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EDITORIAL

As in other issues this one covers a wide range of topics. First is the life story of Britain's number one historical dentist, Sir John Tomes. Thus we can read about the teeth of Dracula and cattle. There is news of a number of practitioners in Wales and Malta and an extract from another one's wartime diary. Also a fascinating history of dental phantom heads. Other characters from the past are Napoleon and Imhotep. There is also the beginnings of memory recall on clinical subjects; in this case low seated dentistry. In future issues it would be fascinating to hear personal stories of other advances. All the authors are thanked for their well-penned contributions. Acknowledgement is due to the following for their help during the past year: Geoff Garnett, Robin Basker, Rachel Bairsto, Ian McIntyre, John Craig, Gordon Watkins, Melanie Parker, Roger Farbey and Helen Nield. Many thanks go to Wesleyan Medical Sickness for its continued support.

COVER ILLUSTRATION: MOURNING JEWELLERY

Rachel Bairsto*

With the death of Prince Albert, Queen Victoria went into mourning and the practice became an unmistakable and intricate part of life in Victorian Britain. It became customary for women to mourn for up to two years after the death of a loved one. There were three stages to the mourning process and only after the first stage was complete could mourning jewellery be worn. An industry developed to supply women with appropriate clothing and accessories. Wearing mourning jewellery was a simple way of keeping a loved one close by and developed into an elaborate art. Teeth were commonly included and set in pendants and broaches and high infant mortality rates ensured that children's teeth were often included.

Animal parts were also incorporated. Prince Albert often presented his wife with love tokens from hunting trips and rings and pendants with animal teeth were also common.

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IN SEARCH OF DRACULA'S TEETH

Fiona Subotsky⁺

Introduction

"Dracula's teeth" are so famous that the term is even used to describe a form of sweet. Yet, according to Paul Barber, the vampires of old European folklore were not recognised by their teeth.¹ This, to our minds, essential feature seems to have arrived with fiction, probably enhanced by visual representation such as illustrations, plays, cartoons and later, films. This article presents the references to vampire teeth and their effects in *Dracula*, the Bram Stoker novel of 1897,² and then some of the probable sources of his imagery, folkloric, literary and scientific.

Count Dracula's Teeth

The novel is composed of a variety of narrative sources, but all agree on Count Dracula's characteristics, whether in Eastern Europe or England:

"Sharp-looking teeth, as white as ivory."³

"Peculiarly sharp white teeth. These protruded over the lips..."⁴

"With a grim sort of smile, which showed more than he had yet done his protuberant teeth."⁵

"The Count smiled, and as his lips ran back over his gums, the long, sharp, canine teeth showed out strangely..."⁶

"...his quiet smile, with the sharp, canine teeth lying over the red underlip."⁷

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¹ Paul Barber, *Vampires, burial and death: folklore and reality*, New Haven and London: Yale University Press, 2010, pp. 7-8.

² Bram Stoker, *Dracula* (1897), London: Penguin Books, 1994.

³ *Ibid.*, p. 20.

⁴ *Ibid.*, p. 28.

⁵ *Ibid.*, p. 29.

⁶ *Ibid.*, p. 33.

⁷ *Ibid.*, p. 45.

"...big white ...teeth, that looked all the whiter because his lips were so red, were pointed like an animal's."⁸

"...He was laughing with his red mouth, the sharp white teeth glinted in the moonlight..."⁹

"...the parted red lips, with the sharp white teeth showing in between..."¹⁰

"As the Count saw us, a horrible sort of snarl passed over his face, showing the eyeteeth long and pointed."¹¹

"A tall man, thin and pale, with high nose and teeth so white..."¹²

It appears that all of Dracula's visible teeth are pointed, like an animal's, and that the upper canines in particular are long and protrude over the lower lip. Their whiteness (like ivory, a tusk being another long sharp tooth) shines out by contrast with very red lips. They are more evident when smiling, or snarling, and "clamp together" as in the expression "baring his teeth". Expressions likening the teeth to those of animals are frequent.

Lucy Westenra, a flirtatious young girl, engaged to be married, is the first English victim. Her friend Mina at first thinks the effects of Dracula's bites on Lucy's neck are the result of a shawl pinprick, but as the attacks continue the wounds become more evident, despite Lucy's attempt to conceal them:

"...there are two little red points like pin-pricks..."¹³

"I looked at her throat just now as she lay asleep, and the tiny wounds seem not to have healed. They are still open, and, if anything, larger than before, and the edges of them are faintly white. They are like little white dots with red centres."¹⁴

"Just over the external jugular vein there were two punctures, not large, but not wholesome looking. There was no sign of disease, but the edges were white and worn looking, as if by some trituration."¹⁵

"...little punctures in her throat and the ragged exhausted appearance of their edges - tiny as they were."¹⁶

⁸ *Ibid.*, p. 207.

⁹ *Ibid.*, p. 332.

¹⁰ *Ibid.*, p. 342.

¹¹ *Ibid.*, p. 364.

¹² *Ibid.*, p. 377.

¹³ *Ibid.*, p. 115.

¹⁴ *Ibid.*, p. 119.

¹⁵ *Ibid.*, p. 151. "Trituration" seems to mean "ground down", more usually in pharmaceutical preparation.

¹⁶ *Ibid.*, p. 157.

"...her throat was bare, showing the two little wounds which we had noticed before, but looking horribly white and mangled."¹⁷

The Three Vampire Women

Mina's fiancé, the young solicitor Jonathan Harker, has been sent to Dracula's castle in Transylvania to arrange the purchase of the mansion at Carfax. While in a daze, he is approached by three lovely young women:

"All three had brilliant white teeth that shone like pearls against the ruby of their voluptuous lips."¹⁸

"...the red tongue as ...it lapped the white sharp teeth."¹⁹

"...the churning sound of her tongue as it licked her teeth and lips..."²⁰

"I could feel the soft, shivering touch of the lips on the super sensitive skin of my throat, and the hard dents of two sharp teeth..."²¹

"...the white teeth champing with rage..."²²

"I knew...the white teeth, the ruddy colour, the voluptuous lips..."²³

These nameless vampire women, who are past Transylvanian victims and lovers of Dracula, also have teeth which are brilliantly white, and sharp, presumably pointed. The description is of sexual anticipation rather than threat, so the adjectives are of jewels, of softness, and of sensitivity until the two sharp teeth (presumably the upper canines) hit the skin. Dracula intervenes to frustrate their enterprise, which causes the women to draw back angrily champing their teeth. They are prevented from biting Harker, and instead are tossed a child in a bag.

Lucy

Lucy's doctor, Dr Seward, and her fiancé, Arthur Holmwood, do not understand why her health is deteriorating and call in the famous Professor Van Helsing for help. But despite repeated blood transfusions and attempted protection by garlic flowers, Lucy is turning into a vampire herself, as evidenced by her teeth becoming progressively longer and sharper:

"The gums seemed to have shrunken back from the teeth, as we sometimes see in a corpse after a prolonged illness."²⁴

¹⁷ Ibid., p. 177.

¹⁸ Ibid., p. 51.

¹⁹ Ibid., p. 52.

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

²³ Ibid., p. 436.

"...the open mouth showed the pale 'gums. Her teeth, in the dim, uncertain light, seemed longer and sharper than they had been in the morning. In particular, by some trick of the light, the canine teeth looked longer and sharper than the rest."²⁵

"...a spasm as of rage flit like a shadow over her face. The sharp teeth champed together."²⁶

Lucy's gums are pale from blood loss, as well as appearing shrunken like those of a corpse. She also "champs" her teeth in anger - when her fiancé is prevented from kissing her. After her death Lucy is entombed and starts to make vampire attacks on children. The men open her coffin:

"...the Professor... pulled back the dead lips and showed the white teeth. 'See,' he went on, 'they are even sharper than before. With this and this,' and he touched one of the canine teeth and that below it, 'the little children can be bitten.'"²⁷

"She seemed like a nightmare of Lucy as she lay there, the pointed teeth, the blood stained, voluptuous mouth..."²⁸

"The sharp white teeth champed together till the lips were cut, and the mouth was smeared with a crimson foam....And then the writhing and quivering of the body became less, and the teeth seemed to champ, and the face to quiver."²⁹

Here Professor Van Helsing clearly indicates that both upper and lower canines are sharp and could have caused the bites visible on the children. There is more champing, which actually cuts the lips.

The wounds in the children's necks are recognised by the hospital doctors as bites, perhaps from a rat or small dog or possibly even from an escaped vampire bat.

"...small punctured wounds on their throats."³⁰

"Dr Vincent took the bandage from its throat, and showed us the punctures. There was no mistaking the similarity to those which had

²⁴ Ibid., p. 155.

²⁵ Ibid., p. 192.

²⁶ Ibid., p. 195.

²⁷ Ibid., p. 240.

²⁸ Ibid., p. 256.

²⁹ Ibid., p. 259.

³⁰ Ibid., p. 228.

been on Lucy's throat. They were smaller, and the edges looked fresher, that was all."³¹

Mina Harker

Mina, now Harker's wife, is next to suffer the assaults of the Count, and begins to turn into a vampire, as indicated by the state of her teeth, though the sequential extracts below are somewhat contradictory.

"...the parted red lips, with the sharp white teeth showing between."³²

"She was very, very pale, almost ghastly, and so thin that her lips were drawn away, showing her teeth in somewhat of prominence."³³

"As yet there was no sign of the teeth growing sharper, but the time as yet was short, and there was time for fear."³⁴

"Her teeth are some sharper..."³⁵

"Van Helsing examines, he tells me, her teeth very carefully, whilst she is in the hypnotic condition, for he says that so long as they do not begin to sharpen there is no active danger of a change in her."³⁶

Fortunately, Mina is saved by the killing of Dracula and her physical changes remit.

Previous toothy vampires

The folklore of vampirism seems to have had a long and wide-ranging history. It came particularly to the notice of the British following 1732, when the cause of much debate was an Eastern European report of a mysterious death followed by cases of supposed vampire attacks.³⁷ The OED's first examples of the use of the term, in 1734, has as definition "These Vampyres are supposed to be the Bodies of deceased Persons, animated by evil Spirits, which...suck the blood of many of the Living..."³⁸ The vampires clearly suck, but when did they start to bite and have prominent teeth?

In Southey's *Thalaba the Destroyer* of 1801 the revenant bride is a vampire, but no reference is made to her teeth. However, a later note describes a demon or "Afreet".

³¹ Ibid., p. 234.

³² Ibid., p. 342.

³³ Ibid., pp. 350-1.

³⁴ Ibid., p. 351.

³⁵ Ibid., p. 384.

³⁶ Ibid., p. 399.

³⁷ E J Clery and Robert Miles (eds) *Gothic documents: a source book. 1700-1820*, Manchester and New York: Manchester University Press, 2000, p. 24.

³⁸ Oxford English Dictionary online, <http://dictionary.oed.com> 13/6/2010.

"...with two large horns upon his head, and a long proboscis, fast asleep. In his head the Divine Creator had joined the likenesses of the elephant and the wild bull. His teeth grew out as the tusks of a boar..."³⁹

Chimeras (monsters formed from a variety of animal parts) have a long history. The Western Christian devil tended to be depicted with the properties of a goat (horns, tail, hooves), although he could also take the form of a serpent/dragon. However Oriental demons were more likely to have huge animal-like canine teeth, upper and lower, and in the eighteenth century there began a fashion for literary images from the east. For instance in Beckford's early gothic novel *Vathek* the demonic monster Giaour "began to laugh with a hideous noise, and discovered his long amber-coloured teeth bestreaked with green."⁴⁰

A frequently overlooked ballad by John Stagg, the "blind bard of Cumberland", published in 1810 uses the theme in *The Vampyre*. Sigismund, the dead friend of Herman has visited him nightly to suck his blood, until he dies:

"His jaws cadaverous were besmear'd
With clott'd carnage o'er and o'er,
And all his horrid whole appear'd
Distent, and fill'd with human gore!"⁴¹

These jaws are coming closer to teeth.

Byron's 1813 poem *The Giaour* is presented as an Eastern tale. It is prophesied to the hero that he will become a vampire; his teeth are mentioned, but with little detail:

"But first, on earth as Vampire sent,
Wet with thine own best blood shall drip,
Thy gnashing tooth and haggard lip;"⁴²

Perhaps it needed a physician to make things more explicit, as did John Polidori in his *The Vampyre* of 1819. The antihero, Lord Ruthven, is clearly based on Byron himself, as an aristocratic and callous seducer. The appearance of the teeth is not remarked upon, but they leave their distinctive mark:

³⁹ Robert Southey, *Thalaba the Destroyer*, London: Longman, Brown, Green and Longmans, 1837, p. 439.

⁴⁰ William Beckford, 'Vathek, an Arabian Tale (1786)' In *Four Gothic Novels*, Oxford: Oxford University Press, 1994, p. 88.

⁴¹ Quoted by Markman Ellis, *The history of Gothic fiction*, Edinburgh: Edinburgh University Press, 2000, pp. 177-8. For the full text see <http://www.litgothic.com/Texts/vampyre.html> "The Vampyre" by John Stagg | The Literary Gothic "The Vampyre" by John Stagg. Text: from John Stagg's *The Minstrel of the North*, London, 1810, pp. 261-268.

⁴² Lord Byron, *The Giaour*, 1813, www.archive.org: Internet Archive, ll. 781-2.

"...upon her neck and breast was blood, and upon her throat were the marks of teeth having opened the vein."⁴³

The *Vampyre* was popularised further by stage adaptations, so that by the time the popular sensation novel *Varney the Vampire* was written in 1847 the image has been well established, and the audience directly witnesses the attack, whose sexual equivalence is clear.

"The lips are drawn back, and the principal feature next to those dreadful eyes is the teeth—the fearful looking teeth—projecting like those of some wild animal, hideously, glaringly white, and fang-like...He seizes her neck in his fang-like teeth - a gush of blood and a hideous sucking noise follows. The girl has swooned, and the vampire is at his hideous repast."⁴⁴

Key features emerge here: the lips are drawn back, to reveal even more clearly the projecting pointed animal-like teeth. The bite mark is clearly described:

"...all saw on the side of Flora's neck a small punctured wound; or rather two, for there was one a little distance from the other."⁴⁵

Bram Stoker's fellow Dubliner, Sheridan Le Fanu, created the lesbian vampire Carmilla, who comes to stay at the family home of the heroine narrator/victim. There seems to have been a mysterious prior visit when the heroine was a small child and experienced at night "a sensation as if two needles ran into my breast very deep at the same moment".⁴⁶ A visiting quack peddler who "professes the art of dentistry" notes that Carmilla "has the sharpest tooth,—long, thin, pointed, like an awl, like a needle; ha, ha!". He offers to file it down, but is refused.⁴⁷ Carmilla is able to take the form of a very large black cat, which at night approaches the heroine/narrator:

"suddenly I felt a stinging pain as if two large needles darted, an inch or two apart, deep into my breast."⁴⁸

The examining doctor notes "a small blue spot".⁴⁹

⁴³ John Polidori, 'The Vampyre (1819)', in Robert Morison and Chris Baldick (eds), *The Vampyre and other tales of the macabre*, Oxford: Oxford University Press, 1997, pp. 3-23, p. 12.

⁴⁴ James Malcolm Rymer, *Varney the Vampire: Or, the Feast of Blood* (1847), New York: Dover Publications, 1972, pp. 3-4.

⁴⁵ *Varney*, op. cit., p. 10.

⁴⁶ Sheridan Le Fanu, 'Carmilla', in *In a Glass Darkly* (1872), www.aegypan.com: AEgypan Press, pp. 207-270, p. 210.

⁴⁷ *Ibid.*, p. 228.

⁴⁸ *Ibid.*, p. 236.

⁴⁹ *Ibid.*, p. 246.

Later, General Spielsdorf, a family friend, tells of the illness and death of his own daughter:

"A doctor said that the patient was suffering from the visits of a vampire! The punctures which she described as having occurred near the throat, were, he insisted, the insertion of those two long, thin, and sharp teeth which, it is well known, are peculiar to vampires; and there could be no doubt, he added, as to the well-defined presence of the small livid mark which all concurred in describing as that induced by the demon's lips."⁵⁰

This vampire delivers bruises from the sucking as with love bites.

Less overt, but nonetheless present, are vampiric elements in *Wuthering Heights* and *Jane Eyre*, written respectively by the sisters Emily and Charlotte Brontë. The possibility of Heathcliff's being a vampire is referred to in the last chapter, and finally, in death "his parted lips and sharp white teeth sneered too".⁵¹

The insane Bertha Rochester, imprisoned in the attic, does actually bite:

" 'I must look to this other wound in the arm: she has had her teeth here too, I think.' 'She sucked the blood: she said she'd drain my heart,' said Mason."⁵²

It is not surprising that when Bertha approaches at night to tear up her bridal veil Jane thinks of "the foul German spectre — the Vampyre."⁵³

Biting Animals

Count Dracula's favoured animals to command are rats and wolves, while he mainly transforms himself into a bat, and on one occasion a huge dog. All, of course are biting animals which can transmit disease, especially rabies, which was endemic in England at the time. Stoker certainly spent time not only in the British Museum library but in London Zoo while researching *Dracula*.⁵⁴ Wolves have large canine teeth, and are often associated with vampires in folklore, presumably because of their tendency to attempt to retrieve corpses from shallow graves.⁵⁵ Indeed, many of Dracula's physical attributes were taken from the descriptions of werewolves, who in life are humans who can take the form of wolves but after death may become vampires. Stoker's notes indicate that other attributes of Dracula were drawn

⁵⁰ *Ibid.*, p. 263.

⁵¹ Emily Brontë, *Wuthering Heights* (1847), London: Penguin Books, 1995, p. 335.

⁵² Charlotte Brontë, *Jane Eyre* (1847), Wordsworth Classics, 1999, pp. 186-7.

⁵³ *Ibid.*, p. 250.

⁵⁴ Clive Leatherdale, *The origins of Dracula*, London: William Kimber, 1987, p. 153.

⁵⁵ Barber, 2010, op. cit., p. 156-7.

from descriptions of werewolves, such as hairy hands, pointed nails, broad hands and eyebrows meeting over the nose.⁵⁶

European bats do not take blood, although they have alarming and nocturnal associations. The blood-drinking bat is a native of central America, and the effects were noted by European travellers from the sixteenth century, though at first the real culprit species was not identified and quite innocent bats were called names such as *Vampyrum Spectrum* and *Vampyressa*.⁵⁷ Indeed, soon there were stories reported of the sightings and even capture of a Chilean vampire with the combined characteristics of a man, a lion and a bat.⁵⁸ These observations seem to have strengthened the folklore, so that while literary vampires do not actually shape-change to bats before Count Dracula, they more clearly have long sharp teeth and proceed to bite and suck. Leatherhead suggests it is very likely that Stoker consulted Sarah Lee's *Anecdotes of Habits and Instincts of Animals* (1853) in which the behaviour of the vampire bat is extensively discussed: "The teeth are so disposed that they make a deep and triple puncture, and one was taken by Mr Darwin in the act of sucking blood from the neck of a horse."⁵⁹ Such a wound could be painless and very small, so that the human victim (whose main body target was the big toe) would not feel anything.⁶⁰

While working on the novel Stoker also wrote in similar language of an evil cat in one of his short stories: "the white, sharp teeth seemed to almost shine through the blood which dabbled her mouth and whiskers".⁶¹ The cat has a long history as a deceptive animal whose form can be assumed by the devil, or by a witch. As we have seen, this was Carmilla's form, and is more usually associated with women. Certainly in *Dracula*, the "vampire women" while not referred to as cats, by no means resemble the more masculine wolf, as does the Count himself. The witch trials of the sixteenth and seventeenth centuries have left abundant evidence that witches were thought to use cats to harm children by sucking their blood, while also offering their own blood to the cat by means of an extra nipple, bruise or cut, which the witch-finders would seek.⁶² Cat's teeth are extremely sharp, and do tend to leave two puncture holes, which seal over rapidly, rather than the lacerations often caused by a dog bite.

