An officer of the 8th Field Ambulance, Captain F A Street, received an immediate Military Cross for his actions on D-Day. Capt R E Savage, dental officer of 211 Field Ambulance was killed in an enemy air attack and Capt C V Lyle was badly wounded. Capt Chaundy, with the 224 Parachute Field Ambulance, 6th Airborne Division, was killed in action during an air drop near the Rhine on the 24 March 1945.[33]

As the major crossing of the Rhine began the number of maxillo-facial injuries rose dramatically due to snipers and spandau (machine gun) fire. Even small entrance and exit wounds often caused extensive swelling of the pharynx and floor of the mouth, with grave risk to breathing. Such wounds required urgent and immediate treatment if lives were to be saved. But there was still a need for repairs to broken dentures, causing masticatory problems. Field dental laboratories were made available in the forward areas for this work to be carried out quickly. Once the armies left Normandy they rapidly fanned out into Belgium, Holland and Germany, accompanied by dental personnel.[34]

Whilst leading a group of stretcher bearers in the Kohima area of Burma in May 1944, Capt M Freeman came under mortar fire from the Japanese. [38] Instead of taking cover he attended to the wounded with complete disregard for his own personal safety, Eye witnesses said his behaviour prevented further casualties. Freeman received a Military Cross for his gallant behaviour.[35]

In all 32 officers and 42 other ranks were killed or died on active service. One hundred ADC officers and men were prisoners of war. One who escaped was Private A Coe, who managed by ingenious methods to reach England. He was later awarded the Distinguished Conduct Medal.

Some final notes

There was an enormous growth in the army dental services during World War II.[36] More than 2,000 officers attended basic military courses and nearly 600 undertook a course on maxillo-facial injuries. In 1914 there were twelve dental officers; by 1918, 850; 1939, 205; and by 1945, 2050. Nearly 15,000 men had maxillo-facial surgery. The RAF plastic surgery units also needed maxillo-facial surgeons to treat the many head and neck wounds and burns suffered by aircrews.

Between 1939 and 1945 there were 20,353,073 visits for dental treatment and 7,817,547 course of completed treatment.[37] This figure does not represent actual numbers of people as many would have attended for more

fn. 19, p. 181.
[33] Godden, op cit., fn. 19, pp. 77.
[34] Godden, op cit., fn. 19, pp. 78-79.
[35] Others are listed in Godden, op cit., fn. 19, pp. 183-4.
[36] Michelson and Muston, op cit., fn. 8, pp. 13-21.
[37] Godden, op cit., fn. 19, pp. 23-26.

than one course. By the time war ended the dental health of most troops had improved dramatically.[38]

Female dentists served with the ADC from 1943, but after the war ended they returned to civilian life. The first woman regular RADC officer, Ruth Carol Bissett, was not commissioned until 1970.[39] Today there are many serving women dentists

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[38] Michelson and Muston, op cit., fn. 8, pp. 14-23.
[39] Ward and Newell, op cit., fn. 12, p. 67.

NATIONAL SERVICE IN THE ROYAL ARMY DENTAL CORPS IN NIGERIA 1951-1953

W A B Brown* +

National Service call-up in the U K

The National Service Act came into force at the beginning of 1949 and all able bodied men were liable to be called-up. The majority went into the army, fewer into the RAF and the smallest number into the Royal Navy. The last intake was in 1960. At that time they served for two years.

I was resigned to doing National Service after completing five-years training to be a dentist followed by a house job at Guy's Hospital. I was 24 years old and elected to spend my two years in the army. In 1951 I was instructed to report with twenty other newly qualified dentists, to the Royal Army Dental Corps (RADC) Training Establishment in Aldershot. I was immediately commissioned, as were all doctors and dentists. As 1st Lieutenant Brown I escaped the rigours of being 'knocked into shape' as a private soldier or cadet to serve King and Country.

After six weeks we were thought to be adequately prepared to be officers in the British army and sent to work in army dental clinics in the UK. I went first for a few weeks to a dental clinic at Woolwich, then to one in Shorncliffe Camp at Sandgate near Kent for two months and finally to the Buff's regiment clinic near Dover where I lived in the officers' mess within the Dover Castle precincts.

Disappointingly, the surgeries of the three dental clinics were inadequately equipped. What was worse for a newly qualified dentist was to be told what treatment I was allowed and not allowed to do. On occasions, I was told only to do emergency treatment for National Servicemen as they would soon be out of the army and then they would be the responsibility of the NHS. I became dispirited with the curtailment of my professional skills by senior officers who appeared more concerned with my clothes and whether or not I saluted them correctly than my clinical competence.

While at Dover I received a copy of an *Urgent Memorandum* from The Secretary of State at The War Office in London. It was sent to the General Officer Commander-in Chief, Eastern Command on 17 August 1951. It stated: "The under mentioned officer, R.A.D.C., is required for service overseas in West Africa (Nigeria – disemplane Lagos) - Lieutenant W.A.B. Brown (415087) Gp. No. 51.05." So I was on my way to Africa.

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And so to Nigeria

I look back in wonderment on my flight by Dakota to West Africa. Today it takes less than twelve hours to fly from Heathrow to Lagos, but in 1951 it took us two-and-a-half days with two night stopovers and three extra stops to refuel. The army must have found that flying personnel to their overseas postings was more economical than sending them on a leisurely two-week sea trip in an Elder Dempster Line ship. On the way to the airport we were handed a booklet describing the kind of life we might expect in West Africa, but the information bore little resemblance to what I eventually discovered. When we landed at Kaduna airport in Nigeria I was handed orders to disembark there and not go on to Lagos. I was greeted by the dental officer, Captain David Baxter, who informed me I was replacing him. We travelled for fifteen minutes in an army truck along a sandy road lined by mango trees to my home for the next seventeen months. The 44 Military Hospital was isolated in its own grounds of fifty or more acres not far from the Governor General's house and within walking distance of the Kaduna Township to the southeast. Baxter introduced me to my future life where I was to be responsible for the dental health of the soldiers of the Royal West African Frontier Force (RWAFF). I was to live and sleep in a room known as a *gida*, one of four in a block with a narrow communal veranda, which I was to share with the medical specialist, surgeon and medical officer for the military families, all National Service doctors.