⁵⁶ Christopher Frayling, extract from *Book of Were-wolves* by S. Baring-Gould, Smith Elder, 1865, in *Vampyres: Lord Byron to Count Dracula*, London and Boston: Faber and Faber, 1992, pp. 342-3.

⁵⁷ Bill Schutt, *Blood and the curious lives of blood-feeding creatures*, New York: Three Rivers Press, 2008, p. 34.

⁵⁸ Frayling, op. cit., fn. 55, p. 35.

⁵⁹ Clive Leatherhead, *The origins of Dracula*, London: William Kimber & Co, 1987, pp. 152-8.

⁶⁰ Schutt, op. cit., fn 56, p. 35 describes this vampire bat, the *Desmodus*, as having "a chisel-shaped pair of upper incisors, and a uniquely bi-lobed pair of lowers."

⁶¹ Bram Stoker, 'The Squaw', quoted in Miller, p. 40.

⁶² Christina Hole, *Witchcraft in England*, London: B T Batsford, 1977, pp. 38-53.

Time and space do not permit analysis of the visual representation of Dracula's teeth, but it is worth noting that in most Dracula films, the baring of the Count's canine fangs, perhaps already bloodied from his victim, is one of the key moments. However, in *Nosferatu*, one of the earliest films, the Dracula equivalent Count Orlok has two elongated front teeth, like a rat, and his accompanying rats spread disease throughout the town.

Human physiognomy:

In Stoker's *Reminiscences of Henry Irving* two of the celebrities he recalls tended to raise their upper lip revealing a canine tooth. Describing the poet Alfred Lord Tennyson, Stoker says this is a "marked ... indication of militant instinct", while of Sir Robert Burton, the explorer, "his canine tooth showed its full length like the gleam of a dagger".⁶³

Darwin, while not referred to directly in the *Dracula* text, had discussed the human equivalent of animal snarling at length in *The Expression of the Emotions in Man and Animals* and was supplied with a number of examples by the eminent psychiatrist Dr James Crichton Browne:

"...outbreak of anger and delusive jealousy in an insane lady ...she drew back her lips, especially the corners of the upper lip, and showed her teeth, at the same time aiming a vicious blow at him."

"A second case is that of an old soldier, who, when he is requested to conform to the rules of the establishment, gives way to ...fury... he rushes up towards Dr Browne...shaking his doubled fist, and threatening destruction. Then his upper lip may be seen to be raised, especially at the corners, so that his huge canine teeth are exhibited."

"...the case of an epileptic idiot 'morose and easily roused into fierceness'. If anyone repeatedly annoys him 'he draws back his thick lips and reveals a prominent row of hideous fangs (large canines being especially noticeable), and then makes a quick and cruel clutch with his open hand at the offending person'." ⁶⁴

Cesare Lombroso, the famous psychiatric criminologist, is explicitly referred to in the text of *Dracula*. He observed of "habitual murderers" in *Criminal Man*:

"...their canine teeth (are) very developed, and their lips thin. Often their faces contract, exposing the teeth."⁶⁵

⁶³ Bram Stoker, *Reminiscences of Henry Irving*, London, William Heinemann, p. 200, p. 359.

⁶⁴ Charles Darwin, *The expression of the emotions in man and animals* (1872), New York: Philosophical Library, 1955, pp. 242-3.

⁶⁵ Cesare Lombroso, *Criminal man*, Durham and London: Duke University Press, 2006, p. 51. Four editions had appeared in Italian and other European languages by 1895, but none in English. A similar quotation appeared in an

Biting, or threatening to bite, was thus regarded as a symptom of insanity, mental deficiency or criminality, with the implication that the behaviour represented a reversion to animal behaviour, in line with the degeneration theory of the day.

Conclusion

While an exhaustive search cannot be claimed, it appears that vampires' teeth were not especially noted in the eighteenth century folklore of the dead returning to suck life from the living. It is argued that the adoption of the convention of biting fangs is due to many ideas combining, including the discovery of the vampire bat, Polidori's wound description, melodramatic stage adaptations, assimilation of witch legends of metamorphosis and blood-sucking, contact with the imagery of oriental fanged demons, and the idea that the physique and behaviour of criminals and the insane were atavistically bestial. Dracula films of the twentieth century have, of course, enhanced the image.

Post scriptum: a problem of perfect teeth

Edgar Allan Poe (1809-1849), without using the word "vampire", frequently used related themes especially "undeadness" in his macabre stories. The brief tale of *Berenice* (1835) is shocking partly because of its reversals of vampiric dental expectations.

The narrator and his cousin grow up together, and share a childhood love. But she succumbs to a wasting form of epilepsy which sometimes causes a death-like trance, losing gradually all her beautiful perfection except for her teeth - "long, narrow and excessively white, with the pale lips writhing about them". The narrator develops an obsession with these, for which he longs with a "frenzied desire". Berenice dies, and is interred. The narrator comes round, as if from a horrific confused dream. A servant enters and tells of a "violated grave - of a disfigured body enshrouded, yet still...alive". Finding his own clothes covered in blood, and his hands marked by scratches, the narrator picks up and drops a box, from which roll out "some instruments of dental surgery, intermingled with thirty-two small, white and ivory looking substances..."⁶⁶

anonymous report in the *British Medical Journal*, as The physiognomy of murderers', 1889, p. 612.

⁶⁶ Edgar Allan Poe, "Berenice" in *The Complete Tales and Poems of Edgar Allan Poe*, London: Penguin Books, 1982, pp. 642-653.

TOOTH DEVELOPMENT IN CATTLE UNIVERSITY OF ILLINOIS (1957-1959)

W A Barry Brown* +

Introduction

In 1956 I worked as a clinical registrar in orthodontics at the London Hospital. One afternoon the dean, Maxwell Horsnell, said: "There's a research fellowship in paedodontics [earlier term for paediatric dentistry] available at the University of Illinois in Chicago for a year. If you'd like to go, I'll sponsor you." I asked a few questions, being particularly concerned I would have to work as a children's dentist rather than an orthodontist. I had found clinical dentistry limiting but was intrigued by orthodontics, which was dependent on an understanding of the complex inter-relationships between growing jaws and the development and eruption of the teeth. Besides, there were numerous theories and approaches to treatment and many debates. I viewed dentistry as a means of making a living and very much a nine to five job. I had never considered being a full-time research worker realizing, if I became one, I would have to totally commit myself and be prepared to sacrifice my other interests. "Well if you are interested, let me know tomorrow," the dean said, waking me from my reverie.

It was an opportunity of a lifetime so I agreed. Horsnell had all the necessary documents for me to complete, for registration with the University of Illinois and for a temporary visa to allow me to become a student in the USA. One section had to be completed by Guy's Hospital where I had trained as a student in 1944-50. They listed my grades and gave an estimation of my academic suitability, stating Mr Brown had done nothing whilst a student at Guy's to draw attention to himself confirming my view that it was because there weren't enough other applicants when I qualified in 1950 that I was appointed to a coveted Guy's house post.

The University of Illinois

I arrived in Chicago in February 1957. The paedodontic [called pedodontic in America] research director, Prof Maury Massler, a charismatic man, quickly earned my respect. I have been forever grateful for his helping me to recognize that I would find a satisfying career in dental research. Nobody in dentistry, until I met Massler, ever suggested I had the requirements for an academic career. I had always been in awe of the academic world. He was a friendly person.

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Although never wasting time on idle talk Massler made himself readily accessible to his research students. As soon as I arrived he asked me to look at the data derived from an investigation carried out by a general practitioner on the effectiveness of the oral screen as an orthodontic appliance for correcting protruding teeth. This modest project introduced me to searching the literature for appropriate references and entitled me to become a collaborative author for the subsequent paper.¹

Before I had completed that work Massler switched me to join Dr Henry Rosenberg looking at the stipple patterns of human attached gingivae. Hundreds of colour photographs were taken and I analysed the distribution and patterns of the stipples without coming to any convincing conclusions. Then Massler got me thinking about the difference between alveolar bone and basal bone, which in the mandible forms the main structure of the jaw, giving attachment to the muscles. It was my first experience of finding that the perceived view of the differences as understood by orthodontists did not tie up with the known and readily ascertainable facts. My curiosity was aroused. By considering the embryology, growth, histology, anatomy and pathology of the mandible and maxilla, I arrived at a better perception of the differences between the alveolar processes and the basal bone. Massler suggested the differences were most likely to be attributed to the characteristics and properties of the overlying attached gingiva and the alveolar mucosa. He posed the question: why was the bone under the attached gingiva more labile than the bone under the oral mucosa? The next stage would have been to devise experiments, but before I got to plan any, Massler put me on to a cattle project.

This was an unexpected assignment for a dental school and the last animal that I had imagined I would be working on, as the school's experimental animals were the diminutive mouse and the golden hamster.

Fluorosis in cattle

Massler's involvement with cattle came about because the farmers in Utah were suing the United Steel Corporation for damages. They claimed excess fluoride had been deposited on their pastures and poisoned their cattle.

The Columbia-Geneva Division of the U S Steel Corporation took over from the American government the steel plant it had built during World War II near Provo in Utah. The Corporation added new processes including a steel rolling mill. The iron ore for this plant came from Iron Mountain located 260 miles south of Provo. At the time it was not known that this particular ore was high in fluoride salts. In 1951 Kennecott Copper Corp., located in the Salt Lake valley the next valley north of Utah Valley (Geneva), was monitoring vegetation in both valleys. It discovered the vegetation round the steel plant was heavily

contaminated with fluorides so privately advised the Steel Corporation of the situation.

The alfalfa plant, almost ubiquitous in the area, was used to make hay for livestock. Because it grew "everywhere", alfalfa was used as an indicator plant in determining areas of fluoride concentration.

The U S Steel Company enquired from the Aluminum Company of America, which had extensive experience with fluoride emissions what the consequence might be. U S Steel learned there could be damaging effects on livestock and serious problems with the farming community, so sought assistance.

Advice was sought from, among others, Utah State University, especially Dr D A Greenwood, head of the Department of Biochemistry. Greenwood held a BS degree in animal nutrition from Iowa State University and a PhD in pharmacology from the University of Chicago. For his Chicago thesis he reviewed fluoride toxicosis and was considered one of the experts in the field.

In 1949 Paul Christofferson, a veterinarian, took over the diagnostic laboratory of Utah State University in Provo. He had qualified during the war and served in army veterinary hospitals in Burma and China, looking after horses and mules. Over 15,000 of these animals were used as pack animals because there were few roads.

Christofferson remembers² one of his first involvements with the fluoride problem was when a Mr Bunker, a dairy farmer close to the Provo works noticed his cattle, which usually fattened for market in two years, took four years to gain the same body weights. Christofferson visited Bunker's farm with Greenwood. He lassoed a steer, held it against the corral fence, grasped its nostrils and examined the animal's teeth. He saw the telltale fluoride hypoplasia stained lines on the incisor teeth and the characteristic wear patterns of fluoride enamel and dentine damage. Bunker's alfalfa had a heavy contamination of fluoride, yielding high levels of fluoride in the teeth and bones. The fluoride levels of the bones compared with 3.2% in raw rock phosphate. Bunker was an obliging farmer who gave Christofferson round the clock access to his animals. The first behavioural abnormality Christofferson noticed was that at first the animals drank normally from a cold spring stream running through the farm; then they suddenly lifted their mouths out of the water and licked their teeth. He also noted other cows spat cud out of their mouths for no apparent reason and he saw dotted round the pasture numerous small partially chewed cuds. Subsequently he read in the literature that cattle near Fort William in the British Isles had similar behaviour patterns. The researchers attributed these patterns to tooth pain in the incisors when the animals drank water and in the premolars and molars when the animals chewed on a sensitive tooth from exposed dentine after enamel had failed to form and cover the nerve rich tissue completely. Christofferson remembers the publication reported that cattle of Fort William chewed the cud 72 times before swallowing. He found the normal cattle of Provo also chewed the cud about 72 times. Cattle with severely affected

¹ A K Toepfer, M Massler and W A B Brown, Effectiveness of the oral screen in the treatment of upper incisor protrusion, *Am J Orthodontics* 1959; 45: 759-767.

² Paul Christofferson, Personal communication, 1995.

teeth chewed their cud from 10 to 36 times before they spat it out. The connection between excess fluoride and damage to bones and teeth has been known for many centuries.

U S Steel decided to address the problems associated with excess fluoride and met with representatives of Reynolds Metal as well as ALCOA who were in the aluminum business. They had bad experience with the farmers who distrusted the industry. U S Steel engaged Dr Mortenson (a PhD in animal physiology) who, with the help of Greenwood and Christofferson, filmed the fluorosis problem around the steel plant: how it occurred and contaminated the pastures and affected the teeth and bones of the cattle who ingested it. This film was shown to the Board of Directors of U S Steel in 1952.

The Company took the unprecedented step of admitting their industrial activities had contaminated the pastures and that they would compensate the farmers for their losses. The Company put together a claims form which the farmers completed and submitted. Meanwhile U S Steel would do everything technically possible to reduce the emissions from their plant.

Fluoride was being given off mainly in the sintering plant where the crushed ore was heated to form small rocks of mixed ore and waste in preparation for smelting. Limestone was added to the crushed ore. It combined with the fluoride as it was heated in the sintering plant, reducing the fluoride emissions.

U S Steel hired Paul Christofferson in 1952 as a veterinarian to evaluate damage to livestock and to represent the Company in its negotiations with the farmers for compensation. The Farm Bureau (equivalent to the National Farmers Union in England) sponsored local farmers who formed the Farmers Fluorine Adjustment Committee. A group from U S Steel under Christofferson's direction would examine the teeth of cattle on all affected farms. They made their assessment of the damage according to a dental fluoride severity classification, worked out originally for humans by Trendley Dean³ and modified by Greenwood. The farmers accepted the classification because they were told the Utah State University had carried it out.

In the beginning the Adjustment Committee employed their own veterinarian, but sacked him after the cattle on three or four farms had been assessed. They trusted Christofferson's assessment so all but a small group of farmers, whose farms were between fifteen and thirty miles from Provo, settled out of court. The others lost their case some years later because they insisted that once the animals had been in a fluoride zone, they were damaged by the intake of fluoride, no matter what the amount. There was no chance they could win on such an assertion as it was well established that the teeth could only be damaged by fluorides in the course of their development. Their claim was also rejected on the grounds of the distance of their animals from the emitting

³ H Trendley Dean, 'The investigation of physiological effects by the epidemiological method', in F R Moulton (ed) *Fluorine and Dental Health*, Washington, DC: American Association for the Advancement of Science, 1942.

chimneys. It had been calculated that the highest concentrations of fluoride would be at a distance of ten times the height of the chimneystack. The animals at fifteen miles distance from Provo were well outside the range of possible vegetation contamination.

After all the claims had been settled in 1955 Christofferson negotiated with the farmers that any further claims would be for animals born on the farms and would be based on tooth damage from a classification specifically worked out for cattle. The first step in making this classification was to determine the chronology of tooth development. Christofferson approached Greenwood who advised him to contact Dr Isaac Schour, dean of the Dental School at the University of Illinois, who put him in contact with his colleague, Professor Maury Massler. Schour and Massler had established the chronology of tooth development for humans.⁴ They agreed to carry out the investigation with Christofferson's help as long as there would be no legal involvement. Eventually Massler proposed a budget of \$40,000 to which the U S Steel Company agreed.

Chronology of tooth development

By the time I arrived in Chicago the technique for obtaining radiographs of cow's teeth had been established by Christofferson. The first films had been examined by Milan Schijatschky, a graduate from Switzerland. He plotted the different stages of development for each incisor teeth on large-scale drawings.

It was known that even slightly raised levels of fluoride led to distinct lines or bands on the teeth which were associated with a disturbance of enamel and dentine formation. The lines and bands could be identified with the precise time the tooth was forming and occurred as the ameloblasts forming enamel and the odontoblasts forming dentine did so in a strictly sequential pattern. Any excess fluoride poisoned cells impairing, to different degrees, their ability to form normal mineralised enamel or dentine.

Christofferson was amused by Schijatschky and remembers him helping to take the radiographs and politely asking the cows to open their mouths while he put the X-ray films in their mouths, as if they were sitting comfortably in a dental chair (Fig 1). At the same time colour transparencies were obtained of the incisors (Fig 2).

Schijatschky had to return to Switzerland and I took over the project from him. He was a very competent worker and I am sure if he had stayed on, he would have accomplished all that I did and more, and in his own particular style. I was very fortunate Massler entrusted the project to me. I now realize that, during my first weeks in Chicago, he was testing my competence.

While I acquainted myself with the radiographs that Schijatschky had examined (Fig 3) and made sure I understood how he derived his results from

⁴ I Schour and M Massler, Studies in tooth development: the growth pattern of human teeth, *J Am Dental A* 1940, 27: 1178-1193.

the original pilot study, steps were taken to locate pedigree herds in Illinois whose owners would agree to their animals being x-rayed. The important point was that pedigree animals would have guaranteed correctly recorded dates of birth. Massler and Christofferson found three managers prepared to collaborate. Walter Davies had Aberdeen Angus cattle at Model Farm in Mundelein, Brad Scott was responsible for White Faced Hereford cattle at Northern Pump Farm in McHenry and the manager of Curtiss Candy Artificial Breeding Services in Cary had dairy and beef bulls. We radiographed the Brown Swiss dairy herd of the College of Agriculture of the University of Illinois in Urbana. Christofferson also arranged to radiograph over 300 registered Holstein dairy cattle in Utah.

Figure 1 Radiographing teeth of cattle. The animal was restrained by a stanchion and the head was immobilised with a nose-lead. The x-ray film was contained in a packet and secured by an elastic band behind the incisors



I was responsible for making first enquiries about suitable radiograph equipment. I knew nothing about the virtues of different machines. After I identified several machines Marvin Weiss took over and contracted with a firm to hire a portable unit. Weiss was a part time restorative dentistry clinical teacher and was very helpful on many occasions. He was a close friend of

Massler from their student days.

I went with Christofferson to visit Brad Scott at Northern Pump Farm to determine under what conditions we would be radiographing the animals. Scott, a big man with a Stetson hat, drove his large estate car as if it were an unbroken horse trying to unseat him. He travelled at speed down narrow lanes, ignoring cross roads as if he was the only rider out on the prairie. All the time, even while driving at speed, he continually called up his cattle men on the car phone ordering them to move the yearlings here or the two-year olds there. It was very impressive. Scott was big man with a restless energy. In between he told us of the move of the herd by train from Texas. The Hereford pedigree herd was a sideline of the owner's main operation of manufacturing pumps.

When we were radiographing these Hereford cattle Christofferson noticed some animals had evidence of excess fluoride intake. It turned out that part of

the farm nutritional strategy was to feed a supplement containing raw rock phosphate which had been imported from the island of Nauru in the Pacific Ocean which turned out to have a 3.5% fluoride component. Usually rock salt for cattle would have been purified and the fluoride salt extracted. I imagine Scott switched to a new brand. In retrospect it never occurred to me at the time that this fluoride contaminated feed might have affected tooth development and eruption rates.

Figure 2 Anterior view of the teeth



Collecting the data

Taking the radiographs and the photographs was a combined operation with Christofferson, Earl Allred, Weiss and myself. The farm workers guided the animals into the animal crush. Once the animal's body was restrained, Allred and Christofferson positioned its head and secured the x-ray film in its mouth. Massler aligned the radiographic machine along the

correct axis at an 18-inch target distance. I pushed the timer button of the radiograph machine for two fifths of a second exposure at 60 kv and recorded the animal's number. The whole procedure was effortlessly done. Christofferson always said it was largely due to Allred's exceptional empathy with animals. It helped too, that we all got on very well together.

The Aberdeen Angus herd at Mundelein was near enough to Chicago to make it a day trip. I met Massler at first light at the end of the bus line at Oak Wood. The morning was freezing cold and I was inadequately dressed. I had arrived half an hour before I was due to be picked up and thinking I wouldn't survive in the cold, went to a nearby apartment block and waited inside the foyer. It was better out of the wind, but even there I felt the freezing cold was getting at me. I was concerned that Massler might arrive and miss me at the bus stop, as I ran to and fro between the foyer and the bus stop. Happily he arrived before I had to seek more drastic assistance. I was no longer convinced that dying of cold was an easy way to go. It seemed to me there were some very unpleasant hours before you died. It was a sobering lesson.

After we had taken the radiographs at Northern Pump Farm, we left the x-ray machine on a Friday evening at the Mundelein farm for an early start. When we arrived on Monday, a large Cadillac was drawn up in the yard and a big guy wearing a broad rimmed, mob style hat, was sitting at the wheel. He turned out to be the owner of the Aberdeen Angus herd. He came to check out the

arrangements his manager had made with us. Christofferson told him we were from the University of Illinois. It seemed to satisfy the boss who immediately drove off. Christofferson joked that the boss looked as if he could have belonged to the mob. The manager confirmed had once been a close associate of Al Capone, the famous mobster. He now owned half of the Schlitz beer distribution network in the Chicago area and, said the manager, he didn't buy that operation in the normal course of business!

Figure 3 Above, occlusal; below, lateral view to show first incisor forming at a right angle to its final alignment in the mouth



While we were radiographing the animals Christofferson learned from the manager that the previous year they had bought a very expensive pedigree bull from Aberdeen in Scotland, but the animal had died. When I analysed the Mundelein cattle radiographs I found that, according to my chronology tables, one bull was a year older than the year stated on his pedigree record. The manager had also told Christofferson they had bought an Aberdeen bull in a local (US) sale. He concluded from my findings that the Mundelein farm owner might have transferred the deceased expensive bull's pedigree credentials on to the locally purchased animal.

Radiographing the bulls at the Curtiss Candy Artificial Breeding Services farm was a memorable experience. The various breeds of bulls were kept under a variety of conditions. Some were in fields with special exits large enough for a man to squeeze through but too small for an infuriated bull to follow. I was told beef bulls were comparatively docile, but dairy bulls, especially the Channel Islands breeds, were treacherous and ferocious. The bulls on this farm were remarkably handsome creatures and among the largest I had ever seen.

The animals were so large and physically strong they were secured in a huge heavy timber crush (an ordinary metal crush would have been demolished). Their keepers who held on to lines secured in the animal's nose ring led the bulls to the crush. One vast bull had eight men to restrain him and yet he still managed with one enormous swing of his head to have all the men

sprawling on the floor. We all responded to the special circumstances and Allred exercising his mesmeric charms calmed the turbulent animals. We witnessed a brilliant display of animal power, slyly curtailed by human ingenuity.

Obtaining the radiographs of these highly prized animals was a marvellous demonstration of collaboration with the farm managers. It was very impressive to see how they and their workers did all they could to help us to achieve our goal. At the time I had no understanding of the trouble and expense to which we put the farmers.

Analysing the radiographs

Only when I began to analyse the radiographs did my contribution to the project really begin. The incisor region of 869 living animals had been radiographed, giving 6952 teeth to examine. Each tooth had to be identified at one of six locations on the chronology ladder, making a total of 41,712 possible observations. When I first saw Milan looking at the radiographs, before I had any idea that he was looking at developing cattle's teeth, I thought he was studying human toes. I started at the bottom of the learning curve. I used a x5 magnifying glass. I found it was easy to identify a tooth as soon as it began to form, even before mineralisation, because of the space that was made for it in the bone, a space that enlarged as the tooth grew and the bone was resorbed away by osteoclasts. Early mineralisation of a developing crown was readily recognized. After a little experience I could readily identify several stages from the completion of the crown to the formation of the root. The greatest care had to be taken when tooth development was at an interim stage. Then it was important to examine the radiograph in complete darkness. With time I realised there were other related details that could be distinguished. The resorption patterns of the deciduous teeth were distinctive and were all additional events I could describe.

The stage of eruption, especially when the tooth was about to emerge into the mouth had to be assessed using the photographs taken at the time the radiographs were obtained.

I thought of a very simple device to test out the sequential nature of tooth development and eruption. I drew for each animal a two-dimensional outline of the crowns and roots of the four incisor teeth on a 5 ins x 8 ins card. Then, for each animal, reading off the stage of development of each tooth from the radiographs, I coloured in red on the cards the stage reached. I arranged the cards in strict age sequence and then holding the cards tightly together, flicked through them in the same way that one could look at animated cards of a Charlie Chaplin sequence. It demonstrated very clearly all I wanted to show, but alas, there was no way such a procedure could be published.

Background reading

As the days passed I realized, while working on the material, how little I knew about tooth development and the formation of enamel, dentine and cementum or even the periodontal ligament and the supporting bone. Learning about these complex and sequential processes, because I needed to understand exactly what it was I was looking at in the radiographs, was completely different from having to know about them simply to answer an examination question. Schour and Massler⁵ had published their studies in tooth development and I absorbed the information quickly. Needless to say it was not until the advent of the Transmission and Scanning electron microscopy in the 'sixties and its use in research into tooth development that the process become properly understood.

Even before this project I had some understanding of farm animals. I had always been interested in anything to do with the countryside and in the war years 1939-45 had a variety of summer holiday jobs on farms. I was full of impressions disguised as information. I soon realised that I would have to know about the different breeds of cattle and their distinguishing characters. I was only vaguely aware that animals had been selectively bred to produce beef or milk. I knew nothing about calves' gestation time and that it was the same as the nine months of human gestation.

Christofferson gave me a crash course in all the most important aspects of animal husbandry and with accompanied visits to agriculture departments in Urbana and by reading the current textbooks, I learned fast.

The exhibit

After I had established the main landmarks in the development and eruption of the incisors and the incisiform canine it was suggested an exhibit should be prepared for the 1958 annual Veterinarian Conference in Philadelphia. My job was to rough out some ideas for presentation and choose the radiographs on which the staff of the Illustrations Studios would draw up some tentative ideas for a design. Hooker Goodwin, the professor of the department, was an artist in his own right and a bit of a *bon viveur* (he introduced me to drinking Martinis in the middle of the afternoon). An anglophile he could not have been more supportive, taking a personal interest in all stages of the preparation. His department designed and constructed the exhibit. Ramona Morgan did the artistic work and sophisticated pipe smoking craftsman, Emil Hospodar, an Assistant Professor of Medical and Dental Illustrations, expertly constructed and assembled the separate components.

I was always aware of deadlines and wondered sometimes how the work could possibly be completed in time, but the secretary of the department, Janice Lindeman was very helpful and all difficulties were overcome. The final exhibit

consisted three panels: the central one exhibited photographically enlarged illuminated radiographs of nine key stages with tracings to show the important features; a side panel showed the technique; and a second side panel graphically summarised the results. I learned much from my participation in the exhibit, especially from the artists who stressed the importance of simplicity, clarity and of allowing the illustrations to speak for themselves so you only needed a few words of explanation for the viewer to be able to understand.

I often wondered about the total cost of the exhibit, but during my time on the project money never appeared to be a problem. The exhibit was eventually given to the agricultural department of the University of Illinois in Urbana.

Trips and visits

Once I had the radiographic data analysed and Massler thought I had the chronology story at my fingertips, he sent me off on short lecture tours to different universities. He was keen for me to take on board the idea that the incremental formation of enamel and dentine followed the pattern of "tree ring" formation. It was true for enamel and cementum, which were added in increments to the external surface of the crown; but not exactly so for dentine as the first layers form on the inside of the future crown and are added incrementally within the root, thus leading to a narrowing of the pulp diameter until it may be totally filled with layers of dentine.

I visited two or three departments in a week staying in centrally located hotels, often traveling by plane. It was very much a whistle stop tour, with no time to visit the sights of any of the places I visited. I remember one identical snowy white congress-style building after another.

I had a week's visit to Provo, Utah, to see where the offending United Steel Company's steel works was located. I flew there with Noel Martin, a visiting professor from Sydney. We both made presentations to the United Steel representatives. These were my first experiences of lecturing and I have no memory of how effective I was. Christofferson looked after everything. He was marvellous as the companionable expert. He was a committed Mormon and abstained from alcohol and strong drinks like tea and coffee (the Mormons were years ahead in recognising that coffee was bad for you), but he never imposed his beliefs on his companions. Whenever I was in his company, there was always the possibility of mixing work with some form of relaxation. In Utah he took us up narrow roads to a ski resort and I recaptured for a moment the feeling of being back in Europe, an illusion that was quickly dispelled when an attractive young blond student waitress gave me a wine glass full to the brim of Crème de Menthe as my after dinner liquor. I drank it and have never been able to drink the sickly sweet green fluid again.

However serious the Mormon religion it never dampened Martin's sense of humour. One day one of the Mormon Elders who worked in the same department as he did had picked up a farm record book from a farmer. On one page someone had written:

⁵ Ibid.

The bee is such a busy soul,
he has no time for birth control,
and that is why in times like these,
there are so many sons of bees.

In Provo I examined numerous mandibles and maxillae of cattle that had been partially dissected. Though it was wintertime I sat outside at a table in the bright sunshine. Because of the dryness of the air I did not feel the cold. The more I worked with the cattle project, the more I realised how much research Christofferson had done. He was the go-between for U S Steel and the several universities carrying out research with its money.

Whenever Christofferson was in Chicago I gave him a progress report. After we had exchanged ideas we would go for a meal in some agreeable restaurant down town Chicago. On one occasion we went to see *My Fair Lady*.

Chicago stockyards were famous, especially from Upton Sinclair's exposé of the Chicago meatpacking industry in his book *The Jungle* (1906). I went along with Paul to visit the abattoir and was horrified to see the way the animals were killed. They were tightly confined in a metal lined pen and the slaughterers stepped over the struggling animals to stun them with their swinging sledgehammers. The dead animals were hooked onto overhead gantries and the butchers set about disembowelling them. I watched as they sawed the carcasses into cuts and joints and a multiplicity of other bits and pieces for offal, with hoofs and horns used for glue and other unknown uses. The heads were cut off and went on their separate route to have their tongues removed. What happened to the teeth I have no idea, unless they were ground down with the bones into bone meal fertiliser. It seemed that nothing was wasted. Veterinarians were on hand to make sure none of the animals were diseased. It seemed to me to be a boring and tedious job for a professional and I wondered how long they stuck it.

Attached to the stockyard was a steak restaurant where even the smallest steak served would have satisfied the hunger of four people with my kind of appetite.

Other projects

A veterinarian student became interested in one aspect of the cattle project and one of Massler's MSc students, Ricky Pineiro, studied the gingival tissues. I confess I did not take particular interest in their projects and was aware that I was being quite territorial as far as giving them access to material that I had personally acquired and prepared. We worked in a very competitive environment. I thought I knew how to deal with the problem, but in retrospect I feel a bit guilty. As I write I remember Maury Massler spoke some guiding words to me.

Master of Science

During my first year at Illinois it had never occurred to me that I should spend a second year in America to do a Master's Degree, though that was what most of the post-graduate students were intent on doing. I was very naïve. I was happily immersed in the projects I was given to do and I enjoyed the seminars, the arguments and disputes. I was totally engaged and even had time to go to evening classes on philosophy, reading Plato's *Republic* and many other of his writings. Aristotle was more difficult. I also read Bernal Díaz's *The Conquest of New Spain* and many other books. Chicago was a marvellous city of opportunities. There was time to visit the Indiana sand dunes at the weekends where friends had summer cottages. It was there I met a doctor who, when I was wondering about the wisdom of staying on for another year, asked me if I was enjoying what I was doing. When I answered enthusiastically how much I was, he simply asked: "What's the problem then?" I should add he was Jewish whose family had been in Germany during the war: he knew all about making the most of life.

Once I made up my mind to take an MSc course I had to decide on a project. I imagined that my early work on the differences between the basal bone and alveolar process bone would be a challenging project, more so than the chronology of tooth development in cattle. I had found the cattle project very interesting and enjoyable but did not believe, with my limited experience, there was enough material to present as a thesis. Happily Massler persuaded me there was and so I registered it as my chosen project, little realizing how much there was to learn from a commitment in depth to a single well-defined line of enquiry.

From the moment I became registered as an MSc student my life style changed, from fully committed participation in doing a job well, to the intense competitive business of fulfilling all the requirements and achieving the grades in a number of courses. Massler happily looked after all of that, directing me along with all his other MSc students into the right courses to attend so as to accumulate the appropriate points. He maintained a very close watch on our progress. He also kept us all on our toes by regularly demanding outlines of what we were doing and samples of our writings. By now, he would say, you should have written your Literature Review, now your Materials and Methods, and so relentlessly day by day he made his demands.

Whenever you handed Massler work, it would come back in a day or two completely edited with suggestions for additional information. Just as you thought you were getting somewhere he would suddenly ask, as he did with me, where is all the data on the premolars and molars? To what data was he referring, I wondered? Nobody had before suggested that I should look at the molars. I found that Christofferson, early in the project, had taken some radiographs of mandibles of dead animals. Although the sample was incomplete I found there were sufficient radiographs to form a reasonable

sequence to make a statement about these teeth. Until then I had treated the molariform teeth as a separate matter and not part of my thesis.

Even before he asked me for that information I was working twelve hours or more a day. Towards the deadline for presenting the thesis, I was working eighteen hours a day, seven days a week. I divided the day into three parts. The first six hours of the morning were for corrections and new writing, the second, for making tables and histograms; and the third, for preparing and assembling illustrations. By the day of my viva I had an uncontrollable right eye twitch, which would only be expected in an anxious man contemplating murder.

The viva examination

I was a bit vague about how the viva for my thesis would be conducted and was surprised to find eight very serious looking academics seated round the table. I had no idea that it was to be such a formal affair, and probably just as well. Massler was at one end and I stood at the other. It all began friendly enough and I was asked some basic questions about cattle. One of the assembled academics asked me the gestation time of a cow, and because it was coincidental with the human period of nine months, I answered without hesitation. My questioner did not want to believe me. What could I say? Fortunately the questioning went on to a more serious issue. Though veterinarians and farmers said that cattle had four pairs of incisors, the biologists knew there were only three pairs and that the last pair was incisoform canines. As I had written the thesis and constructed all my tables calling all four pairs of teeth, incisors, an argument developed between the basic scientists and the dentally qualified members of the examining board. There was a real confrontation between the opposing parties. Academics were bent on scoring off each other. Both sides were equally scornful of each other. For the last half hour of my viva, I listened alternatively to the justification of the clinicians with the firmly (and correctly) held opinions of the scientists. In the end a compromise was reached. In front of each copy of the thesis I had to write a simple foreword to say that the thesis had followed current veterinarian usage in referring to the canine tooth of cattle as the fourth incisor. Giving a reference by Loomis,⁶ I was home and dry. It was Charles A Reed, associate professor of zoology, who gave me the reference and it was he who identified for me the value of chronology tables in archaeology and particularly for helping to resolve when animals were first domesticated. The assumption, when you found numbers of animals of roundabout the same age, was they had been domesticated as distinct from animals of different ages being killed in a hunt. Reed gave me a great boost when he said my chronology of cattle tooth development was a valuable landmark piece of research, with special implications for archaeology.

⁶ F B Loomis, Dentition of Artiodactyls *Bull Geo Soc Am* 1925; 36: 583-604.

Publication

It was unfortunate that shortly after my viva I had to return home to England. I had to leave Massler to prepare the 'Chronology of tooth development' manuscript for publication from my thesis. It must have been a tremendous task, one that at the time I did not properly appreciate, especially as I was accorded senior authorship.⁷ I did learn subsequently and realised how much I had to thank Massler for all he did to help me.

Conclusions

My background in orthodontics was invaluable for interpreting the sequential nature of tooth development and eruption and in recognising the synchronisation of these processes with the growth of the jaws of cattle.

I have never ceased to be amazed by nature's device for accommodating the first stages of the very large developing first incisor. The tooth formed in the thickness of the bone at a right angle to its final alignment in the mouth (Fig. 3). As the mandible grew by appositional growth and the incisor erupted, it rotated through a right angle into its correct alignment. I was equally impressed by the fan-like pattern of the individual trajectories of eruption of the incisors and the incisoform canine. As these teeth erupted they spaced themselves out along an ever-lengthening arc.

Working on the project raised numerous questions related to the embryology, development and growth of the jaws and the teeth, and I was constantly able to utilise my understanding of growth from my orthodontic background. When I eventually became a full-time basic science teacher I frequently used the knowledge acquired whilst working on the project.

In my subsequent research I often used exhibits to present the work in which I was involved. My experience for the exhibit made for the veterinarian conference in Philadelphia, taught me a lot about how they should be designed and constructed, as well as how they should be worded.

When I returned from the States I worked on the chronology of tooth development in pigs.⁸ My concluding research papers, published after I retired in 1987 again utilise my American experience. I worked out the chronologies of tooth development, eruption and wear for Fallow deer (*Dama dama*)^{9,10} and

⁷ W A B Brown, P V Christofferson, M Massler and M B Weiss, Postnatal tooth development in cattle, *Am J Vet Res* 1960; 21: 7-34.

⁸ R A McCance, E H R Ford and W A B Brown, Severe under nutrition in growing and adult animals. 7. Development of the skull, jaws and teeth of pigs, *Brit J Nutr* 1961; 15: 213-224.

⁹ W A B Brown and N G Chapman, The dentition of fallow deer (*Dama dama*): a scoring scheme to assess age from wear of the permanent molariform teeth, *J Zool, Lond* 1990; 221: 659-682.

Red deer (*Elaphus cervus*).^{11, 12} They have been of particular interest to Wildlife researchers.

Some personal thoughts

Before I arrived in the States I was more a careless chatterer than a conversationalist and was very undisciplined in the way I expressed my ideas. Working in America changed all that. I suspect one of the reasons was that having been so involved in one main idea for so long, I really knew more about it than most people and with Massler continually asking my views, I learned to organise and sequentialise my thoughts. He encouraged me to make presentations with the briefest of notes, saying that when I talked about the work with him I was perfectly fluent without any notes and so why shouldn't I be in public. It was with such encouragements from my two years in the States that I got the confidence to undertake a variety of projects.