After lunch, much to my surprise, everyone retired to their room for a siesta. No work was done after 1pm, except for emergencies and ward rounds. That became the pattern of my life whenever I was in Kaduna, north east of Lagos.

I was surprised to learn that only National Service personnel commissioned as officers were seconded to the RWAFF and only regular soldiers of the rank of sergeant and above were posted there. The absence of British 'Other Ranks' was to be a crucial influence in the type of dentistry I would experience.

On the first morning Thomas, my batman, awakened me from a deep sleep at 6.30am. I rose immediately with the usual enthusiasm of one waking up the first day amidst new surroundings. Breakfast was fruit, orange or grapefruit, followed by two eggs, fried bread and bacon, rounded off by toast and marmalade. A Paludrine tablet, a preventive against malaria, was put on everyone's side plate and I took one every morning throughout my stay in West Africa and escaped the debilitating disease. Salt tablets were also available.

Dentistry in Kaduna

After breakfast, David took me across to the Dental Centre, a three-minute walk from the gidas. I was introduced to Sgt Tapp, a British Non-Commissioned Officer (BNCO) dental technician, Cpl Sylvanos Oko who ran the centre and Pte Akujuobi, his assistant, the last two of the RWAFF (Fig 1).

The Dental Centre was a single storey 25-foot square building divided to

provide a spacious surgery and a smaller laboratory. A veranda served as a waiting room.

There were eight patients waiting to be seen: two African women, five African soldiers and one BNCO. The two African women were wives of colonial workers, one in the Public Works Department (PWD) and the other a policeman. The civilian dentist was out of town and there was a reciprocal arrangement between the army and civilian dentists to stand in for each other.

Figure 1 Outside the dental centre: from left to right Sgt Tapp, the author, Cpl Sylvanos Oko and Pte Akujuobi.

The policeman's wife at first refused to open her mouth but was persuaded by her husband. When he pointed to the offending tooth, she made a tentative bite at his finger, calling forth a torrent of words from all assembled and a kick or two into the bargain from her husband; subsequent treatment was more easily given. It was a surprise introduction to dentistry in Africa. The following morning, the African woman whose husband had kicked her into submission came in smiling and obediently did all that she was told.

Baxter returned to England a few days later and I was on my own, left to discover how I would take care of the dental health of the soldiers and families of the RWAAFF. In Kaduna, I was responsible for two thousand men in two battalions and several service corps. In Zaria, 50 miles to the north I looked after one thousand men; and in Enugu, nearly 400 miles to the south, another thousand men. The families of these soldiers were also entitled to treatment. I had a completely free hand on how I organised my day's work.

My senior RADC officer was stationed 700 miles away in Accra in the Gold Coast (Ghana). I soon learned the only people from whom I could seek advice were my ever-helpful medical National Service colleagues. In retrospect it is interesting to reflect that nobody in the RADC Command questioned that a dentist qualified just over a year would be able to manage on his own, especially as the needs of the European servicemen were just as complex in West Africa as they were back home. I soon learned that my senior RADC officer's main preoccupation was how many fillings I did each month. That was

paradoxical as I discovered after a few days of seeing African patients that their dentitions were different from those of the Europeans. To all intents and purposes they were absolutely free of caries: very few African soldiers needed any fillings. They had different dental requirements. This was such an obvious fact; I could never understand why my superiors in Accra were always asking me to do more work. There simply was not the demand for treatment of the kind that existed in the UK. I subsequently learned that unless a Nigerian applying to join the army had perfect dentition, he would not be recruited.

There was very little restorative dentistry for me to do. However, I extracted many structurally sound teeth because of very severe periodontal disease, a condition that led to the destruction of most of the supporting bone. Their removal was a very simple procedure. Occasionally, however, a molar tooth would have to be extracted because of a dental abscess arising from rare dental decay. In those cases, the supporting bone securing the teeth in their sockets would be intact and extracting the tooth could entail an elaborate surgical procedure.

There were some special situations. The Africans frequently filed the opposing corners of their upper central incisor teeth at an angle of 45°, to form, for aesthetic reasons, an inverted "V". Little did they realise the damage they were doing. The filing took away the outer protective enamel of the tooth and exposed the underlying dentine leading to the tooth pulp, which often became infected and died. Subsequently an apical abscess developed or a large invasive cyst formed in the bone round the apex of the root of the tooth. I treated these cysts by root filling the tooth, exposing the overlaying bone and removing the lining of the cyst. If I had to extract the tooth, I would replace it with a tooth on a small denture and file the opposing corner of the artificial central incisor tooth to match the original filed tooth.

Nigerians did not have impacted molar teeth that are so familiar in the UK. They usually had big enough jaws to accommodate all their teeth. Also, their teeth are reduced in size by wear caused by eating yams and cassava with associated grit. The wearing away on the interstitial surfaces could be as much as 2-3 mms per tooth, which was equivalent to the mesio-distal length of a third molar, so making adequate room to enable the third molar to erupt correctly into the mouth. A similar explanation would account for dentitions in which four additional premolars developed and erupted and found enough space to function normally.

One day a six-foot tall, robust looking soldier had to have a tooth extracted. After I gave him his injection, he suddenly got up from the chair and said: "Sir, I have strong *ju-ju* to protect me against the metal of my enemy's weapons so, Sir, It's on my belt. I don't want to damage your instruments." He proceeded to remove a little leather sac tied to his belt with a thong. I thanked him for his consideration.