Massler would often casually walk round among his students wherever they might be working and paused to see how they were getting on. He once told me how fortunate I was that I had a facility for analysing data, but also that I was able to synthesise and organise diverse information into concepts. He implied that people were more usually analysts or synthesisers, but rarely both. Massler's observations were helpful as, until he made them, I had never considered how my mind might work. I found being involved in research was a most enjoyable and interesting way of earning a living. Massler once remarked how fortunate I was that I had no personal commitments as it left me free to concentrate on the work in hand. I smiled!

With my Illinois Master's degree I was able to apply for academic jobs and increasingly distant myself from routine clinical work. On one occasion Massler had said to me that when I returned to England I should not get chained to a dental chair; I should look at several disciplines. Of course British dentistry did not work that way. Maury also said he was satisfied that I would be a good basic science researcher, but did not think that I had enough experience in clinical research.

My experience of doing research dramatically demonstrated how the process of testing a hypothesis involved an intense commitment to

understanding every small and relevant fact that could possibly be related to the subject of the hypothesis.

I always felt that when Maury Massler seconded me to the cattle project, he gave me far more responsibility than anyone would have given me back in England. Of course he and Christofferson were there in the background and helping all the time, but I was left with the impression that I was responsible for making sure all the data was satisfactorily analysed and capable of being published.

Massler's capacity to review and edit our written work at speed left a great impression on me. You always knew that you would get your draft manuscript back within twenty-four hours, so you never lost the impetus to drive on and get finished. It was a commitment that I tried to follow with students who submitted manuscripts for my attention later in my career.

My two years in the States introduced me to formalised hypothesis testing and I learned to apply the principles I had acquired in every area of my life. Attainment of objectivity in all matters became my goal.

Unanswered questions

Years later there were still some unsolved matters with the cattle project. Why is it that though the incisors might be clearly banded by hypoplastic fluoride damage on their labial surfaces, it did not always follow that the lingual surface was equally marked. I suspect all cattle's teeth have a fine covering of cementum which gets rubbed off, especially on the labial surface of incisors, quite early after the teeth has erupted into the mouth, but at the time of writing up my thesis there was no published consensus. There was a lot more to know about the periodontal ligament attachment: first to the bone and more complexly to the attached gingiva. Tooth attachment was different in certain important aspects in the incisor region. Though we often puzzled at the absence of maxillary incisor teeth, we never reviewed the evolutionary and adaptation significance.

Summary

It was possible to examine a radiograph of an animal with developing teeth and use the chronology tables to assess age within plus or minus two months. This accuracy was tested at a Chicago stockyard show. We offered to radiograph the animals competing in the different classes. When the farmers realised how accurate we could be, many were reluctant to submit their animals for radiographing. Judges at the cattle shows apparently often doubted that the animals were correctly classed according to age and radiographing the animals would have helped to eliminate cheating. Massler was interested in exploiting the use of radiographs for ageing animals, as a possible way of earning a royalty, but for one reason and another the idea never got off the ground.

The results of our research were used in the United Steel Company's defence against farmers suing them for damages to their livestock.

¹⁰ W A B Brown and N G Chapman, Age assessment of fallow deer (*Dama dama*): from a scoring scheme based on radiographs of developing permanent molariform teeth, *J Zool, Lond* 1991a, 224: 367-379.

¹¹ W A B Brown and N G Chapman, The dentition of red deer (*Cervus elaphus*): a scoring scheme to assess age from wear of the permanent molariform teeth, *J Zool, Lond* 1991b; 224: 519-536.

¹² W A B Brown and N G Chapman, Age assessment of red deer (*Cervus elaphus*): from a scoring scheme based on radiographs of developing permanent molariform teeth, *J Zool, Lond* 1991c; 225, 85-97.

Christofferson said that the forty thousand dollars that the company paid for the research at the Illinois Dental School was one of their best investments in terms of useable evidence with which to challenge the claims of the plaintiffs.

Archaeologists working on the onset of domestication in animals recognised the value of the chronology tables in establishing the ages of animals. When I saw a slide of one of our published illustrations at a lecture given by an archaeologist in 1984, quoting "Brown *et al*" but drawing different conclusions to ours, I realised how much more work could have been done with the project.

Today the 'Chronology of tooth development' is published in all standard texts and still provides a base line for research projects. Most recently it was used to investigate the age at death of cattle recovered by archaeologists from Neolithic sites in England.

Acknowledgements

I owe Maury Massler a great debt of gratitude for his generous encouragement and for providing me in the progressive learning environment of the University of Illinois such a wonderful opportunity to learn the basics for my scientific career. There were very few similar opportunities in England at that time.

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NAPOLEON II (1811-1832) AND HIS TEETH

Xavier Riaud*[†]

Napoleon Bonaparte

Napoleon François Joseph Charles Bonaparte was born on 20 March 1811, the son of Napoleon I (1769-1821) and the archduchess Marie-Louise of Austria (1791-1847).¹ At birth he received the title of King of Rome. The Constitution of the 2 floréal year XII (18 May 1804) granted the title of Imperial Prince to the eldest son of the Emperor.

After the campaign of the Rance and the fall of Paris, Marie-Louise and his son lived in Rambouillet, then in Blois. On 4 April 1814 Napoleon signed an abdication act preserving the rights of his son, but two days later he had to renounce any rights for him and his line of descent. Napoleon bid *adieu* to his troops on 20 April and left for the island of Elba whilst the King of Rome and his mother went to Vienna. The young boy was also Prince of Parma, but from 10 June 1817 he had no official powers there.

During the Hundred Days (period from his escape from Elba until Waterloo), the Emperor's son officially became once again Imperial Prince but not King of Rome. At the end of the Hundred Days, the abdication at the Elysée Palace on 22 June 1815 indicated Napoleon I's political life was over and he proclaimed his son the French Emperor under the title of Napoleon II. The boy, however, lived in Vienna. A commission named by the government confirmed the choice of the deposed Emperor,² but this decision was rescinded on 7 July. Louis XVIII entered Paris the next day. Napoleon II had only occupied his father's role for 15 days.

On 22 July 1818, at the age of 7, he became Duke of Reichstadt. In 1830, the French people cried: "Long live Napoleon the 2nd" in the streets of Paris and he was supposedly going to be the King of Belgium or Poland. He died in Vienna of tuberculosis on 22 July 1832, without any alliance or descendants.

Cutting of first teeth

Napoleon I met Lady De Montesquiou (1765-1835), his son's governess, when she was carrying the boy next to the Orangerie, in Saint-Cloud.³ He asked her if his

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¹ <http://fr.wikipedia.org>, Napoléon II, 29/04/2007, pp. 1-6.

² <http://fr.wikipedia.org>, Napoléon II, 29/04/2007, pp. 1-6.

³ See A Cabanès, *Légendes et curiosités de l'Histoire* [Legends and curiosities of History], Michel Albin (éd.), Paris, 1953.

son was doing well. The governess thought he was grumpy and cried. He probably had toothache.

Returning from a trip to Belgium, the Empress Marie-Louise found her son strong, with four teeth, but thin and pale, possibly due to teething. Even though the Emperor was fully dedicated to his campaign in Russia he found time to ask Lady of Montesquiou about his son's health. In his letter he hoped she would tell him soon that his son's last four teeth had grown.

Back from Dresde, Marie-Louise went to Saint-Cloud where her son was living. Now aged 16 months he had fifteen teeth but did not yet talk. In 1813, the Empress wrote: "My son is going really well," indicating that all his teeth had grown since he was three months. He was only two years old.

Marie-Louise's letters

Marie-Louise lived by the Emperor's side for four years from 1810. From 1813 to 1814, she wrote a series of letters to Napoleon including accounts of her son's oral health issues.⁴ They were published by the Baron Carl-Fredrik Palmstierna in 1955. He faithfully re-transcribed the contents of the letters in the French language of the time. They illustrate how even leading families suffered from severe, recurring toothache.

Chronology

On 8 February 1814 she wrote that he was doing quite well but had a raging toothache this morning which made him suffer for more than three quarters of an hour. "He already has two ruined teeth which depresses me."⁵

25 February: He suffered badly from a raging toothache "but there is no remedy to that. It comes from a problem tooth". She said Dubois⁶ had spoken to her about extracting it but it would be near impossible to convince the boy to have this operation because "when we merely suggest to put cotton on his tooth, he awfully cries out".

27 February: Napoleon slept until 6 o'clock in the morning, but he was still quite grumpy: "I attributed this behaviour to his toothache which often causes him great pain."

28 February: He was really well but still felt pain in the night, "but that was just a matter of half an hour".

On 29 February there was no problem.

⁴ See F E R De Maar, *Le mal aux dents du Roi de Rome* [The toothache of the King of Rome], in *Revue de la Société française d'histoire de l'art dentaire*, <http://bium.univ-paris5.fr>, 1981, pp. 25-26.

⁵ See Carl-Fredrik Palmstierna, *Marie-Louise et Napoléon* (1813-1814), in Stock (éd.), Paris, 1955, pp. 66, 109, 114, 117, 123 and 126.

The King of Rome had a strong chin, a feature peculiar to the Hapsbourg family.

⁶ Since the child was living in France at that time, it is Dubois-Foucou who was Napoleon's personal dentist and not of Antoine Dubois (1756-1837), a surgeon who delivered Marie-Louise's baby in 1811, as believed by Palmstierna, *ibid.*, p. 305.

However, by 2 March she wrote: "This morning, your son still wasn't well and he really suffers from his teeth. He has raging toothaches at every instant. I fear that his ruined teeth will still provide him with long pain."

But next day she indicated that the boy was well, having slept well all night and was in a good mood during the day. "I think that his small indisposition is completely healed provided that his bad teeth caused him no discomfort because they had really caused him great pain for a long time."

On 13 March he had raging toothaches during the day, "but tonight he feels better and is happy".

14 March: "Your son is well ... "and his raging toothaches are completely over".

By 18 March she was getting a bit suspicious: "Her son was well except he said "he suffered from his teeth. We found out that very often he would complain about his teeth, but when I declared going for a stroll was incompatible with the swelling and inflammation of his gums and mouth and that we would be obliged to deprive him from this pleasure, his pains suddenly disappeared and he never complained about them tonight".

20 March: "Your son ... is quite well and he has sometimes raging toothaches, but it is because of his ruined teeth that will make him suffer for a long time".

On 25 March Napoleon complained several times about his toothache but as he did so when laughing "I doubted about his pains because experience proved that it might have only been a pretext or even a mischievous trick".

On 3 August she sent good news about her son's health, he felt very well "except for his recurring painful toothaches".⁷

Young Napoleon's teeth continued to be a problem. In July 1817 the Baroness of Montet (1785-1866) wrote that he was most handsome but thought it was a shame that his teeth were so black and already hideous.⁸

Napoleon's testament

Provision 6 of the Napoleon I's testament will stipulated: "I bequeath my son the golden dental kit left at the dentist's."⁹ According to Claude Rousseau (1998) it seemed that Biennais's dental casket (Fig 1) bequeathed to the Napoleon Foundation could correspond to the kit inherited by his son.

Hypothesis about the young king of Rome's death

There are several theories on the King of Rome's death. Many historians believe he had been poisoned. Some think it may have been administered by his doctor.

⁷ Palmstierna op. cit., fn. 5, 1955, pp. 153, 155, 159, 162, 165, 171 et 269.

⁸ See Alexandrine Du Montet, Prevost de la Boutetière de Saint-Mars, *Souvenirs de la Baronne Du Montet (1785-1866)* [Memories of Baroness Du Montet (1785-1866)], in Plon (éd.), Paris, 4^{ème} édition, 1914.

⁹ See Claude Rousseau, *L'instrumentation : les 'outils à dents' des nécessaires de Biennais. L'énigme du nécessaire dentaire de l'empereur de la Fondation Napoléon* [Instrumentation: the tools for teeth', Biennais' dental sets. The enigma around the dental set of the Emperor of the Napoleon Foundation], in *Actes de la Société Française d'Histoire de l'Art Dentaire* [Acts of French Society of the history of dentistry], Saint Malo, 1998, <http://bium.univ-paris5.fr>, pp. 1-7.

Others suggest it came from his dental surgeon who had been paid to poison the Duke when taking care of his teeth. A famous Parisian daily newspaper, the *Revue de Paris*, published on 11 August 1910 an account of where a dreadful rumour originated. It is the Prince Napoleon, King Jerome's son who was reported to have confided this account to Lady Judith¹⁰ who was the secretary of the "Théâtre-Français".

An agreement was made between the Court of Vienna and the French monarchy. Napoleon's son was no more useful in the diplomatic plans and the news of his existence became a European danger. Metternich commanded his death. It was the great Duchess Stephanie of Bade, the cousin of Napoleon I, who reported the crime to her. She had a chambermaid whom she really liked. When she was about to get married her mistress gave her a huge dowry in order to show her affection. The ex-chambermaid married a famous dentist (Carabelli) in Austria.

Figure 1 Napoleon's dental casket



A little later, she fell sick. When dying, she asked for the great archduchess to come to her deathbed to hear an important confidence. She told her that her husband had confessed to killing the son of the Empress Marie-Louise. Her husband used to treat the young Duke's teeth. One day Prince Metternich¹¹ summoned him and spoke to him without witnesses around. He asked him to slowly kill the son of Napoleon I by performing during at least a year regular but sufficiently separated poisonous injections on his gums. His death was meant to appear as if he had died of melancholy.

A dentist called Carabelli

Georg Carabelli von Lunkaszprie (1787 or 1788-1842)¹² was the first doctor to give lectures on dentistry in Vienna, from 1821. He was a dentist at the court of the Austrian Emperor Franz and was the founder of a stomatology clinic at the University of Vienna. In a treatise on dental anatomy that he published in 1842, he described a tubercle on the palatal surfaces of his first upper molars. He explained the description of it in a more detailed second work which was published after his death in 1844. This tubercle kept the name of his discoverer.

Acknowledgements: Many thanks go to Dr Henri Lamendin, a great French dental historian and a friend. Also to the Napoleon Foundation for permission to use the two pictures.

¹⁰ See Henri Lamendin, Napoléon II: un dentiste et l'Histoire [Napoleon II: a dentist and history], in *Le Chirurgien-Dentiste de France* 8-15 June, Nos 988/989: 104-108.

¹¹ See Cabanès, op. cit., fn. 3.

¹² See <http://en.wikipedia.org>, Georg Carabelli, 2007, p.1.

THANK YOU IMHOTEP

Julie Papworth

My young colleague called me hurriedly into her surgery to help her. There sat a patient in some distress, unable to close her mouth. Clearly she had a dislocated mandible, the first one I had seen in 'real life' in over thirty years of practising dentistry. It was a very long time since I had been taught what to do in such situations and I had only the vaguest memory of the instructions delivered to me one hot afternoon long ago in a lecture theatre in Birmingham.

However, all was not lost. Only the night before I had been reading about the medicine of the Ancient Egyptians and the teachings of the famous Egyptian doctor Imhotep (Fig 1). Imhotep lived during the third dynasty and was chief vizier to Pharaoh Zozer. He was renowned as an astrologer, architect, priest and pyramid builder, but above all as a great physician. After his death he had been deified and his name invoked as a god of healing. The Greeks identified Imhotep with their god of medicine Asklepios, now more commonly known by his Latin name *Aesculapius*. During my reading I had enjoyed learning about the Edwin Smith Papyrus (Fig 2). This was acquired by Edwin Smith in Luxor in 1862 and is believed to date from around 1600 BC. Some believe that it was written by Imhotep himself and it records and preserves many of his beliefs and teachings. To quote from a book by Richardson and Morris, *The History of Medicine*:¹

The Edwin Smith Papyrus is a roll more than 4.68 metres long, written on both sides and consisting of nearly 500 lines. The writing on the front describes forty-eight surgical cases. It is remarkable for establishing the relationship between lesion and symptoms and signs and for grouping these in to what we would now call syndromes (this advance is usually attributed to the Greeks). The author is also precise about his examination of the patient, the interpretation of the illness, whether to treat or not, details of the treatment if he feels this will have a reasonable chance of success and the establishing of the prognosis. Most significantly, the author realised that disease and injury had natural causes and were not due to supernatural influences.

In particular I read with interest:²

If thou examinest a man having a dislocation in his mandible (jaw), shouldst thou find his mouth open and his mouth cannot close for him, thou shouldst

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¹ Robert Richardson and Hillary S Morris, *The history of medicine*, Quiller Press, 2005, p. 25.

² Ibid. p. 27.

put thy thumbs upon the ends of the two rami of the mandible in the inside of his mouth and thy two claws (the fingers of each hand) under his chin and thou shouldst cause them to fall back so that they rest in their places.

I approached my patient and did exactly this. It worked immediately, resulting in one very grateful patient and two very impressed work colleagues. Thank you Imhotep!

19TH CENTURY BRITISH DENTISTS IN MALTA: DAVID AND JAMES FINNIE.

George E Camilleri* *

In the first decades of British Rule in Malta, the Malta Government Gazette was the only newspaper published which, besides official notifications, also carried personal advertisements. Following the Austin and Lewis Commission the British Government considerably eased press censorship in 1839 and many newspapers started publication.

In 1838, during the Governorship of Sir Henry Bouverie, David Finnie, advertised in the *Malta Government Gazette*:¹

Mr. Finnie of Margaret Street, Cavendish Square. London, Surgeon Dentist now on a visit to Malta may be consulted professionally for a short time at Mr. Dunsford's 254 Strada Reale.

The Dunsford was a hotel and in several other instances visiting dentists initially saw their patients at their hotel residence. By the following year Finnie was using his home address at 205 Strada Forni (now Vincenti Buildings), Valletta as a clinic.

However, he was not in Malta all the time. In the decade of his connection with Malta, Finnie was away for considerable periods, probably at Alexandria, Egypt. At that time it was a fast growing cosmopolitan city under Muhammed Ali, who had established himself as the Khedive of Egypt, building modern Egypt and resisting the Ottoman jurisdiction. Many European nationalities, including the British, had established cultural, business and professional centres in the modern city of Alexandria that Ali fostered.

In early 1848 we are informed in the newspaper *Malta Times*:²

Mr. Finnie who has resided in our island for some time past as a Dentist and had succeeded in gaining a considerable portion of celebrity in the profession, has again returned to Malta with the intention of continuing his abode here.

On 14 July 1850 Finnie travelled on the 'Merlin' to Alexandria, where he died of typhus fever on 27 October. The British Consul in Alexandria put an advert in the Maltese papers giving Finnie's creditors twenty days to put forward any claims. The *Malta Mail* of 15 November ran an obituary:

We deeply lament to have heard of the death at Alexandria, on the 27th ultimo of David Finnie Esq., after a severe attack of typhus. Mr. Finnie was well known in

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¹ Advertisement, *Malta Govt Gazette*, 26 September 1838, p. 427.

² *Malta Times*, 21 March 1848, p.3.

Malta, where he had established himself as a dentist and acquired an excellent practice by the eminence of his talent and professional skill. Mr. Finnie occasionally visited Alexandria, where his son has recently established himself and it was during the prevalence of typhus, that he contracted the disease which has deprived an affectionate son and daughter of a kind and benevolent father.

Finnie's son, James, Finnie decided to come to Malta from Alexandria. In May 1851 he was practising from 42 South Street, Mr. Muir's Lodgings. He soon moved to his own practice at 1 Strada Stretta. In the *Malta Mail* of 16 April 1852 we read:

Mr. Finnie, Dentist, begs to announce to the public in general and to his friends in particular that being about to quit the island on professional business, his absence will not be prolonged beyond the month of November next.

The trail is lost here. There is no evidence that he ever returned to Malta. Some years later a touching obituary notice in the *Malta Times* of 20 May 1869, announced the death on "29th April at Southampton, Agnes beloved wife of James Finney of Alexandria, Egypt, aged 26yrs". This was 17 years after the last advertisement. Presumably James Finnie must have returned to his Alexandria practice and married a much younger girl. However he must still have had enough friends in Malta to warrant the obituary notice.

EVOLUTION OF DENTAL PHANTOMS IN MANCHESTER*

Margaret Wilson[†]

Introduction

Dentistry is a craft specialty which requires the acquisition of theoretical knowledge and practical skills. The latter include development of manual dexterity especially in the safe use of hand and rotary instruments in a patient's mouth. In order to ensure patient safety, many skills need to be developed in simulated exercises before applying them to patients.¹ In order to protect patients it is necessary for skills to be practised and perfected on models and manikins before student clinicians are allowed to perform operative procedures directly on patients. The use of manikins is not new and has formed an important part of dental education since the introduction of formal dental education in Manchester in the nineteenth century.

There are many examples of phantom jaws and heads in the Manchester Dental Hospital Museum. The reasons for this may be due to the number of re-equipping opportunities brought about by the necessity to move to different premises as the hospital and school expanded, and also the desire to remain at the forefront of technical developments.

Mounted jaws

Papers on simulated dental clinical practice,^{2,3} describe the work of Edward Oswald Fergus, a Glasgow dentist who underwent a period of postgraduate study leading to a DDS from the University of Pennsylvania in 1892. In 1894 Fergus described and coined the term "dental phantom" to

* Based on a lecture to the Historical Medical Equipment Society, London, 17 April 2010.

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¹ L W Klein, Computerized patient simulation to train the next generation of interventional cardiologists: can virtual reality take the place of real life? *Catheter Cardiovasc Interv* 2000; 51: 522-7.

² D Mason, Oswald Fergus, a pioneer of simulated dental clinical practice, *Henry Noble History of Dentistry Research Group Newsletter* 2006; 18.

³ D Mason and J Beaton, The Fergus family and the Scottish Royal Colleges, *Scottish Medical Journal* 2009; 54: 47-51.

⁴ O Fergus, Dental "Phantom" for use of students and demonstrators, *Brit Dent J* 1894; 9: 528-531.

describe his invention for use as a teaching aid for dental students. Although described as a "dental phantom", the Fergus phantom was in effect a set of mounted jaws, with natural teeth set in plaster. Prior to the Fergus phantom, individual teeth were held in a vice, so the introduction of an arch of teeth set in jaws allowed extracted teeth to be positioned in a natural arrangement, thereby allowing simulation of operative dentistry in the mouth.

In his paper Fergus admits⁴ that methods to hold teeth in a vice already existed prior to his "Phantom". The Manchester Dental museum has a set of mounted jaws with natural teeth in dental stone (Fig 1). Manchester Dental School was founded in 1884, a year after the Hospital was opened. The first Warden (later known as Dean) of the School was an eminent American dentist, Dr Parson Shaw DDS, trained in North America. The Phantom jaws were used in the School from 1884 until 1900. It is not known if these jaws were based on the Fergus Phantom or were introduced from North America.

Wooden phantom heads

The first true phantom heads were made of hard wood blocks, with jaws similar to the Phantom jaws recessed under the wooden heads (Fig 2). These wooden heads were not exclusive to Manchester as other dental schools in the UK have used similar heads.

Fig 1 Mounted jaws with natural teeth in stone



Fig 2 Wooden head



There is some discussion about the origins of the wooden heads, some claiming them to have been adapted from milliners' hat blocks or wig makers blocks. Having looked at examples of these blocks it is my conclusion that the Manchester Wooden Phantom heads were custom built for use in dentistry.

Natural teeth were set directly into plaster of Paris or dental stone in a similar manner to the phantom jaws.

A photographic archive in the Museum shows undergraduate students working in the Phantom Head room with treadle drills dated 1901 (Fig 3). It is

interesting to see that the phantom heads were arranged to replicate the clinical situation in the 1901 Filling Room (Fig 4). There was clearly recognition of the importance of clinical simulation even in those early days. In addition to the phantom jaws and heads, attempts were also made to replicate the presence of lips cheeks and pharynx. They were attached over the jaws, but were very delicate and friable and not able to withstand wear and tear (Fig 5).

Fig 3 Phantom Head Class 1901



Fig 4 1901 Filling Room



Fig 5 Mounted jaws with lips cheeks and pharynx



Steel heads

Steel heads were introduced into the school in 1930s. They were considered superior to the wooden heads because they were easier to keep clean and were therefore more hygienic (Fig 6). There was a different mechanism for attaching models containing teeth to the steel heads. The rubber moulds available to make the models could accommodate both natural and plastic teeth and even edentulous ridges. Dental students entering the Phantom head course were asked to contact local dentists and obtain as many extracted natural teeth as possible. Plastic teeth (Riverside Crylopax, Riverside Dental MFRS. Ltd, at that time based at 61 Speranza Street London SE18 1NX) were used when there were insufficient natural teeth available. The advantage of plastic teeth was that all the students could have the exactly the same teeth in identical arrangements, which was not possible with natural teeth. Plastic and natural teeth were fixed rigidly in dental stone in the heads and were not easy to replace without casting a new model.

Fig 6 Steel head



In the 1960s, the introduction of the high speed drills which required water cooling posed a problem as wooden and steel phantom heads and phantom jaws had no enclosed area for containing water. A temporary solution was found by attaching a plastic bag to the back of the steel heads using adhesive tape.

Until this time patients sat upright in the chair for treatment and the dentist stood behind the patient. The role of the dental nurse was to

mix materials and hand them to the dentist. The introduction of dental chairs which allowed the patient to be placed supine and the dentist to be seated marked the beginning of 'four handed dentistry'. It was now necessary to work closely with a nurse to clear the additional water produced by the high speed hand pieces from the patient's mouth.

Phantom heads also needed to change so that students could operate in the seated position so a method of containing water and disposal of waste filling material and debris was required.

Metal Heads

The new metal phantom heads had a high speed suction mechanism built into the back of the head to take away water and waste dental materials. Such heads were installed in the 1980s (Fig 7). They were designed so that the dental student could remain seated.

Fig 7 Metal head with suction



The plastic teeth used in these heads were of a higher quality, giving greater anatomical detail. They were screwed into place permitting ease of tooth replacement. Surrounding the teeth were plastic gingival tissues as opposed to plaster or stone and replacement rubber cheeks.

In the 1980s natural extracted teeth were beginning to be more difficult to obtain so the availability of high quality plastic teeth was an advantage. The disadvantages of using plastic teeth included: relative ease of cutting plastic with diamond burs compared to natural teeth, and unlike enamel, lack of bonding with tooth coloured restorative materials.

Plastic heads

These heads were set up in the Manchester Dental Education Centre (MANDEC) for postgraduate use in the 1990s. They have soft plastic lips and cheeks which can be replaced (Fig 8). The heads were attached to mobile units so they can be easily stored. High speed suction is available and plastic teeth are used.

Current phantom heads

For undergraduate use, they are set in modules/clusters of four each with a computer and video display unit. This represents the huge advances in

digital technology which is now part of clinical practice. All the clusters are connected to a central display unit for demonstration and teaching purposes. This arrangement, although an easier practical solution in terms of space, services to units and teaching ease, does not replicate the clinical situation (Fig 9).

Fig 8 Plastic head



Fig 9 Current phantom heads



Conclusion

Clinical simulation is as important and relevant today as it was 100 years ago. It is interesting that despite the introduction of more sophisticated equipment and techniques in the delivery of clinical dentistry, the fundamental shape of the dental phantom head has remained very similar to the wooden heads first used in the 1900s. In the intervening years the phantom head has been able to evolve and adapt to the technology required for training dentists in the twenty first century.

BOOK REVIEW Stanley Gelbier

An appraisal of the skulls and dentition of Ancient Egyptians, highlighting the pathology and speculating on the influence of diet and environment,
Dr Judith Miller, BAR International Series 1794, Oxford: Archaeopress 2008, 143pp, £29.

This book is written by Judith Miller, well-known to members of the Lindsay and Henry Noble dental history societies. It is based on her PhD thesis presented to the University of Manchester. The book examines how dietary changes over 4,000 years affected the dentitions and bones of ancient Egyptians. For this Miller used material from many primary sources.

This book is well written, with 8 chapters, 56 tables and 91 figures. The chapters follow the time-honoured division of material as seen in theses. They deal with: medical papyri; geography, climate and diet in ancient Egyptians and the consequential medical conditions; the title of dentist in Egyptian history and conflicting evidence of the practice of restorative dentistry; previous dental examinations of ancient skeletal and mummified material; material and methods; results; discussion; conclusions; and recommendations. All of these chapters are filled with information. They and the fourteen columns of references are invaluable resources for scholarly researchers, but they will also provide a fascinating read for countless dentists and other who are interested in the ancient Egyptians.

The photographs beautifully illustrate the many pathological conditions encountered by Miller.

I was most fascinated by the sections on diet and dental disease, as well as those on medical papyri, the title of dentists and the practice of restorative dentistry in ancient Egypt.

The book will make a welcome addition to many library shelves and those of students of dental history and Egyptology.

HUGH LEECH AND HIS WAR-TIME DIARIES (1939-1944)

Chris D Stephens* +

Introduction

Hugh Leech (Fig 1) died on 1st February 2010. When he was alive he indicated I could use as much or a little of the account which follows in any way I thought appropriate. As his wife and daughter sadly predeceased him there is no one else who I believe needs to be consulted. This material from his diaries will appear in a forthcoming book on the 135 years history of Bristol Dental School.

Figure 1 Hugh Leech



Leech was a highly respected consultant orthodontist and an important member of the British Society for the Study of Orthodontics before it merged with three other societies to become the British Orthodontic Society. He was Honorary Secretary of the BSSO from 1955 to 1958 during which time he organised the first of the Society's annual conferences - known then as Country Meetings - which was located in Sheffield. By coincidence he was President of the Society in 1984 and organised the last conference to use this format in 1985. He was always known jokingly as "the third Broadway Twin" as he bore a startling resemblance to the two brothers Eddie and Ron Broadway who were also among the first orthodontic consultants to be appointed. Always a strong supporter of his alma

mater, Leech had established the University of Bristol Dental Students' Society during his time as an undergraduate. This society still prospers and continues to support teaching and social activities of the University of Bristol Dental School, with its Faculty of Medicine.¹

Hugh went up to Bristol in 1939 initially intending to study law, but disliking it rapidly transferred to dentistry. His diaries provide a vivid account of his time as an undergraduate at Bristol during the Second World War. It is a curious fact that while he was fire-watching on the roof of the Bristol Dental School, Arthur Darling (a later first Professor of Dental Surgery and Director of Dental Studies at Bristol)

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¹ See <http://bristol dental alumni.co.uk>

was learning anatomy for his 2nd MB from (later Professor) Howard Tonge (later Dean of Newcastle Dental School) as they fire-watched on the roof of the Durham Medical School.²

The idea of keeping of a diary originated from the suggestion of Leech's headmaster, the Rev R W B Langhorne, during his final term at the Cathedral Choristers' School, Exeter. In keeping with other diarists, the original enthusiasm waned, but the temporary lapse was soon to result in a regeneration when Leech became a first year dental student at the outset of World War II in 1939. The words which follow are Leech's own.

1939

On 2 October 1939 I registered as an undergraduate student at the Wills Memorial University tower in Clifton. My immediate purchases were a second-hand gown for ten shillings³ and microscope for £2 10s 0d. I enrolled in the Mortimer House Men's Hall of Residence⁴ near the Clifton Suspension bridge and at first shared a second floor study-bedroom with a fellow dental student, as extra accommodation in the building was required for the recently evacuated students from Kings College London; their refuge from the anticipated air-raids on the capital following the outbreak of hostilities. Little did they then realise that such events would not escape them!

There were about forty-five students in residence from all Faculties and my first impressions were favorable in spite of the attendance at dinner that first evening (wearing the obligatory gown). A shadow was cast by the long and dreary "welcoming" speech by the Warden, Mr. "Bags" Turner, which was full of what we considered to be petty restrictions. Some of these, however, were necessary because of the possible results of enemy action and the strict observance of the "black-out" and air-raid precautions, including the correct use of hose-pipes, sand-buckets and stirrup-pumps. These were needed for the extinction of fires from incendiary bombs and any unnecessary tampering with them was a "sending-down" offence.

Before retiring we were escorted to the basement air-raid shelter and, instructed in the correct procedures to be followed on the sounding of the air-raid siren. Formal lectures started the next morning in the main buildings in University Road and, as far as I was concerned, consisted of the 1st BDS pre-clinical course. The first lecture was in the theory of chemistry by Dr. Rixon, starting at 9am. Whilst more formal dress and gown were required by the lecturers, students were allowed a certain degree of sartorial licence, men wearing a blazer or sports jacket with flannel trousers and sporting their recently acquired faculty tie, whilst the women usually wore the traditional skirt and jumper. Nylon had not yet been invented, so that during the very cold winter to come they were obliged to wear the less attractive knee-length woollen stockings. Some students made up for this much later, however, when the availability of nylon stockings materialised with the advent of American service personnel! After the one hour chemistry lecture we

² For further information see Obituary: Hugh Leech, *British Orthodontic Society News* 2010; 15: 8.

³ 50p in today's coinage.

⁴ Now a nursing home.

adjourned immediately to the Biology Department for another hour's lecture. by Major Jock Sloan, who was also the Commandant of the University Senior Training Corps. After a short break we strolled up to the Royal Fort for a lecture in physics by Dr Piper. By this time our minds and bodies were showing signs of fatigue. As this final lecture theatre was relatively palatially furnished with 'plush' seats it took some effort to remain awake and attentive in spite of the riveting presentation of the subject.

Practical laboratory work took place in the afternoons, the most memorable being taught by Dr O C M Davies in chemistry. He was usually known as "Beak". Davies was an elderly gentleman with degrees in both medicine and law. He treated "his boys and girls", as he called us, with a slightly patronising attitude. As we now regarded ourselves as very much 'grown up' this rankled a little at first, but soon subsided when we appreciated his very fine teaching.

On 24 October I formally became a student of the University by attending the Matriculation Ceremony and shaking hands with the Vice Chancellor, Sir Thomas Loveday, followed by the signing of the University Roll. Our Chancellor was Winston Churchill, yet to become Prime Minister and head of the coalition government for the remainder of the War. Fortunately there was an abundance of facilities for relaxation and those at the university union building - the imposing Victoria Rooms - were soon put to very good use. The Freshers' Social Dance early in the term was a great success; quite informal and a splendid opportunity to meet members of the other faculties and the King's College guests.

Apart from its large hall and stage, where many notable performances were to take place, it housed the refectory run by a very pleasant and efficient manageress in the form of Mrs. Underdown. The gymnasium and bars were to occupy many of my happy hours, in spite of the fact that the men's bar was out of bounds to the students of the fair sex! The barman was an ex-Royal Navy boxing champion, Frank Treasure who, with his wife, were devoted to the welfare of their clientele, especially when they over-indulged!

The magnificent sports grounds at Coombe Dingle and the new Squash and Fives Courts in Woodland Road completed the picture and I was fortunate enough to become a member of the University 1st soccer XI this term.

This first term proved to be most enjoyable and free from any enemy activity; in fact it was difficult to believe that the Country was at war and the period was generally described as "the phoney war". We were kept very busy with our studies and end of term exams and extra-mural activities, but the latter rarely involved fraternising with the opposite sex as, believe it or not, we were all far more concerned with ensuring a good academic achievement for our examiners at this stage of our careers.

One incidence of light relief occurred towards the end of term when the residents of Mortimer House regaled themselves in female attire and make-up prior to attending a debate at Clifton Hill House women's hall of residence. The motion "That Cosmetics are a Necessity" was carried almost unanimously, thanks to our support and a good time was had by all; especially as this was one of the few occasions when men and women students were allowed to socialize officially.

On returning home to Mortimer House we were confronted by a considerable number of envious inmates from our rival establishment, Wills Hall. A general boisterous fracas ensued which was far from appreciated by either the Warden of Mortimer or the very apprehensive lay air-raid warden in his tin-hat and authoritative

arm-band, who kept blowing his whistle and threatening us with arrest as so-called "rioters". The air-raid siren had already sounded and he obviously was not too sure whether we were indeed students or disguised enemy paratroopers.

The following day we were paraded before our own Warden to be censured and warned that any recurrence of our outrageous behaviour would result not only in being dismissed from Mortimer, but even sent down. Needless to say, a subsequent request for lady guests to be allowed an invitation to Sunday tea was firmly denied.

The University Rag Week in December was not forbidden by war-time restrictions and proved to be very successful. Our barrel-organ and collecting box excursion to most of the City centre resulted in a considerable donation of funds to the Salvation Army War Work Appeal.

I went down for the Christmas vacation with a feeling of considerable satisfaction and maturity from school days to manhood! Little did I realise then that the real maturity was destined to manifest itself in the coming year.

1940

The Spring term started badly at Mortimer with outbreaks of 'flu', measles and food poisoning. This and the summer term progressed much as before with still little evidence of hostilities. We lived in a fool's paradise and were completely unprepared, at least psychologically, for the horrendous events to reach us late in the year.

The new dental hospital opened in Lower Maudlin Street, opposite the old department at the Bristol Royal Infirmary (BRI). Until then it had consisted of little more than a few rooms equipped with ancient dental chairs and few facilities, so the new building was a revelation! There were something like thirty or more brand new modern dental chairs and units in the conservation room alone, together with well equipped laboratories, lecture theatre, local and general anaesthetic rooms, prosthetic and orthodontic departments and a common room. To complete the picture was a basement kitchen for refreshments and a concrete air-raid shelter!

The cricket season started in May at Coombe Dingle which was to become the venue for very many happy years, including my graduation from the second to the 1st XI, my secretaryship and vice-captainship. This was all too good to be true. The "phoney war" came to an abrupt end on 10 May when Germany invaded Holland and Belgium. Neville Chamberlain resigned and our own Chancellor, Winston Churchill, replaced him as Prime Minister and War leader.

By the end of the Summer term these countries had surrendered and France had fallen with over 30,000 thousand British and colonial troops lost and 335,000 successfully evacuated by an armada of little ships from Dunkirk back to these shores. We were issued with extensions to our gas masks and obliged to leave Mortimer House to make way for further "evacuees". These turned out to be King's College London women students - the final humiliation! The only consolation was that I managed to scrape through my 1st BDS exam, but it was far from certain that there would be a University to return to by the end of the Summer vacation. A few weeks later I returned from holiday to register as a clinical student with the General Medical Council and started working at practical dental mechanics in the new hospital laboratory in July.

My quest for "digs" was soon fulfilled by joining several other dental students at a residence in Woodland Road, conveniently opposite the main University buildings and just up the road from the Princes Theatre. Several visits were made to the latter to see touring London shows, but unfortunately this was doomed to an early demise as a result of incendiary bombs, which completely gutted the place a few months later⁵.

A period of relative tranquility was soon shattered by air-raids from the German Luftwaffe over the City and especially targeting Filton Aeroplane Company, which was then one of the largest aeroplane manufacturing works in the world⁶.