When the colonial dentist was away, civilians from Kaduna and the surrounding villages would come to the Army Dental Centre for emergency treatment. They were usually straightforward emergencies, but one day I was

faced for the first time with a condition I knew I could not treat. A woman in her fifties who spoke no English, and for whom Corporal Sylvanos, translated, said the *ju-ju* doctor had blown white dust into her face and caused a lump to grow in her mouth. She asked if could I get rid of it. I looked in her mouth where there was a large irregular shaped swelling of the palate and back of the mouth. It was a tumour of a kind I did not recognise. I had no alternative but to send her to the civilian hospital and hope somebody there could treat her. I never heard what happened to the lady and she still remains to remind me how limited my skills were.

Availability of materials and output

One of the trials with which I had to contend was the unreliable delivery of essential materials. In my first week at Kaduna I discovered there were no more local anaesthetic cartridges in spite of them having been ordered by my predecessor from the UK many months earlier. The hospital pharmacist told me it would be months before I could expect any to arrive. I borrowed some from Mr Black the civilian dentist. As I was concerned with the prospect of running out again, I wrote home to have a supply sent privately.

Local anaesthetics were not the only shortage. I recall how thankful I was that materials essential for making dentures, ordered from the UK over a year earlier, arrived at the Dental Centre. Each administrative authority blamed the other for their inefficiencies.

When the senior visiting dental officer came from HQ Accra in the Gold Coast, he noted from my records that I was doing a fair amount of minor surgery. He told me I should concentrate on doing fillings and nothing fancy. We can always send anyone in need of surgery, home to England. When I suggested I might be saving the army money, he was dismissive. He also complained that I wasn't doing enough fillings. "It is understood", he said:

Here in West Africa there isn't the same need for dentistry as at home. I know you cannot do the same number of fillings so, when you send in your returns, just multiply the number of fillings you do by three."

I told the colonel that if he wanted the figures altered, he'd have to alter them himself. I would record only the exact amount of work that I did.

When a new colonel arrived at Accra I received a letter from him a month or two before I was due to return home. He referred to my especially low attendance figures and the inevitable "low conservation" returns. I felt irritated by his letter because I believed that during my time in Kaduna I had done all the restorations found to be needed at the regular dental inspections I made of the battalions. I was confident and pleased as a matter of professional pride that the dental health of the African soldiers for whom I was responsible was well under control. I was never called out for emergency treatment during my 18 months in Nigeria. However, I could not guarantee the same for the European

military personnel, as it was mainly left to them and their families to decide if they wanted treatment from me. The colonel wrote:

I am new to this Command and am completely ignorant of local conditions and your trials and tribulations, but I do ask you to do your utmost to step up these figures for fillings, it will ease my burden somewhat and avoid some adverse criticism from the powers that be. It may give you a lead to tell you that the other Dental Centres have brought their monthly averages to over 100 conservations. To be perfectly frank, I see no reason why a daily *average* of six fillings should not be maintained for every working day ... Anyway, do your utmost to increase the output. I regret having to make these observations & especially so soon after my arrival, but I can assure you it is not from choice - I get the unenviable task to do & must just do it.

I wrote an immediate reply to explain why I was not able to increase the number of conservations because I had already completed all the treatments that I had discovered were needed.

Itinerant dental officer in Zaria

As well as looking after the dental health of the battalions in Kaduna, I was responsible for the RWAFF training battalion at Zaria, 50 miles to the north by road plus the battalion stationed in Enugu about 400 miles to the south by train. There were between 800 to 1000 African soldiers and 30 European officers and BNCOs at each centre. The big challenge we had was to take all the moveable dental equipment except the heavy adjustable dental chair from Kaduna with us when we visited these battalions. We, also, took along an old fashion pedal drill in case of a power failure. If dentures were needed, we also took all the processing equipment. Cpl Sylvanos Oko, with the help of Pte Akujuobi, very competently made sure everything was packed and I don't ever remember anything being overlooked.

I travelled to Zaria in the cab with the driver of a three-ton truck with Sylvanos and Akujuobi, with the dental equipment in the back of the truck. As we travelled northwards out of Kaduna, the Macadam road ended and was replaced by a sun-baked clay and laterite surfaced road which, as we drove along, left a long pinkish plume of dust to trail behind.

As we travelled north the scenery imperceptibly changed. The trees that had survived the bush fires were larger and patches of cultivation could be seen. There were many more termite anthills of all shapes and sizes: short and tubby, large and fat, tall and shiny and small and shiny. They had an irregular four to six foot wide base and could be six feet or more tall, which one could imagine as the kind of city that would be found in the world of fairies.

On the approach to Zaria the road skirted round the old walled town. The wall, a quarter to a half-mile in length, was constructed of mud that, in many parts, had crumbled away. Today, Zaria is a picturesque town occupied by the

Hausas, ruled over by an Emir who lives in a substantial palace. We drove past the European trading centres and after a short journey came to the officers' mess where I was allocated a circular mud bricked walled building with a thatched roof and all modern conveniences.

In the time available it was impossible to check the dental health of 800 men with the usual 20 minutes needed to make a proper examination. Even sitting a man in a dental chair, adjusting the headrest and the light to look in his mouth and updating his dental chart would take ten minutes. I soon realised that Africans very rarely had decayed or missing teeth of the kind that prevailed in the Army in the UK and their teeth were usually perfectly aligned and worn down, so that it was very easy to see any evidence of decay. So, I devised a very simple procedure for examining the African battalions with the maximum of speed and efficiency, which made sure that any serious dental problem was quickly identified and treated.

While the companies of the battalions were paraded, I stood on a raised platform wearing an operating gown and with the sun behind me. Sylvanos arranged for each soldier to step forward in turn. When they stopped in front of me they opened their mouths. With two clean mirrors I retracted their cheeks, and looked round the lower and then the upper teeth. Any necessary treatment was immediately obvious. I called out to Sylvanos what had to be done and the soldier was given an appointment to be treated by me later.

And then to Enugu

Enugu was 400 miles to the south of Kaduna. I received orders from Headquarters in Accra to undertake a dental inspection of the RWAFF battalion. I was to take Sgt Tapp, the dental technician, a very skilled craftsman.