On one occasion, whilst 'fire-watching' on the roof of the new dental hospital at night, I witnessed the amazing sight of several barrage balloons going up in a blaze of fire, having been struck not by enemy action, but by lightning during a thunderstorm⁷. During August and September, massive air-raids continued with high-explosive and incendiary bombs destroying the Rodney works at Filton. Casualties were heavy, as I witnessed first hand, since in addition to my ARP (air-raid precaution) duties, I was now enrolled as a part-time stretcher-bearer at the Royal Infirmary. This macabre atmosphere was heightened by my entry as an anatomy student into the dissecting room where we had to share a cadaver in groups of four. Thankfully dental students limited their dissection to the head and neck! The head of the department was Prof. Whitnal. The dental tutor was an elderly general practitioner by the name of Dr Stock, who seemed to suffer from perennial allergic rhinitis.

Physiology lectures were provided by the dean of the Faculty of Medicine, Prof Brocklehurst, who always closed the theatre doors at 9 am sharp to prevent the entry of late-comers. Histology practicals by Dr Thornton and experimental physiology (frogology!) and biochemistry by Dr Molly Wiltshire completed the picture. The latter's affliction appeared to be permanent indigestion! Having much later in life become an orthodontic lecturer myself⁸, I can now more readily appreciate the effects that some students have on one's little idiosyncrasies!

November 1940

This particular month saw the first really serious interruption of our academic life by the start of the main blitz on the city itself from enemy aircraft. On the evening of Sunday the 24th all hell was let loose during a raid lasting from about 6.30 pm. until 11.30 pm. To quote from my diary: "Bombs falling continuously. The worst hours I have ever experienced. Whistling bombs, parachute flares, incendiaries falling everywhere. Slight lull at 11 pm. I dashed down from my digs, where a large chunk of masonry had crashed through the sitting room window on to the table under which we were sheltering, to the BRI, where I was stretcher-bearing almost non-stop until nearly 7 am the next morning. I saw several nasty operations

⁵ The same raid destroyed the Kings College library, removed for "safe keeping" to the University's Great Hall.

⁶ Between 24 November 1940 and 11 April 1941 there were six major bombing raids. In total Bristol received 77 air raids with 1299 people killed, 89,080 buildings damaged and over 3000 later demolished.

⁷ Student firewatchers included a future Bristol Vice Chancellor Alec Merrison.

⁸ Hugh was appointed Lecturer in Orthodontics at Birmingham in 1958.

in the theatre where surgeons Willway and Fitzgibbon were fully occupied, including several amputations. To quote the latter to us students: "This is not surgery, it's butchery!" Whilst lifting one elderly woman from the stretcher to the operating table her leg came away in my hands! The Anatomy Department at the University is completely wrecked and the Great Hall has only its bare walls left standing. The tower is intact with a time-bomb (unexploded) alongside it. "There is a terrible shortage of water owing to the pipe-lines being damaged and no gas."

Tuesday 26th

"Woke up after a nap wondering if I had been dreaming. Fires are still burning, but 'Brocky' (Brocklehurst) still gave his lectures at 10am and 12 noon! There is a large bomb-crater between the old and new buildings".

A few days later we attended the central health clinic for inoculation against typhoid fever and the same evening went to a lecture by Prof Rogers on "Trephining the Skull"! During the evening of 2 December the next heavy air-raid started on the city lasting four hours, with stretcher bearing by candle-light, since the BRI's electricity supply had failed. This meant man-handling the stretchers to the operating theatres and wards around the defunct lift-shafts. The new library at the University was gutted and C Ward of the BRI, was hit, with fortunately few casualties. Likewise the Children's Hospital. Although our stretcher-bearing finished at 2 am, we still had to attend Prof's lecture at 9 am, with a film of William Harvey's description of the circulation of blood, *De Motu Cordis*!

It was with a great sense of relief therefore that this momentous autumn term ended and I went down to the relative peace and quiet for a pleasant Christmas vacation.

1941

The air-raids continued throughout the first few months of the New Year, but dropped off gradually and life returned to the more normal. The BBC Symphony Orchestra, recently evacuated from London with its conductor Sir Adrian Boult, were regular performers at the Colston Hall and instituted lunch-time concerts, sometimes attired in their Home Guard uniforms! An entrance fee of only one shilling was much appreciated by the audience, especially hard-up students who were able to hear top-rate piano soloists such as Moiseiwitsch, Poulshnoff, Myra Hess, Solomon, Moura Lympany, etc.

Having reached the age of nineteen I registered for my National Service, but was duly deferred from call-up into the armed services and sent back to continue my studies until fully qualified. We were informed that we would eventually be of more value as service doctors and dentists - a view not universally accepted by some of our future patients! Naturally some of us had an uneasy feeling of guilt about this enforced deferral, when many of our friends and non-medical students were already mobilised for active service abroad. At least there was the peculiar "consolation" that we too were very much in the thick of enemy action from above with no means of retaliation.

Apart from all our other activities, enforced or otherwise, a few of us could not resist the temptation of accepting a request for "fire-watchers" from the Warden of the women students hall of residence. Manor Hall. We soon discovered, however,

that we would be safely billeted in our own rooms reserved for men only on the top floor and strictly out of bounds to the fair sex! In contrast to today's student life, we were even segregated at meal-times, having to occupy our own table!

By now a few of us decided that even all these extra-mural war-time duties hardly justified our reserved occupation, so that we took the next best option and managed to get into uniform by joining up in the Somerset Yeomanry Home Guard. Our headquarters was at Alpenfels, a Swiss style chalet the other side of the Clifton Suspension bridge. Part of our duties consisted of the defence of the latter against possible enemy parachute invasion and we were proud to announce the eventual complete success of our endeavours, since no invasion took place and the bridge remained intact!

The year ended fairly peacefully and we were henceforth able to concentrate fully on our studies. With a view to our eventual call-up as service dental officers, a few of us transferred from the Home Guard to the more professional University Senior Training Corps and passed our Certificate A exam which denoted a level of efficiency for eventual officer cadet status. This was additionally a form of insurance against the possible failure to pass our academic exams and risk the earlier call-up as mere privates! By now I had transferred my loyalties from soccer to rugby, playing as hooker for the 2nd XV and occasionally for the 1st XV.

1942

During this year Bristol was rarely affected by air-raids, so that we were able to concentrate without interruption on our academic studies. After passing the preliminary exams in anatomy and physiology and also dental mechanics we moved on to our clinical medical and dental studies with lectures and tutorials in medicine by Prof Bruce Perry, in surgery by Mr Wilfred Willway and in pathology and bacteriology by Prof Tom Hower.

The Bristol Dental Students Society was formed with myself as secretary. Our first lecture was by Prof Perry on the use of vitamins, still a fairly new subject. The University Debating Society held a meeting in March with the proposal "That Medicine is a suitable profession for ladies". The motion was carried but not, I am ashamed to say, with a great majority.

Clinical surgery rounds started at the BRI under the excellent tuition of Mr Willway, who often put the fear of God into not only us students, but the nurses and ward sisters as well. As antibiotics had yet to be discovered, some of the patients presented a pitiful sight suffering from prolonged hospitalisation and convalescence. On the extra-mural side, life at Coombe Dingle was as pleasant as ever where, apart from other University teams such as Cardiff, Exeter, Reading, Southampton and Birmingham, we were also in mortal combat on the playing fields with our arch-rivals, King's College London, the evacuees! Later in the year some of us moved from our digs into full-time accommodation on the vacated top floor wards of the BRI as fire-watchers. In return for these duties we were provided with free board and lodging, much to the envy of other students. Fortunately the air-raids were now few and far between, the only bomb affecting the BRI landing on the mortuary with non-urgent casualties!

1943

We continued with the part-time medical side of our training whilst embarking on the bulk of our work: clinical dental practice, demonstrations and lectures under the tuition of the dental dean, Mr P Stoy and his assistant, Mr Pickles, together with various part-time honorary consultants.

There were short spells in the casualty department and ward rounds with the surgeons Mr. Cook and Mr. Chitty at the BRI. VD clinics were given at Guardian House by Mr. Hardy Kingston, better known by the students as "Poxy Percy"! Since antibiotics were as yet unknown, the routine treatments often consisted of abdominal injections of arsenical preparations. The sight of these was enough to keep any, errant observer on a straight and narrow path!

Bristol was now full of American servicemen awaiting the D-Day invasion of Europe. We were sometimes privileged to entertain their medical and dental officers as guest speakers at our Society meetings, and occasionally visit their hospital departments. On the lighter side, the entertainment branch of their servicemen, the equivalent of our ENSA, put on a marvellous production of 'This is the Army' at the Victoria Rooms. The renowned composer Irving Berlin wrote, produced and acted in the show. The University 'Revunions Society' was similarly active, but in not quite such a professional capacity. The more serious productions of the Dramatic Society were whole-heartedly supported. These activities were very good for the general morale during these trying times.

'Union Week' in June was an equally successful occasion. It started with a 'Biergarten' (beer being just about the only alcohol in sufficient quantity) and followed by garden parties at the halls of residence, the Senior Training Corps dance and several sports events. Having won our cricket match against King's College we later formed a combined XI to defeat the Welsh Universities handsomely. Our own dental team also beat the medicals, but again our combined efforts won the match against Thornbury on what was formerly the famous W G Grace's ground at Alveston. The opposing captain was Dr Grace, a more recent relative of the old man. One extraordinary event occurred as a result of this match being reported on the back sports page of our local newspaper, the *Bristol Evening World*. My brother, a signals officer attached to a regiment of the Somerset Yeomanry on active service in the Middle East, attended the field ablutions where the only hygienic essentials were provided by the flimsy overseas edition of this newspaper. Imagine his surprise when, prior to its use, he noticed his brother's name amongst the opening batsmen for the 'Varsity'. As usual the year closed with end-of-term exams, which in my case meant passing 1st Part Final BDS. Only one more to go!

1944

This final year started sadly with the death of Mr Willway. He never suffered fools gladly but his teaching was universally admired, as was evident from the overflow of the congregation at his funeral in the BRI chapel.

6 June was momentous for two reasons, one international and one personal. To quote from my diary: "Second Front opened at 6 am Started my final exams!

Paratroop, airborne and beach landings on the coast of Normandy between Le Havre and Cherbourg".

Soon afterwards final year medical students were commandeered to help with the returning casualties at Swindon and other hospitals. In September the 'black-out' and fire-watching duties were abolished, to tremendous universal relief. Sadly for us this meant the end of our accommodation at the BRI as this was urgently required for the re-commissioning of new hospital wards.

Five of us were soon compensated by moving into a relatively palatial first floor flat (complete with grand piano, which I put to good use) and situated conveniently almost adjacent to Clifton Hill House Women's Hall of Residence! A very agreeable liaison with some of their residents resulted in our inviting them to an occasional Sunday lunch with an amicable arrangement: we provided the materials out of our food rations whilst they did the cooking. Washing-up was a mutual affair.

In December I mercifully completed my undergraduate training by passing my final BDS exam. I secured the post of acting unpaid junior house-surgeon at the dental hospital. Life was beginning to look very rosy, except that soon I would be eligible for call-up into His Majesty's services, which filled me with no small amount of apprehension and excitement.

During the year several student weddings had taken place including that of a final year lady medical student to an American officer. Most of the reception was provided by the US Forces, which was a revelation to guests who had long suffered the deprivation of war-time austerity⁹. I have a vague recollection of new dustbins filled with ice and bottles of rum and coco-cola!

The December Dental Students Dance at the Victoria Rooms was a great success with our special guests in attendance - "Percy" Stoy (Dean), Georgie Fawn (Dental Surgery), Trevor Johnson (Orthodontics), Claremont (Periodontology) and Pickles (Prosthetics). These were the teachers who had tolerated us for so long and coerced us through our exams.

1945

My final few months at the start of this new year continued to be full of interest, not least of which was the visit of our Chancellor himself. Winston Churchill conferred honorary degrees in the University Great Hall on Ernest Bevin (Minister of Labour) and A V Alexander (Defence Minister). "Winnie", as he was affectionately known, looked very tired to those of us acting as ushers, which was not surprising considering his strenuous war years as War Leader and Prime Minister. This appearance, however, disguised his real mental state which was as active as ever, judging by the delivery of his usual masterly speech.

⁹ General Omar Bradley of the US First Army undertook detailed planning for his 'Omaha Beach' landings in France at his headquarters at Clifton College, Bristol, England.

Victory in Europe

V E Day, was announced by him in May. At the end of the Spring term I very sadly went down from this wonderful university for good. Within a month I had been called up into the Army Dental Corps as a 2nd Lieutenant for preliminary training at York barracks, and then Aldershot. This seemed to me a little pointless now that the war in Europe was finally over. However, there was still the war to be waged against Japan which looked as if it would continue for some considerable time with many more casualties. Mercifully this was brought to a rapid conclusion following the dropping of atomic bombs on Hiroshima and Nagasaki. My anticipated involvement in the "real war" was therefore never to materialise.

After the preliminary few months army training I was posted as a dental officer to the Parachute Training Depot at Hardwick Hall in Derbyshire. Having been foolhardy enough to volunteer to do my jumps, I was thankfully turned down on medical reasons, purely because I wore spectacles! Previously recruits were rejected if they wore full dentures, even though they were otherwise 100 per cent fit. This was because of the risk of swallowing them or choking during the impact of landing! A simple solution was found by my dental predecessors who designed metal denture containers into which the teeth were to be placed just prior to leaving the aircraft. Needless to say many airmen used them as tobacco pouches instead!

Many of those I met and treated were wonderful battle-hardened men, but even so there were one or two who said they would rather be back at Arnhem than visit my surgery! A memorable sight each morning was the batman polishing the artificial leg of the officer in the billet next to mine - the human original having been blown off in action.

It was with an element of regret and eager anticipation that I left this unit after a year and was posted to the canal zone in Egypt. The following two years were also full of adventure and fulfillment prior to my eventual 'demob' in 1948, but that is another story.

Afterthoughts

Except during the periods of direct enemy action, most students, like their other young contemporaries, enjoyed themselves to the full. "Eat, drink and be merry, for tomorrow ... etc".

Food was sufficient and even the powdered egg and milk and ubiquitous spam (tinned ham) were tolerated after a while. Fresh food was limited and fresh fruit only available during the normal British season, since imports from abroad were severely restricted. I remember the look of incredulity on the face of a small patient at the BRI children's ward who was given a present by an American GI¹⁰ serviceman. It was a banana. He had never seen one before!

Special functions such as weddings and birthday parties required some ingenuity, the "banquet" often consisting of vegetable soup, fresh chicken (no home freezers then) and tinned fruit pudding, for which ration coupons had to be sacrificed. Ice cream was often unobtainable. I remember some American servicemen friends motoring by jeep all the way to Blackpool especially to find

¹⁰ General infantryman.

some, after seeing holiday makers there enjoying it on the Pathé cinema news. Practically the only celebratory alcohol consisted of sherry, Algerian wine and beer. Whisky, gin and other spirits were in extremely short supply and usually only obtainable 'under the counter'.

There were no bars at the Coombe Dingle Sports ground, so celebratory drinking or otherwise took place at the Victoria Rooms¹¹ where the visiting teams were entertained.

Fairly weak Georges Bristol Bitter Beer was the only drink available. Mixed company usually retired to 'Aunties', the nearest local pub run by two elderly ladies and very popular with both students and Americans. For non-alcoholic beverages, Fortés Ice Cream Parlour and the Berkeley Cafe opposite the university were popular, as was the Blackboy cafe near the Clifton Downs.

Horts and The Grand Hotel were reserved for special occasions for those of us who could afford them. This usually meant supplementing our meagre parental allowances (few University grants then) by paid fire-watching on the roofs of such places as Harvey's Wine cellars at 10 shillings per night. The greater attraction of earning £5 per night on the fuel dumps at Avonmouth docks was left to the more patriotic and foolhardy!

For more up-market entertainment, Bristol was very fortunate in that the tragic destruction of the city from air-raids did not affect such places as the Colston Hall, The Theatre Royal and the Hippodrome, where symphony concerts, classical plays and the performances of visiting Opera companies took place.

SIR JOHN TOMES (1815-1895)*

Melanie Parker*

Introduction

Throughout 2010 the BDA Dental Museum celebrated the life of Sir John Tomes FRS FRCS LDS (Fig 1). The museum was successful in obtaining a grant from the Royal Society which was celebrating its 350th anniversary last year. The work on Tomes dovetailed with two other anniversaries of events with which he was inextricably linked: the 150th anniversary of the first UK dental qualification, the LDS, and the 130th anniversary of the British Dental Association.

John Tomes has always loomed large over the profession and was the subject of a paper by his biographer, Sir Zachary Cope, at the very first meeting of the Lindsay Society for the History of Dentistry on 18 October 1962. However a survey at the 1909 BDA conference of BDA members and wider dental professionals found less than half of them had heard of Tomes; and of those no more than one-third knew of his most significant achievements. The time was ripe to raise his profile.

Tomes was a man of many talents. This paper takes an overview of all aspects of his life as a general practitioner, inventor, scientist and reformer. It is examined in chronological order with many overlaps in the various spheres of his life as he frequently combined several of these interests at the same time.

Early life

John Tomes was born on 21 March 1815 at Weston-on-Avon, Gloucestershire. The family's wealth was limited so 16-year-old John was apprenticed to an apothecary, Thomas Furley Smith, in nearby Evesham. At the end of his five years John made his way to London to King's College and Middlesex Hospital medical school. It was whilst a student, in early 1838, that he became interested in teeth and bone¹. He showed his results to Thomas Bell, professor of zoology at King's College and lecturer on dentistry at Guy's Hospital, and to his fellow students. The former provided an introduction to Professor Richard Owen who loaned Tomes some specimens in return for slides. Tomes was encouraged by Bell to submit a paper to the Royal Society. 'On the structure of the teeth, the vascularity of those organs, and their relation to bone', completed at the end of May 1838, was read to the Society on Tomes's behalf by Bell on 21 June. In it he described the microscopic structure of the teeth of humans and various animals. This was regarded by Tomes² and the Royal Society as new research and these investigations into teeth

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¹ John Tomes, letter to the editor, *The London Medical Gazette*, 10 July 1840, pp. 632-634, p. 634.

² Ibid.

¹¹ First opened in 1842 and now used by the University's Music Department.

"furnish[ed] abundant evidence of their vascularity and consequent vitality".³ In fact much of Tomes's research had already been discovered by German physiologists. Tomes, however, said "I had... one consolation in my disappointment, which was that, that which I had described corresponded in the main with what had been seen by the German physiologists; and more, that I had carried my researches to a greater length than they seemed to have done."⁴

The paper was passed to Richard Owen for reviewing to appear in *Philosophical Transactions* of the Royal Society but he advised against it. Thus early on in his professional life Tomes is surrounded by controversy; the new, inexperienced researcher pitted against the well-known academic. Perhaps it is surprising that Tomes managed in the end to gain the upper hand. It appears that Owen, after seeing Tomes's initial work wished to pursue this line of enquiry himself and tried to block the young student's efforts. By this time Owen was an active member of the Royal Society. He read a paper to the British Association in September 1838 claiming Tomes's ideas as his own. However through a series of letters in well known medical publications⁵ it became clear that the ideas were those of Tomes. *The Lancet*,⁶ no less, reproved Owen but this was too late for the paper to appear in *Philosophical Transactions*. Instead it was published in *The London Medical Gazette* on 16 February 1839. By then Tomes had conducted further experiments including feeding piglets on a mixture containing madder for 25 days. After slaughter he discovered that their bones and teeth were brilliant red. So impressed were his contemporaries with his research skills that Robert Bentley Todd, Professor of Physiology and Anatomy at King's College, asked Tomes to write an article on bone for his *Cyclopaedia of Anatomy and Physiology*.

Tomes the practitioner

Tomes passed the first exam for the MB in 1839 but did not to finish his medical training. After his paper was read to the Royal Society it was suggested by James Moncrieff Arnott, Professor of Surgery at King's College, and Sir Thomas Watson, physician at Middlesex Hospital, that Tomes become a dentist as there was a need for one with a good scientific understanding. Tomes also had the practical experience needed, having extracted many teeth during his training. At this time no qualification was needed to establish oneself as a dentist. In a letter dated 3 January 1840 Tomes says he had made up his mind to become a dentist and seems to have already secured a post as dental surgeon to the newly opened King's College Hospital.

At the same time Tomes set up practice at 41 Mortimer Street (now Cavendish Place), already medical heartland. Tomes proposed a fee of £1 1s (one guinea; £75⁷) and in his first year aimed to make £200 (£150k using the average earnings index) and to then double it. He was obviously setting himself up as an eminent dentist. The high quality of his equipment such as his chair with its adjustable seat, back and head rest (Fig 1) indicates what he achieved. His estate at death was

³ *Proceedings of the Royal Society*, 1838; 34: p. 70.

⁴ *The London Medical Gazette*, 16 February 1839, pp. 748-756, pp. 748-749.

⁵ *The London Medical Gazette*, *The Lancet* and the *Dublin Medical Press*.

⁶ *The Lancet*, 25 July 1840, pp. 643-646.

⁷ All sums given are approximations of the value today based on the retail price index unless otherwise stated.

worth over £25 million (using the average earnings index)⁸. He did extractions for the poor, for free, from 9am to 11am each day.⁹

Figure 1 Dental chair, commissioned by Tomes in 1856
(BDA Dental Museum, item number LDBDA : 7652)



Tomes the inventor

As soon as Tomes embarked on his dental career he ordered equipment for his new profession. Most pressing were extraction instruments. He had undertaken many extractions during his time as house surgeon at the Middlesex Hospital; keeping records of every case that he saw: 49 out of 50 needed extractions.¹⁰ The instruments available to Tomes did not meet his approval: "forceps for extracting the front teeth; the key instrument for the removal of the back teeth; and the elevator, where the neither of the former were effective...I became dissatisfied with forceps as they are commonly made, and with the key, from the direction in which force is applied."¹¹

The forceps Tomes was given to use as a house surgeon only came in a couple of different styles/sizes that had to be used for all teeth and could only grip two or three points. The key to

which Tomes referred was used in a sideways movement which must have increased the chance of damage. "The gum is often considerably bruised...and always [leads] to an unpleasant degree of soreness."¹²

Tomes said he knew some eminent surgeon-dentists used and spoke highly of the key and it was better than common forceps. However he felt it needed more skill to learn how to use the key than well-made forceps. Thus he set out to improve forceps design and produced a range of forceps with jaws designed to fit different teeth according to the shape of their necks and roots. He preferred straight jaws with the curve in the handle, unlike the earlier hawk's bill forceps where the curve was in the jaws. The handles, however, he said, should be made to suit the operator.

Tomes went to one of the best instrument makers of his day for his new instruments: Jean Marie Evrard. He put in his first order for two forceps on 20 January 1840.¹³ He went on to order 15 forceps of his own design including two for children. In total (along with a couple of other hand instruments) they cost £8 18s

⁸ Grant of Probate, from correspondence with Major (Retd) Ian Tomes.

⁹ Zachary Cope, *Sir John Tomes: a pioneer of British dentistry*, London: Dawsons of Pall Mall, 1961, p. 12.

¹⁰ John Tomes, *A course of lectures on dental physiology and surgery delivered at the Middlesex Hospital School of Medicine*, London: John W Parker, 1848, p. 139.

¹¹ John Tomes, On the construction and application of forceps for extracting teeth, *The London Medical Gazette*, 4 June 1841, pp. 424-430, p. 424.

¹² *Ibid.*, p. 425

¹³ Original invoice, BDA Dental Museum, item number LDBDA : 7467.

(£650). Tomes recommended the following method as the way to have forceps made: "an average tooth...should be selected and given to the forceps-maker and he should be instructed to make the jaws to fit the neck of the tooth exactly."¹⁴ Tomes's forceps became popular immediately: King's College and Middlesex hospitals ordered sets in August and October 1840 respectively.

Tomes was not the first person to improve on the traditional hawk's bill forceps. Cyrus Fay was awarded a silver medal by the Society of Arts in 1824 for improved forceps. Tomes also acknowledged that a couple of other dentists had tried to improve on forceps but he dismissed Mr. Snell's design as of "very limited use"¹⁵, and Sheppard's safety forceps he described as "next to useless".¹⁶ Chitty Clendon's claim to originality was squashed after he was shown to have purchased his forceps from Evrard after Tomes.¹⁷

Tomes did claim that his specific designs for forceps were his own and that he had not copied others. Crucially he must be credited with popularizing the concept of having a set of specialized forceps by publishing his designs in an article in *The London Medical Gazette* on 4 June 1841:

Other practitioners...may have been led to construct similar instruments. They have not, however, to the best of my knowledge, described them...I will describe those that have been planned or modified by myself; and I do so without wishing to claim any merit as an inventor, but merely as having carried out a principle admitting of general application, which has been neglected, or at least neglected to have been made public.¹⁸

In addition Tomes ensured his designs were accessible by giving his patterns to Evrard, who had set up premises at Middlesex Hospital where Tomes was working, and where people could go along to inspect the forceps: "...neither, as far as I can learn, are their patterns in the possession of any surgical instrument maker."¹⁹

Tomes was rightly proud of his achievement. He wrote in 1848:

In 1841 I described and figured ... what I believed to be new and much improved ... forceps ... during the interval the instruments...have come into general use. To borrow an instrument maker's phrase 'no other tooth instruments will sell now' whereas previous to the date of my paper, they had no such instrument to offer for sale.²⁰

To support Tomes's assertion the earliest catalogue in the museum, an S. Maw general surgical catalogue from 1839,²¹ contains two sets of dental equipment comprising a key and two forceps, one curved and one straight, and a second set containing two keys, large forceps for molars and two 'common' forceps. After Tomes's article designs for sets of specialized forceps begin to appear; the

¹⁴ Tomes, op cit., fn. 11, pp. 424-430, p. 427.

¹⁵ Ibid., p. 425.

¹⁶ Ibid., p. 426.

¹⁷ John Stanton, letter to *The Medical Times*, 4 May 1843.

¹⁸ Tomes, op cit., fn. 11, pp. 424-443, p. 426.

¹⁹ Ibid.

²⁰ Tomes, op cit., fn. 10, p. 321.

²¹ BDA Dental Museum, item number LDBDA : 8038.

museum's earliest dental catalogue after the 1841 *London Medical Gazette* article, is a Claudius Ash catalogue of 1858²² showing a set of Tomes's forceps priced at 130 shillings (£500) for a dozen.

Although forceps are Tomes's best known, perhaps earliest, and certainly most enduring design he produced other designs particularly for hand instruments (Fig 2) including adaptations to the elevator design of his mentor, Thomas Bell, where he introduced a distinctive pointed head which was flat on one side and scooped on the other, making it easier to sharpen. Tomes also produced designs for a plugger, spring mallet and finishing file for gold foil work. Like some other Victorian dentists he tried to improve on the basic hand drill with his own design but after the introduction of Morrison's foot engine he acknowledged: "In this instrument the difficulty of securing adequate power appears to have been surmounted."²³

Figure 2 Hand instruments designed by Tomes, from left to right: gold foil finishing file, hand drill, forceps, spring mallet, elevator, enamel cleaver and gold foil plugger. (BDA Dental Museum. Composite of item numbers LDBDA : 9849, 1824, 468, 2291, 266, 10153, 9850)



Tomes did come up with one larger invention – the 'dentifactor' which made dentures. When Tomes started his career all dentures were made by hand. He learnt how to do this himself but left most of the work to technicians:

I regard the artisan in my workroom as a person who supplies me with what I want in the same way as an instrument maker supplies a surgeon...I got a working goldsmith, not a subordinate, but taking the lead in the matter, and he remained with me fifteen years.²⁴

²² Ibid., item number LDBDA : 8039.

²³ John Tomes and Charles Tomes, *A System of Dental Surgery*, London: J & A Churchill, 1873, pp. 325 – 326.

²⁴ Cope, op cit., fn. 9, pp. 13 -14.

From his workroom book²⁵ we can see Tomes used bone, walrus ivory and gold for his denture plates; suction, clasps and springs for retention; and ivory, mineral and natural teeth. He was using the latter as late as 1874 when the book ends. From his own experience Tomes knew what hard work it was to carve ivory dentures and set out to find a mechanical way of improving on this. He adapted a process used in other occupations for his denture-specific version, the dentifactor. It worked:

By means of a blunt tracing instrument and a drill, in such manner that the blunt tracing instrument moving over the surface of a well-formed model governs the cutting of the drill, thus producing a superior and more accurate manufacture of artificial teeth, gums and palates at comparatively small cost.²⁶

Tomes used his invention in conjunction with his technicians: "In my own work-room the base is carved by a patent machine, which altogether supersedes the hand-carving and the pigment. ... much saving of time and without the possibility of error."²⁷ This is confirmed in the work room book where dentures are often attributed to both the dentifactor and a technician.

Tomes was obviously proud of his invention. In a letter of 7 March 1845²⁸ He said he would submit it to the Society for the Encouragement of Arts, Manufacturers and Commerce. Five days later a paper by Tomes about the dentifactor was read by a Mr Sibley, probably the engineer George Sibley, Tomes's brother-in-law since his marriage to Jane Sibley in February 1844.²⁹ Tomes's paper also described a new material for taking impressions, which was more accurate than the beeswax then in use: 'composition'.

The dentifactor was inspected by the Society of Art's committee of mechanics on 20 March 1845. On 2 June at the Society's headquarters their president, Prince Albert, awarded Tomes the Gold Isis Award for his dentifactor. The machine was then displayed at the Royal Polytechnic Institution³⁰ It went on to be manufactured by Charles Holtzapffel, the chairman of the committee of mechanics.

Sadly for Tomes the dentifactor does not appear to have been a commercial success. Early in the following decade a completely new material for dentures, 'vulcanite', was developed and superseded ivory. Tomes himself moved over to mostly using gold for the plates.³¹ Interestingly he does not appear to have personally used vulcanite for denture making, with just one illustration in his workroom book of a vulcanite denture. The one lasting legacy of the dentifactor is in the BDA President's chain of office. The dentifactor was able to scale up and down and the pendant on the chain is believed to have been based on a much larger plaque. The pendant, itself, fittingly shows Tomes.

Tomes's inventions ran alongside and were integrated into his private practice and his hospital work. In 1843 he was appointed dental surgeon to Middlesex

Hospital, the first former student to become a member of staff there. From October 1845 he gave a series of sixteen one hour lectures on dental physiology and surgery to its medical students at the end of each Monday afternoon.³² They weren't compulsory and he had a low attendance for the first one: "I am resolved never to deliver any more lectures unless I have a class of six".³³ The lectures were appreciated by a wider audience, however, being published in *The London Medical Gazette* from 1845-47 and then in book form in 1848.³⁴

Around the same time (1843) Tomes was amongst a dozen or so dentists who made the first attempt to professionalise dentistry by calling upon the Royal College of Surgeons of England to create a special diploma for dentistry and to award their newly created fellowships to dentists. However Tomes' first foray into reform and politics failed.

Tomes the scientist

In 1849, after an eleven year gap, Tomes submitted his second paper to the Royal Society. Establishing his practice, his hospital appointments and his inventions had doubtless kept him busy but perhaps he had also been deterred by the episode with Owen. Alternatively maybe he had been disappointed that his earlier research had not been entirely new and wanted longer to work on original material.

Tomes' second paper, read on 21 June 1849, focused on the structure of marsupial's teeth and was based on the work of (and presented by) Robert Grant, professor of comparative anatomy and zoology at University College London. The following year Tomes submitted two more papers; the first, on the dentition of rodents, was read on 30 May by William Bowman; the second, a joint paper with Middlesex Hospital colleague Campbell de Morgan, was presented on 10 June. The latter, which described changes that take place in growing bone, was read by Tomes himself as he had been elected a Fellow of the Royal Society on 6 June 1850 (Fig 3). Tomes presented his last paper to the Royal Society, 'On the presence of fibrils of soft tissue in the dental tubes', in 1856. The existence of dentinal canals and the fibres within was known but it was Tomes who accurately described the fibrils' role in transmitting pain, linking his microscopic research and his clinical work. Such was the importance of Tomes's research that he had both the process of enamel production and the dentinal fibrils named after him.

When Tomes was elected as an FRS he became the first dentist to be elected on the basis of his dental research. His citation however, as well as describing his papers to the Royal Society and his course of lectures highlighted the medal he had been awarded for the dentifactor. This shows an appreciation of him as an all rounder, only ten years into his career – at a time when he had hardly started on his educational and political reforms.

²⁵ Workroom book, 1848-1874, BDA Library collection.

²⁶ Patent, 3 March 1845.

²⁷ Tomes, op cit., fn. 10, p. 366.

²⁸ Royal Society of Arts Archive, item number PR.MC/101/10/199.

²⁹ Tomes and Sibley were presumably close: both built homes for their retirement in Caterham, Surrey.

³⁰ Receipt of delivery in Tomes's scrapbook, BDA Dental Museum, item number LDBDA : 7469.

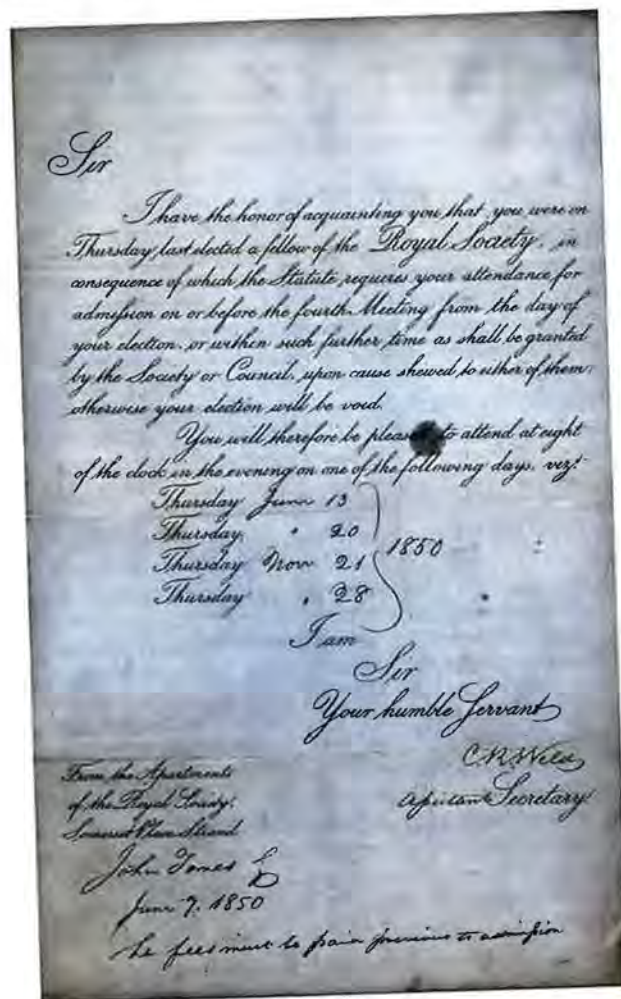
³¹ Workroom book, op cit. fn. 25.

³² Lecture admittance card, BDA Dental Museum, item number LDBDA : 8042.3.

³³ From Tomes's diary, quoted in his obituary, *British Dental Journal*, 1895; 16: pp. 462-492, p. 463.

³⁴ Tomes, op cit., fn. 10.

Figure 3 Letter announcing Tomes's election to the Royal Society, 1850
(BDA Dental Museum, item number LDBDA : 7468)



Tomes the reformer

Tomes's first foray into dental reform in the mid-1840s was unsuccessful but just over a decade later he tried again. It would appear that his hand was forced, or at least nudged, by the actions of dentist Samuel Lee Rymer and co-thinkers who, in

1855, wanted to form a College of Dentists with an independent training course and exam for dentistry. This ignited the 'memorialists' as they have been called³⁵ to again petition the Royal College of Surgeons for fear dentistry would become a separate profession rather than allied with surgery. It was Tomes who spoke to the College's secretary Belfour and who took up his suggestion to form a specific body to negotiate with the College – this became the Odontological Society with Tomes as an honorary secretary taking a leading role in negotiations with the College.

Tomes's membership of the Royal Society was crucial in the success of the memorialists, rather than Rymer's faction, and the establishment of the first UK dental qualification.³⁶ Tomes did not have a Royal College of Surgeons qualification. He could not therefore work from within the College although he had friends who were members, including Septimus Sibley, his brother-in-law and fellow Middlesex Hospital man, who was elected an Fellow of the College in 1857.³⁷ Success came in July 1858 with the passing of the Medical Act which empowered the Royal College of Surgeons of England to award a specific dental qualification, creating Licentiate in Dental Surgery.

As legislation to establish a qualification in dentistry was nearing reality the Odontological Society decided to establish the Dental Hospital of London and its associated London School of Dental Surgery to provide training. Tomes was on the sub-committee to devise the school's scheme of education and became its first lecturer in dental anatomy and surgery after it opened in 1859.

The date for the first LDS examination was set for 13 March 1860. It is still unclear exactly how the exam, which was an oral exam, worked – or at least how the three dental examiners, Tomes, Thomas Bell and Arnold Rogers, 'passed'. For the list of fifteen candidates who passed on 13 March included the three dental examiners, implying that they were not just given the LDS in order to become examiners. In addition they all paid the £10 10s fee.

In 1862 Tomes was given a handsome silver tea and coffee set by his fellow practitioners in recognition of his achievements on behalf of the profession. To do so shows the great esteem with which he was held yet perhaps his greatest moment was still to come: passage of the 1878 Dentists Act.

As early as 1865 Tomes was looking to establish a statutory register, sending a memorial to the General Medical Council. However progress was slow: Tomes had moved out of London to his new country home in Caterham, Surrey. A decade later, in 1876, the Dental Reform Committee was founded. In the following year, after the resignation of Samuel Cartwright Junior, Tomes was elected chairman and empowered to negotiate with the four main colleges of surgeons.³⁸ That in Edinburgh was particularly unhappy with the proposal that those registering with the LDS could call themselves 'surgeon-dentists' or 'dental surgeons' especially as the Bill also

³⁵ Alfred Hill, *The history of the reform movement in the dental profession in Great Britain during the last twenty years*, London: Trübner & Co., 1877.

³⁶ Malcolm Bishop and Melanie Parker, Sir John Tomes FRS, Fellows of the Royal Society, and Dental Reform in the nineteenth Century, *Notes and Records of the Royal Society* 2010; 64: pp. 401-416.