I had nine days in which to examine 900 men and carry out any treatment, so my professional routine at Enugu was considerably different from that at Kaduna. I started work at 7 am and hoped to complete all the necessary inspections and treatments by 9 am, when I joined my fellow officers for breakfast. By 10 am I returned to the Medical Inspection room, a half-mile walk from the mess, and worked until lunchtime. I gave up my routine afternoon siesta and treated patients for an hour-and-a-half to two hours. It suggests that life must have become very leisurely in Kaduna for RADC officer Brown.

When the senior dental officer in the Gold Coast (Ghana) became ill I was posted there for three months, travelling to treat the battalions in Kumasi and Tamale.

Postscript

When I arrived in Nigeria, I had an insatiable desire to discover all I could about the people and the country. I had plenty of time available to explore because, in Kaduna, we worked only from 8 am until midday. But slowly my energy declined. We all wondered why we felt so enervated. We attributed it to the weather: its sameness, humidity and heat, depending on the time of year. We blamed the lack

of food for our lethargy, for we were disinclined to eat in the hot weather. I suspected the lack of adequate mental stimulus slowed our brains down to match the unchanging environment in which we lived. It was easier to play tennis or hockey or cards than read a book.

During the last few months of my stay in Nigeria, I was exhausted and had an insatiable desire to sleep. I would sleep during the afternoon and was ready for bed at 9.30 pm. It was a struggle to get up in the morning. As the weeks passed I became increasingly passive and docile. By the end of my stay I would not have been surprised if, in looking in the mirror, I saw a cabbage winking his eye back at me. Remarkably I was totally at peace with myself and could have imagined myself sitting quietly in a chair all day watching the world go by as if it was nothing to do with me.

The RADC and the Army

There simply wasn't enough work to justify a full time dental officer in Kaduna. As it was I travelled to Zaria for three days at a time, to Enugu for three weeks and to Lagos; and I was in the Gold Coast for three months. If I could be spared away from Kaduna for all those weeks and there was no dental crisis in Kaduna, it suggests the dental requirements were greatly over-estimated.

However, as critical as I may be about my experience of the army, I gained useful professional experience. More than that, I gained from my time in Nigeria an incalculable depth of knowledge and understanding about a country and its people which has proved to be an invaluable model with which to compare and contrast the British way of life.

The Regular Army was not always happy with having to deal with the National Service conscripts, particularly the older ones. There was no use shouting at us! However, I had the highest regard for the professional knowledge and skills of my RAMC and RADC National Service conscript colleagues. I suspect the Regular Army greatly benefited from having the services of many highly qualified National Service doctors who, in ordinary circumstances, would never have thought of choosing the army for a career.

My time as a National Service officer in the army was a rewarding experience introducing me, while in West Africa, to a world I had only known in fiction. I am especially grateful to the many soldiers in the Royal West African Army Frontier Force who taught me so much about their country. As a dental officer I gained broad professional insights that helped me to decide my future career. My survival in the army was very dependent on the give and take and understanding that existed between my fellow National Service officers and the support of assisting staff. I was fortunate to travel extensively and experience so much of the rich and varied cultures of West Africa.

Acknowledgement

I want to pay a special tribute to Corporal Sylvanos O Oko. He was responsible for the efficient running of everything to do with dentistry and the army wherever I had to work in Nigeria. I used to receive signals from Accra headquarters telling me when I was to visit the different battalions outside Kaduna. I trusted Sylvanos implicitly to organise the clinics and arrange tours for dental inspections in Zaria or Enugu.

ONE HUNDRED AND FIFTY YEARS OF THE ODONTOLOGICAL COLLECTION

Milly Farrell*

Introduction

The museums' department at the Royal College of Surgeons of England has held an extensive dental collection since the early twentieth century. Currently known as the Odontological Collection, this assortment of over eleven thousand dental specimens has an elaborate history that dates back to the mid 1800s. Care of these items has been transferred between societies and museums up to its present residency in the stores of RCS. The origins of the collection date back to the Odontological Society of London, which was first founded in November 1856 and was initially based in accommodation rented from the Medical Society of London in Hanover Square. In 1858 it opened the Dental Hospital of London in Soho Square which provided a more permanent home for the society.

Figure 1 A collection of Transactions from the Odontological Society of Great Britain, currently held at The Royal College of Surgeons of England

The minutes recorded in the meeting's transactions of January 1859 (Fig 1) show the new home of the society facilitated the gradual accumulation of "books, drawings, diagrams, casts or preparations" which could be made available for further research in the field of dentistry.[1] In the 150 years since this suggestion was made a collection has been established that rivals dental research sources on an international scale. The main purpose of its existence, to enable further investigation and research, has remained unaltered.

The initial proposal was to build a credible library and functioning museum which could be made available to those involved in the field. Although the original museum and library no longer exist, the specimens collected for the

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[1] A E W Miles and J W White, One hundred years of the Odontology Museum, *Proceedings of the Royal Society of Medicine* 1959; 52: 29-34.

original Odontological Society's Museum survive in the care of The Royal College of Surgeons of England in Lincoln's Inn Fields, London. This paper presents the history of the collection from its conception in 1859 to the present. The historical context of some of the specimens are reviewed in further depth to give an individual insight into their impact upon the collection. It is appropriate to review the elaborate history of this diverse collection this year, as 2009 marked 150 years since the Odontological Collection came into existence.

Origins of the Collection (1859-1909)

The people listed as present at the previously mentioned 1859 meeting include such eminent dentists as Samuel Cartwright (1789-1864), Robert Nasmyth (1792-1870), (later Sir) Edwin Saunders (1814-1901) and (Sir) John Tomes (1815-1895). These founding fathers added considerable weight to the establishment of the Odontological Collection, making it inevitable that the collection would develop into an unparalleled resource in dental anatomy and pathology. The first recorded contribution was of a hippopotamus skull donated on 2 April 1859. In 1860 Edwin Sercombe (1826-1875) was appointed as the first official curator of the Odontological Society's Museum. In 1863 the College of Dentists was absorbed into the Odontological Society. This amalgamation resulted in the addition of a large selection of dental specimens from that college's museum, which had been collected since its foundation in 1856. The transfer of this museum to Soho Square is recorded in the College of Dentists' minutes book of 1863. The exact size and scope of this acquisition is unclear as most of the original labels have been lost from the specimens. However, it is remarked in past papers that a substantial quantity of material was gained by the society as a result of this merger.[2]

By 1868 the collection had outgrown its relatively new lodgings, largely due to the fact that it shared a room with the society's library. Further space was made by transferring two large bookcases into the operating room of the hospital - an unlikely concept in present day practice! In 1870, the 24-year-old son of John Tomes, Charles Sissmore Tomes (1846-1928) was appointed curator of the collection, having qualified as LDS and MRCS the year before. The first catalogue of the collection, issued in 1872, recorded just over 1,000 entries, several of which refer to large groups of specimens. Material dating to this time, such as those originally donated by Samuel Cartwright, William Cattlin and John Tomes are still in the collection today and their details have subsequently been made available online (http://surgicat.rcseng.ac.uk/). These items largely consist of prepared juvenile skulls and dentitions revealing the stages of growth and eruption. Tomes' donation of over 200 specimens had the exact ages recorded alongside. The modest size of the museum's allocated space became inadequate for the ever-increasing collection so it was fortunate that a building was acquired in Leicester Square for a new Dental School and Hospital. In 1901 this establishment received the patronage of King Edward VII and its name was changed to 'The Royal Dental Hospital'. This relocation meant that, for the first time since its foundation, the collection could be used regularly by students. The school was also reportedly visited by

[2] F Colyer, The history of the Odontological Museum, *Br Dent J* 1943; 75: 1-9.

professors and their pupils from rival dental schools, such was the growing reputation of the educational value of the material.

Charles Tomes relinquished his position as curator in 1880. He was succeeded by Samuel Hutchinson (1848-1904) who took it upon himself to fully restore and reconstruct the museum. It is recorded that a hefty sum of £75 was spent on new showcases and a cleaner was employed to dust each specimen.[3] A new edition of the catalogue produced in 1882 shows the total number of specimens had increased to over 1,500. In 1885 a museum assistant was hired at the rate of £1 per week. However, this new member of staff was unfortunately soon discharged as he was found intoxicated on two separate occasions. In 1900 (Sir) Frank Colyer (1866-1954) took over the position of curator. Members of the society suggested the possible transfer of the museum to an alternate site due to the ever increasing size of the collection and the need for expansion of the Dental School and Hospital. Therefore, in October 1900 the museum was moved to a large room on the third floor of the Royal Medical and Chirurgical Society of London in Hanover Square (Fig. 2).

In 1907 the foundation of the Royal Society of Medicine led to the incorporation of the Odontological Society as the RSM's Section of Odontology. This new society occupied Hanover Square so the museum remained undisturbed. In 1909 care of the museum collection was transferred, on a temporary basis, to the Royal College of Surgeons in anticipation of the RSM's relocation to Wimpole Street.

Figure 2 The Odontological Society's Museum at Hanover Square, 1900

Phossy jaw

One specimen of particular historical relevance is a mandible with phosphorus necrosis, or 'Phossy Jaw' (Fig. 3). This diseased jaw bone was donated in 1872 by Charles Gaine (1850-1915) a dental surgeon. Phosphorus necrosis was a particular risk for 19th century match-makers who worked directly with white phosphorus in match factories.[4] Exposure to phosphorus fumes gradually led to its accumulation in the jaw bone and the brain. Dental caries and other forms of tooth decay acted as the portal which allowed the fumes to enter the bone. The first signs of phossy jaw were often painful swellings along the side of the jaw, which would develop into a condition of open abscesses as the phosphorus essentially ate away the jawbone. There was a foul smelling discharge. As the necrosis progressed, a chemical reaction

[3] Miles and White, op cit., fn. 1.
[4] A E W Miles, Phosphorus necrosis of the jaw: 'Phossy Jaw', *Br Dent J* 1972; 133: 203-206.

between the phosphorus and the air caused the patient's jaw to glow in the dark. Progress of the disease was slow. The ultimate outcome was a deforming jaw suppuration which typically led to a deterioration of general health. The only available solution to such conditions was the complete or partial surgical removal of the jaw which was both a dangerous and disfiguring procedure.

The debilitating effects of white phosphorus were recognised as early as 1844. Although less toxic forms of phosphorus were available white phosphorus was cheap and easy to obtain so legislation prohibiting its use was not enforced until 1906.[5] The use of child workers within match factories resulted in much public outcry over these conditions and led to tougher legislation over general factory working environments. Labour activists published a series of pamphlets and introduced the public to young victims of the disease.

Figure 3 Phosphorus necrosis of the mandible

In 1890 General William Booth (1829-1912), founder of the Salvation Army, wrote an extensive report which reviewed the painful sufferings of match-makers who had contracted 'phossy jaw', many of whom were women and young girls. One year later, General Booth opened his own match factory in East London and employed 120 workers. It was constructed as a model example of how the harmful effects of the industry could be avoided.

Two mandibles in the Odontological Collection show the debilitating effects of phosphorus necrosis. The specimen pictured above, was unfortunately donated with no further information about the individual case. The second mandible shows necrosis of the left side of the jaw, with destruction of the bone beginning to spread to the right side across the incisors, with a gradual obliteration of the dental sockets and alveolar process. This case is reportedly of a 35-year-old male match-maker. The specimen was donated to the collection in the 1860s by Sir John Tomes. The use of white phosphorus in match factories was forbidden throughout most of Europe by the Berne Convention of 1906. As a result phossy jaw has virtually disappeared and is now mainly of historical significance. However, similar necrosis of the jaw has occasionally occurred in conjunction with the medical administration of bisphosphonates to some cancer or osteoporosis patients.

The Royal College of Surgeons of England (1909-present day)

According to the catalogue dating to the transference of the Odontological material to The Royal College of Surgeons, the collection consisted of about

[5] Ibid.

2,900 items. All were housed in a small room below the main Hunterian Museum that could freely be accessed by visitors. The agreement made between the college and the RSM's Odontological Section was that all items in the collection at the time of transference were to be eventually returned when the section had sufficient space to re-house it.[6] Unfortunately the Hunterian Museum at the Royal College of Surgeons was the site of a direct hit during the bombings of London in 1941. Although two-thirds of the Hunterian collection were destroyed, due to its basement location the Odontological Collection remained largely unscathed. Owing to the devastating destruction the Council of the RSM offered the complete Odontological Collection into the care of the college as a goodwill gesture towards reconstitution of the museum. The new full and formal title of the museum became the Odontological Series of the Royal College of Surgeons' Museum. Ties have been retained between the Odontological Section of the RSM and the Royal College, with the former maintaining an interest through the appointment of an honorary curator (currently Dr Barry Berkovitz). The Annual President's Prize meeting of the Odontological Section is hosted in the museum.

In 1959 the Odontological Collection was able to occupy a separate room to that of the Hunterian specimens and therefore became its own official museum. Sir Frank Colyer remained curator until his death in 1954 (a total of 54 years of dedication to the museum) making him the longest serving curator of the collection in its 150 year history. Owing to his efforts the size of the collection more than doubled, which was mostly due to the donation of his own collection of human and animal skulls. Sir Frank was succeeded as honorary curator by Prof A E W ('Loma') Miles, who was assisted by a paid curator, Dr Caroline Grigson. Miles and Grigson also made significant contributions to the collection, not least through the 1990 revision and re-publication of Colyer's encyclopaedic volume on *Variations and Diseases of the Teeth of Animals*'.[7]

In 2003 a full refurbishment of the museum space resulted in the transfer of most of the odontological specimens into store, where they remain to date. The current collection contains just over 11,000 specimens of which two-thirds are animal and one-third is human. All specimens are related to the study of dental anatomy and pathology. The categories included in the material are wet and dry preparations of cranial portions of the skeleton, complete skulls, individual teeth, dental casts and dental instruments. Perhaps the most impressive aspect of the collection is the quantity and scope of the primate material. It includes almost 3,000 skulls from a species range that covers all of the great apes through to the world's smallest primates, such as the dwarf lemur and the Philippine tarsier. Finally two large excavations provided an extensive assortment of archaeological human skulls which were also contributed to the collection.[8]

[6] A E W Miles, The Odontological Museum, *Annals Royal College of Surgeons of England* 1964; 34: 50-58.
[7] A E W Miles and C Grigson, *Colyer's Variations and diseases of the teeth of animals*, Cambridge: Cambridge University Press, 1990.
[8] Excavations of Breedon-on-the-Hill, Leicestershire (1946) and Polhill, Kent (1964).

Excavation of Breedon-on-the-Hill

The Iron Age Site of Breedon-on-the-Hill was excavated by Kathleen M Kenyon in 1946: approximately 190 human skulls were exhumed.[9] Records state that the advancing quarry operations unfortunately prevented the complete removal of the postcranial remains. The skulls were donated to the Odontological Museum during the 1950s and have since formed the focus of much research. Most notably perhaps is the assessment of age through dental wear of the molars as undertaken by Miles in the 1960s.[7] He measured the areas of enamel wear on the molar surface and formed a chart that expressed the stages of such wear through the ages (see Fig. 4).

Figure 4 Molar Wear Chart as indicator of age by A E W Miles[10]

This chart is referred to in age analysis studies of bio-archaeological assemblages to date and is currently considered a foremost source in forensic age estimation. All of the skulls originally examined by Miles are retained in the Odontological Collection and are still used in postgraduate research projects and other studies.

Current Curation

Donations to the collection have subsided over the decades, largely due to the immense quantity and variety of material already stored. The last item to be donated was Sir Winston Churchill's dentures (Fig 5), presented in 2000 by Derek Cuddlip. He was the technician of Churchill's dentist, Sir Wilfred Fish (1894-1874).

[9] K Kenyon, Excavations at Breedon-on-the-Hill, *Trans Leicestershire Archaeology Soc* 1946; 26: 16-81.

[10] A E W Miles, Assessment of the ages of a population of Anglo-Saxons from their dentitions, *Proceedings of the Royal Society of Medicine; Section of Odontology,* 1962: 55: 881-886.

The Odontological cataloguing project began in 2008 and is almost complete. The entire collection is due to be re-boxed and fully re-catalogued by 2011. The cataloguing and storage of the human part of the collection was completed in June 2009. Each record can now be accessed in full on-line. The Royal College of Surgeons' online catalogue Surgicat is available to all at the following web address: http://surgicat.rcseng.ac.uk/.

As indicated on this website SurgiCat currently holds records of approximately half of the College's deposited manuscripts. The deposited collections relate to the history of the College and the Hunterian Museum and more generally to the history of medicine and surgery.

The catalogue also holds records of about 50,000 museum objects. They include full records of the Hunterian Collection of human and comparative anatomy and pathology specimens. In addition SurgiCat contains records of other anatomical, pathological and zoological specimens as well as historical surgical instruments, paintings and sculptures from the College Museum.

Figure 5 Sir Winston Churchill's Dentures

For any further enquiries about the Odontological Collection or for information concerning access to the collection for research, please contact the author at mfarrell@rcseng.ac.uk

Lindsay Society Autumn Conference, Ironbridge, 2-4 October 2009

Ian McIntyre

Once again our secretary, Stuart Robson, organised an exceptional venue for the autumn conference: the Best Western Valley Hotel in Ironbridge, near to Telford in Shropshire. It lies in the historic Iron Gorge area, part of our industrial heritage. An excellent choice of venue that belied any association with a national chain of hotels by virtue of its highly individual layout, based upon an old country house and its associated outbuildings. Set in its own gardens alongside the River Severn, the hotel had the additional bonus of a well stocked bar and an AA 2-rosette restaurant. It was to this seemingly idyllic venue that 36 delegates, members and their guests, arrived in brilliant sunshine; things could not have got of to a better start. The hotel staff were mostly local and very welcoming, suggesting sites nearby that early arrivals could explore with the aid of a complementary map. Refreshed from this exercise we all gathered in the hotel bar prior to an excellent 3 course informal meal in the Chez Maw restaurant that lived up to its AA billing.

On the Saturday morning, with the weather still staying fine, we gathered in the Glass Classroom at the Enginuity site of the Ironbridge Museum, a bright airy room that suited our party very well. The first speaker was Stephen Hancock, editor-in-chief of the *British Dental Journal*. He got the proceedings off to a thought-provoking start with his presentation 'Is the BDA history?', answering his own question from the viewpoints of is it a relic or is it an important organ of record. Stephen, who in addition to his dental training has also been a student at the Central School of Speech and Drama, drew parallels between the Arts and Sciences of the BDA's motto and the stage, illustrating his point with quotes from Oscar Wilde, without which he asserted any presentation was inadequate, and The History Boys. Stephen showed how in the earliest journals the classified section provided an insight into dental social history. He traced the BDJ's history through to the 'seventies up until when it had been the only scientific journal of the UK profession and thus was perceived as being a bit stuffy for the ordinary members of the BDA. The advent of specialist journals then created a dichotomy: should the BDJ continue as a specialist journal or should it become more of a members' newsletter? Stephen then showered praise on a former editor, who happened to be in the audience, Dame Margaret Seward, who introduced colour and the A4 size. Turning to today, Stephen told us how it was real time publishing with all of the articles "in the air". He only knows for certain what the very next issue will contain, letters are selected from a wide range of submissions. Whilst the BDJ publishes research articles on-line the paper journal only carries the "story" to put the research into context. Stephen concluded by answering the question: "is the BDJ History?". YES, because it is the repository of our past and NO because it keeps pace with developments.

Ian McIntyre was next up after coffee with a presentation on 'The impact of oral conditions on military operations". After apologising for not having a

quotation from Oscar Wilde, Ian covered his brief with references to facial trauma, scurvy, trench mouth (ANUG) and barodontalgia.

Whilst facial trauma had not directly influenced the course of warfare, the barber surgeons responsible for its early treatment and the latter-day oral surgeons had greatly influenced the general development of surgery from their experience of battle injuries. On the other hand scurvy had greatly influenced the outcome of military operations and indeed the course of history, Ian illustrated this point with reference to the crusades, Captain Anson's voyage to harass the Spanish during the War of Jenkins Ear and the seminal work of James Lind. Trench mouth was a minor irritant compared with trench foot, but one that was of great concern to the afflicted, because of its impact upon their social lives after the war, and one that prior to the advent of AIDS was a condition largely limited to military personnel.

The final presentation of the morning was by Professor Stanley Gelbier. His usual immaculately researched report was on the life of Sydney William Garne, a hitherto little known British-qualified dental surgeon who made his professional life in Columbo, Ceylon (now Sri Lanka).

Stanley's lecture could also have qualified as a genealogist's instruction paper on how to conduct research, it was so thorough. He showed photographs of Garne as a founder-member of the Ceylon Dental Association and its president and even one building in which he had his surgery. This report can only be a snapshot of the exceptional detail into which Stanley had researched his subject.

After lunch at the hotel we went our various ways to explore Ironbridge. The majority went to the Blists Hill Victorian Town, a living history museum with reconstructed shops and streets. Actors played the part of shopkeepers and the public. Mid afternoon brought hard rain and your author and John Craig found themselves marooned in the New Inn, agents for Bank's Famous Ales. We were pleased, in the interests of research, to try them and can report they have kept remarkably well. The Society's Annual Dinner was held in the Chez Maw[1] restaurant at the hotel in the evening, another excellent meal that confirmed the hotel's 2-rosette status.

Sunday morning was very well attended with no signs of excess from the night before. It got off to an excellent start with a presentation by Professor John Davenport entitled 'Painted faces through the ages'. John (whose parents were artists of some renown, but who forbad him from following art as a career) has, following his retirement from dentistry, become a portrait artist.

[1] Some readers will recognize the name from Maw's tooth pot lids and toothpaste. Another Iron Gorge Museum, the Jackfield Tile Museum, had information on the local firm of Maw & Co. It displayed beautiful tiles, faience and art pottery.

Although John's talk only showed two examples of his own work it is clear that he has achieved in his second career the same eminence as in his first. In a fascinating review of portrait painters' skills that was beautifully illustrated, John finished with the new portrait of Hew Mathewson, the retiring and last GDC president. Strangely, this divided opinions in the audience from those who thought that it was not a good likeness to those who were impressed. While perhaps no-one would call Hew a beauty, it was certainly, in this case in the eye of the beholder!

After coffee Brian Avery, consultant maxillofacial surgeon and a past dean of the Faculty of Dental Surgery of the Royal College of Surgeons of England, gave a presentation on the 'History of maxillofacial surgery'. Starting with the roles of the barber surgeons and John Hunter, through John Tomes and the introduction of the LDS in 1860, Brian progressed to the stabilisation of fractures, initially by inter-arch wiring, then cap splints, internal wiring and finally plates. There were then advances to the treatment of major trauma, orthognathic surgery and a more recent progression into the care of oral cancer for which maxillo facial surgeons are now the major provider. The profession is now expanding into paediatric craniofacial surgery, of which he gave some remarkable examples involving the reshaping of whole heads - dentistry it is not!

Finally we heard from Dame Margaret Seward, who had been hoping to present her autobiography, which had been six years in the writing, entitled 'Open Wide' and subtitled 'Memoir of the Dental Dame'.

Unfortunately, the publishers were not quite ready, so she told us all about it instead. By the time that you read this note the book will be available, priced very reasonably at £19.95.[2]

The Autumn Conference was, as always, a most congenial occasion for which special thanks are due to Stuart Robson for choosing such an interesting location and organising such a splendid event.

Lindsay Society 47th Annual General Meeting
Stuart Robson

The Society, under the chairmanship of Professor Robin Basker, held its AGM on 4 October 2009, attended by 40 members and guests. The treasurer, Dr Peter Frost, presented the audited accounts and reported the Society was in a reasonably stable financial position with assets of £9,024. During the past financial year there was a trading surplus of £866. The increased publication costs of the expanded *Dental Historian*, the 50th issue of which appeared in June 2009, were partially offset by a generous sponsorship from Panadent, for which the Society was most grateful. After discussion it was recommended that the annual subscription of £22 for UK members and £27 for overseas members committee be retained for 2009-10. Peter Frost has set up a standing order facility to help members pay their subscriptions. Membership has risen slightly: now 90 including 6 overseas members.

Dr S Robson, honorary secretary and Prof R Basker, chairman

The secretary, Dr Stuart Robson, reported that the next Lindsay Memorial Lecture would be held in conjunction with the BDA Annual Scientific Meeting in Liverpool at 12 noon on Saturday 22 May 2010. The Guest Lecturer will be Professor John McCabe of Newcastle University. His chosen title is 'Dental Materials - Lessons from the Past and Future Prospects'.

The BDA Museum staff were congratulated on their continued articles of historical interest in *BDA News*.

The Autumn Conference will probably take place in Winchester on 1-3 October 2010. A number of speakers have already indicated their willingness to participate, reflecting the growing interest in historical topics within the profession.

Following the elections the officers for the forthcoming year are:

Chairman – Prof Robin M.Basker
Chairman-elect - Dr Stuart Robson
Editor – Prof Stanley Gelbier
Treasurer - Dr Peter Frost
Secretary - Dr Brian Williams
Committee - Mary Mcfarlane, Air Vice-Marshal Ian Mcintyre
Dr Stuart Geddes
Co-options - Mrs Rachel Bairsto (Director, BDA Museum)
Dr Rufus Ross (Henry Noble Research Group, Glasgow)

Update on the Henry Noble History of Dentistry Research Group
Rufus M Ross

Following the affiliation of the Group to the Centre for the History of Medicine of the University of Glasgow, our executive lunchtime meeting on 8 September 2009 was held in Lilybank House, which houses the Centre. An added bonus is that no charge is made for the use of the premises and the buffet lunches are excellent – but these have to be paid for!

The History of Dentistry Research Group has established a close relationship with both the Royal College of Physicians and Surgeons of Glasgow and the University. Carol Parry, archivist at the College and an active member of the Group is in charge of our continuously expanding and popular website. In addition she is establishing a separate dental history unit of historical dental books held by the College which will be available for dental historians. A catalogue of these works has been compiled by James Beaton, lately College librarian. Carol will also advise on the purchase of pre-1900

[2] Margaret Seward, *Open wide: memoir of the Dental Dame*, Durham: The Memoir Club, 2009.

dental books that would be the basis of a separate collection owned by the Group, for which, funds are available through the Menzies Campbell Bequest.

We have over sixty paid-up members. Our treasurer, Dr Marie Watt, reports a healthy financial situation which allows us to invite lecturers from further afield. The Group's *Dental Magazine* continues to receive widespread praise for its new format and outstanding art work under the excellent management of Professor David McGowan.

Dr Jo Cummin BDS MA (Hons) PhD, was our speaker for the autumn lecture on 27 October 2009 held at the Royal College. She is an honorary research fellow in the history of dentistry at the University as well being the excellent assistant editor of *Dental History*. In her talk *The Dentist is In: John Gaddesden and the Rosa Anglica,* Dr Cummins *gave* a comprehensive and detailed account of the life and times of the medieval scholar, John of Gaddesden. She conveyed the ethos and beliefs of the late 13th century with outstanding clarity. John of Gaddesden's *opus magnum,* The *Rosa Anglica* contained a wonderful collection of nostrums to cure all diseases including a description of how he removed a "stone" from his father's mouth, ostensibly a salivary calculus. He was also credited with curing King Edward II of smallpox by wrapping him in a variety of red coloured materials, such as curtains and blankets. Dr Cummin's talk was illustrated with an outstanding and artistic slide presentation which was greatly appreciated by the meeting.

Our speaker for the Spring meeting in April 2010 will be Dr G Howard Moody, who gave such an absorbing and interesting Lillian Lindsay Memorial lecture at the BDA conference on 6th June

As a result of our affiliation with the university's History of Medicine Centre its director has suggested our Group should host and organise a 'Regional Dental Forum' in 2010 to encompass historical and contemporary aspects of dentistry,. As chairman of the Group I have been asked to organise the event. I have thus been in contact with Prof Basker to propose participation by the Lindsay Society. Watch this space for further developments.

History of Medicine Equipment Society

There will be a meeting of the society at the BDA Museum, 64 Wimpole Street, on 17 April 2010 at 10/10.30 am. The programme is: Rachel Bairsto, Welcome and Introduction; Stanley Gelbier, Some early dental extraction instruments; John Kirkup, Dental contributions to orthopaedic surgery; Melanie Parker, Sir John Tomes (1815-95) and his inventions; Adrian Padfield, Dr Barton, his tongue clip & Junkers terminal & other equipment; Margaret Wilson, A history of dental phantom heads; Peter & Julie Mohr, Brown Kelley (1866-1941) & the 'Antrum of Highmore'; Tour of the Museum; Tea and Equipment Identification. Interested dentists are welcome to attend the meeting. Further details and application form from Peter Mohr, Hon Sec HMES, email: <peter.mohr@manchester.ac.uk>; otherwise 16 Westminster Road, Eccles, M30 9EB.

Worshipful Society of Apothecaries

Warmest congratulations go to Dr Julie Papworth, only the second dentist to gain the society's Diploma in the History of Medicine (DHMSA), 29 years after the first person to do so.