³⁷ Septimus Sibley's country home in Bletchingley, Surrey was less than five miles from Tomes's house in Caterham.

³⁸ Royal College of Surgeons, Edinburgh, Royal College of Surgeons, England, Faculty of Physicians and Surgeons, Glasgow and Royal College of Surgeons in Ireland.

proposed that surgeons, without an LDS, could not use the term 'dentist'. They feared that the titles 'surgeon-dentist' and 'dental-surgeon' implied the holders were fully qualified surgeons. Tomes, writing from his home in Caterham, quoted an 1860 ruling by the Court of the Queen's Bench saying that the term 'surgeon-dentist' "means that the person is skilful in healing diseases of the teeth and nothing more."³⁹

To obtain Edinburgh's support Tomes decided to concede that those who were medically qualified could practise without a specific dental qualification. The Bill was steered through parliament by Sir John Lubbock, a friend of Tomes, passing its third reading on 15 July 1878. Tomes was given the honour of being the first name in the first Dentists Register, exactly a month later.

Of course it was only the titles 'dentist', 'dental surgeon' and 'surgeon-dentist' that were protected (with a fine of £20 - £1500 today - for using the terms illegally) not the practice of dentistry. Perhaps if the surgeons had been less protective of their role and their view that having a general knowledge was sufficient to practise in the specialities then maybe the professionalization of dentistry would have been advanced further at this stage. Tomes however recognised that compromises had to be made in order to get something through.

Now that registration had been achieved it needed to be monitored by the profession and the British Dental Association was established for this purpose. The obvious candidate for president was, of course, John Tomes. The well known portrait of him by Carlile Henry Hayes McCartney (Fig 4) in the BDA headquarters was commissioned by the Dental Reform Committee and presented to Tomes on 26 July 1880, the day of his presidential address. It shows Tomes at his Phillip Webb designed home, Upwood Gorse. This portrait shows a quirk of Tomes - his constantly undone top button.

In 1886 John Tomes was knighted for his services to dentistry and granted a Coat of Arms two years later with the appropriate motto *Nil Sine Labore* (Nothing Without Work).⁴⁰ Unfortunately this work may have contributed to the ill health he suffered during much of his life.

Sir John Tomes died, aged 80, on 29 July 1895 and was buried in St Mary's churchyard, Upper Caterham, Surrey. Fittingly the gravestone is now being cared for by the BDA as "The history of his life is the history of our profession."⁴¹

³⁹ Letter from Tomes to the President and Council of the Royal College of Surgeons, Edinburgh, 3 January 1878.

⁴⁰ Ian Tomes, op. cit., fn. 8.

⁴¹ Editorial, *British Dental Journal* 1895; 16: 434.

Figure 4 Oil painting of Sir John Tomes by Carlile Henry Hayes Macartney, 1880 (BDA Dental Museum, item number LDBDA : 2936)



Acknowledgements

I am grateful to Malcolm Bishop for his research on Tomes's connections with other fellows of the Royal Society, and to my colleague Sophie Riches for her work on the establishment of the LDS.

The illustrations are reproduced by kind permission of the BDA Dental Museum.

THE DENTISTS OF LLANDYSUL 1900-2000

Harold Selcon*

Introduction

The material for this paper is drawn from my book¹ written for the local history society. This follow-up to a larger book² about the doctors, nurses, chemists, hospitals, asylums and ambulance services of the area was well received locally and sold for charity. Only a few copies of the dental book were printed for the society, by an ex-patient with a small printing business, but they were never sold. The editor of *Dental Historian* thought it deserved a wider readership and suggested this paper be submitted for publication.

The paper covers a period when there were enormous changes in the structure of the dental profession and the care it provided. It examines a number of dentists who worked in Llandysul, West Wales. The village of Llandysul in Ceredigion, used to be the hub of the Welsh woollen industry. Now the town which lies along the banks of the River Teifi is better known for its fishing and canoeing.

Although it was well served by doctors, nurses and chemists, in the 19th and 20th century there were few dentists, so some patients would have obtained care from other workers. Before 1921 dentistry was not a closed profession, so anyone could provide treatment.

Dr Tom Evans of Caeryglyn, Llandysul included dental forceps as well as obstetric forceps and tonsil guillotines in his equipment. Older residents remember Thomas Davies, the pharmacist at Medical Hall in Lincoln Street extracting teeth in his back room when requested for local farmers on market days. Davies' daughter married one of the local woollen mill owners. He had a small factory adjoining the chemist shop where he made flannel shirts. Even when I entered medical practice in 1955 some older patients thought it reasonable to ask me to remove a tooth, and there were old forceps in a cupboard.

In the 20th century six Llandysul dentists were registered:³

John James Thomas
Nesta James (nee Lewis)

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¹ Harold Selcon, *The dentists of Llandysul 1900-2000, including a short history of dentistry*, Privately printed, undated.

² H Selcon, *The changing face of medicine in the 20th century Llandysul: GPs, nurses, chemists, ambulances, hospitals etc serving the area 1900-2000*, Cardigan: E L Jones and Son for Llandysul Local History Society, 2002.

³ Dentists Registers, consulted in the National Library of Wales in Aberystwyth.

Peredor Jones
John Michael Thomas
Lyndell David James Davies
Brian Armitage.

Apart from Armitage all were from Ceredigion or the surrounding counties; and all spoke Welsh, as did their auxiliary staff who were all local men and women. In addition, Albert Victor Hickey held surgeries in Llandysul on market days, in the front room of a house opposite the Cilgwyn arms in Bridge Street.

John James Thomas (1848-1942)

He was born, educated and lived for the whole of his life in Llandysul. There is no evidence he went away to study dentistry. His entry in the *Dentists Register* indicates he was un-qualified but registered under the 1878 Dentists Act, ie he was in practice for 5 to 7 years prior to entry on the list.

In the 1870s he worked as a young man with a local doctor, T Jones (registered at Richmond Villa). It is likely Thomas gained the necessary medical and dental skills to set himself up as a practising dentist in the town. Documents⁴ show he was well established in Blodfa, Lincoln Street, by the early 1890s. A family oral tradition suggests Dr Jones, a son of wealthy local society, was so impressed with Thomas' ability that he offered to finance him through medical school. Unfortunately he died before the idea could be implemented and Jones family did not carry out his wishes.

At the start of the 20th century Thomas was the only dentist resident in Llandysul. At the time many Welsh people were emigrating to America. He arranged for his nephew, Thomas John Thomas, to go to Philadelphia, to study at the Pennsylvania College of Dental Surgery, from where he graduated in 1907.

He returned to Wales in the following year and assisted his uncle for several years before leaving to set up his own practice in Lampeter. A handwritten, un-witnessed will, amongst J J Thomas' papers dated 14 September 1908, names TJT's uncle as executor and leaving everything to him. However he went on to marry and had a son to whom he passed the Lampeter practice.

John Thomas' practice must have provided a good income. At a sale of 'The Full Moon Estate' in the central part of the town, held by John Francis and Son at the Porth Hotel on 17 January 1912, he purchased three cottages on the opposite side of Lincoln Street to his surgery in Blodfa. He drew rent from them until his death, by which time the cost of their upkeep outstripped the income.⁵

In the same year he married Hannah Jones of Rhydygen, Talgareg. He was 64 years old, she was 25. Their happy and loving marriage produced a child in 1916: Mary Elizabeth (Minnie).

⁴ Family letters and newspaper cuttings held by his grand-daughter.

⁵ I was told that the rent was of the order of one shilling a week.

In 1914 he acquired a 5-seater Studebaker, one of the first three⁶ local people to have a motor car, for £245. The insurance premium of £10-15-0d included £1 to cover his chauffeur (although Thomas also had a driving licence).

Although in his 70s, he continued to practise after the war ended, with his wife and later his daughter acting as receptionist/nurse. In the last decade of his life he was virtually retired and employed an assistant.

When Thomas died in 1942 the practice closed. His obituary⁷ paid a well deserved tribute to his long service.

Nesta Gem Lewis (1902-1958)

She was born on 19 December 1902, the third daughter of the headmaster of Llandysul Grammar School. There was also a brother, Benjamin (Rory) James, the youngest of the family. After education to secondary level in Llandysul Lewis left for London to train, gaining the LDS from the Royal College of Surgeons of England in 1925. At school and university she was a keen hockey player. Soon after qualification Lewis returned to the town and set up a practice at Llwynderw, Bridge Street, staying there until 1934. At that time Rory, now a qualified solicitor, also returned to Llandysul. They decided to share accommodation, buying numbers 4 and 5 Bridge Street. He had the ground floor; her surgery and waiting room were upstairs.

By then, John Thomas of Blodfas was very old. Lewis' practice flourished and she took on a friend and neighbour, Enid Thomas, who lived next door to the surgery in Brithdir, Bridge Street, as a receptionist.

In 1948 the town was pleasantly surprised when, at the age of 45, this apparently confirmed spinster married a well respected Llandysul man of about her own age. William Lloyd James was the headmaster of the local primary school and a master fisherman. His monster trout caught in the River Teifi was stuffed, still to be seen at the Porth Hotel.

The practice continued to expand. In 1951 Lewis took on an assistant, another John Thomas, unrelated to the old dentist. The NHS has started three years earlier and the practice followed the latest trend by employing a receptionist and dental nurse. Three years later she opened a branch practice in Cardigan, run by Thomas. It was there that most of the dental laboratory work was done.

Happily married, with a successful practice, a congenial partner and efficient auxiliary staff, all seemed to be going well. However, in 1958, at the relatively young age of 55, Lewis died and was buried in Llandysul church yard.

Peredur Jones (1919-?1966)

In 1944 another dentist came to Llandysul, a Welsh speaking Welshman from further north. Jones was born in Cemaes, north of Machynlleth, where his father was headmaster of a local school and where he was educated.

⁶ The others were Dr Tom Evans and a local wealthy grocer.

⁷ Obituary: J J Thomas, *Cardigan and Teifiside Advertiser*, 30 January 1942.

Before war broke out Jones went to London to study, qualifying LDS Eng in 1942. He joined the Army as a dentist but contracted poliomyelitis. It left him with residual weakness in his right side and he was invalided out in 1944. In that same year he married Esme Davies who had been brought up by her grandparents at the Porth Hotel in Llandysul.

They settled in Llandysul and he opened a surgery at the Poplars in the High Street. His slight limp did not prevent him from carrying out most dental procedures. They acquired Dolgrogws Farm in partnership with Esme's aunt and Jones enjoyed his role as a gentleman farmer as well as a dentist. For most of their married life they lived at the Porth Hotel. Their daughter, Andrea, was born in 1947.

The Poplars surgery was situated on the ground floor. There was a well equipped surgery, laboratory and waiting room. Ryland Davies was the dental technician. He had served in the RAMC during the Second World War in India and Tokyo as a nursing orderly. After he was demobbed and came back to Llandysul Davies was offered a job with Peredur. He had had no dental training before but under the guidance of the dentist quickly became skilled in all aspects of dental mechanics which he carried out in the laboratory on the premises. It was a happy association and Davies and his wife Maisie lived in the upper storey of the house which had been converted for them into a flat, only leaving in 1957 when their first child Andrew was born and they needed more space. Davies could turn his hand to most things and willingly helped Jones on the farm when needed.

In his younger days Jones was a good amateur footballer. Although polio stopped him playing he took an interest in the town's team. Over the next few years ill health and domestic problems took their toll. By 1966 he had to give up the practice, was estranged from his wife and was living with his mother at Ty bad Gardens. No one in Llandysul remembers his subsequent fate. It is thought he left the town in the 1960s to return to his birth place and died shortly afterwards.

John Michael Thomas (1928-2003)

This Thomas was born in Aberdovey in 1928, unrelated to the earlier John Thomas. Having lost his parents early he was brought by relatives in Neath. He was educated at Ardwyn School, Aberystwyth and then Taunton School. He then went up to Edinburgh Dental School, qualifying with an LDS from the Royal College of Surgeons of Edinburgh in 1950. He had intended to specialise in hospital-based dentistry in Bermuda. Although wanting to travel he heard of an opportunity and came to Llandysul in 1951 as a 'short term' locum for Nesta Lewis. However, he enjoyed the work and was welcomed as a Welsh speaker. Thomas therefore stayed on, first as an assistant then as a partner. When Lewis died in 1958 Thomas carried on the practice in Bridge Street, Llandysul, which she had founded, as well as a branch practice in Cardigan which he had initiated in 1954.

Thomas married Nina Lewis, a member of the Lewis family who ran the oldest Welsh printers in Ceredigion, in 1958. For a while they lived in Cardigan, commuting between the practices. Then Thomas took on a partner to run the Cardigan practice and to help in Llandysul. He was John Albert

Lazzaro Capanini, born in Aberystwyth. Capanini had qualified with a BDS Birmingham in 1957. Previously local doctors were called in to give local anaesthetics but these two dentists coped on their own: JT usually gave the anaesthetic, JC operated.

With the coming of the NHS doctors and dentists were busier and employed receptionists to help. Enid Thomas and Rae Evans provided this service to Thomas' practice. Mair Phillips from Pentrecwrt assisted at the chairside.

John Thomas and his wife returned to live in Llandysul, in 1966, buying Caeronen, a large house on the Gilfachwen Road opposite the Grammar School. He pursued many country sports: fishing, shooting and riding with the local hunt.

In 1975 Thomas gave up NHS dentistry and went into school dentistry for a time before returning to a private practice at his home at Caeronen. Mair Phillips accompanied him on both these ventures.

When Thomas left the Bridge Street Surgery in 1975 the practice ceased to exist. However, Capanini continued to run the Cardigan practice.

In the early 1990s Thomas developed polymyalgia and arthritis so had to retire early from dentistry. He became progressively disabled and developed lung cancer. He died in July 2003 aged 75 years, soon after his 45th wedding anniversary.

Lyndell Davies (1944-2005)

He was born in Neath in March 1944 but came to live in Llandysul at the age of three months. He was educated in the town, attending the Llandysul Grammar School (now Ysgol Dyffryn Teifi) before going to Edinburgh. He qualified with a BDA in 1967. Davies gained experience in Birmingham and Carmarthen and then returned to Llandysul in 1974 to set up his own practice at the Poplars, High Street, where Peredur Jones had practised.

The only other dentist in Llandysul at that time was John Thomas, carrying on Nesta Lewis' original practice in Bridge Street. Thomas knew Davies from their Edinburgh days and had allowed the then-student to observe his work at the Bridge Street surgery.

Davies equipped the Poplars with the latest equipment: x-rays, high speed drills and the latest acrylics which had taken over from the old vulcanite and gutta percha. Like nearly all other dentists in the area he held branch surgeries, in his case at Lampeter. With this extra work he took on an assistant, Patricia Young. She provided most of the care in Lampeter and helped out in Llandysul on two and a half days.

In 1988 Davies gave up the Llandysul practice. By then the town had another dentist who had extended his existing Newcastle Emlyn practice to Llandysul a few years earlier. Davies continued to practise in Lampeter until 2002, after which he did locum and domiciliary dentistry.

In his sixties he commuted between his homes in Wales and Ireland, enjoying the facilities in both – especially golf. In his youth he had played football and squash, but golf became all-embracing.

When interviewed in 2004 Davies was fit and full of plans to retire to Ireland. In May 2005, now living in Ireland, he suddenly became ill, rapidly deteriorated and died on 17 June.

Brian Armitage (1934-1999)

Born in Bamsley in 1934 he was brought up and educated in Pencoed, near Bridgend, attending its Grammar School. A good athlete and scholar he started applying to university dental departments from the age of sixteen. He was accepted by Guy's dental school, represented it at rugby and athletics and qualified BDS London in 1955 at the age of 21 years.

A year later he married his childhood sweetheart who had attended the same school and Methodist church; and who in the meantime had qualified as a nurse. Armitage then became a National Service dental officer, rising to the rank of major. He ended his service in charge of Western Command Dental Services, stationed at Malvern.

After two years he returned to civilian life. He and his wife settled in Sheffield and had two children, a girl and boy. His son John also qualified as a dentist. The fame went to Wales in 1979, setting up practices in Newcastle Emlyn, Cardigan and then Llandysul. His first surgery was in Bradford House, King Street. The building was later condemned so he bought Compton House further up the town in High Street. This remained his Llandysul surgery until he retired.

Armitage did not actually live in Llandysul. At first he was at Plas Cerdin Ffostrassol, a large nine-bedroomed house with twenty acres of land. He later moved to a 100 acre farm, Troedyrhiwfenydd, where, amongst other things, he raised old breeds of sheep. He specialised in Llanwenog and Border Leicestershire breeds and carried off prizes for these classes at the Royal Welsh and other agricultural Shows. However his dental commitments meant his wife and family had to do a lot of the day to day farm work as well as answering the telephone.

He was keen on dental advances and introduced the latest high speed drills and x-ray equipment into all his practices.

Islwyn Evans

Armitage was not Welsh speaking but employed local Welsh receptionists and a local born technician, Islwyn Evans. Evans' story is of particular interest. Born at Groesffordd, Llandysul in 1927 and educated locally he joined the Royal Navy in World War II and was assigned to the medical branch, serving as a dental assistant. When he left the Navy in 1947 he was given a grant to continue training as a dental technician – worth £3 13s 9d per week which included the bus fare to Cardigan (at that time 13s9d for a weekly return ticket). He completed a 6-year apprenticeship with the Matthias brothers who were both qualified doctors and dentists but practiced as full time dental surgeons in Cardigan.

After completing his training Evans worked for the Llandysul dentists Lewis, Thomas and Capanini in their well equipped dental laboratory in Cardigan. The other Llandysul dentist, Lyndell Davies did not have a branch

surgery in Cardigan and had his own dental mechanic in his Lampeter surgery. Thus he did not use Islwyn professionally but knew him and was in fact related to him (Lyndell's father and Islwyn's mother were brother and sister).

Evans retired in the mid-1970s to run a pub, The Fox and Hounds, in Cwmtych – which seemed to be the end of his career in dentistry. However, after Brian Armitage came to the area in 1979 the dental mechanic working for him soon decided to leave. When Evans attended the Armitage surgery for treatment he learned the practice had lost its mechanic so offered his services. They were gratefully accepted. Although Evans had been out of dentistry for some years he found little had changed – many of the materials used had improved but the basic techniques were the same.

Armitage's son John qualified BDS Sheffield in 1984. He joined his father in the following year, sharing his work in Newcastle Emlyn and Llandysul. In 1995 Armitage took early retirement to devote more time to farming and his other leisure pursuits – fishing, painting and golf. From then his son no longer visited Llandysul and the town has never since had a resident or visiting dentist.

Brian Armitage did not live long to enjoy his retirement, dying in 1999.

When Armitage left the practice Islwyn Evans retired again. However after a few months he was persuaded by John Armitage to return to work on a part time basis. Certainly by at least November 2004 he was still working in the dental laboratory in Newcastle Emlyn.

Armitage's wife survived him but she too died at the beginning of 2004.

Albert Victor Hickey (1899-1973)

Although he was never resident in Llandysul Hickey was a regular visitor on Tuesday mart days, for many years before and after World War II. Born in Stirling, Scotland in 1899, although not qualified, he became a registered dentist in 1922⁸ and settled in Wales. By 1926⁹ he was settled at Melrose, Newcastle Emlyn, where he remained. It was both his home and surgery.

His surgery in Llandysul was in Fronheulog, Bridge Street (just opposite the Cilgwyn Arms) where he rented a room from Mrs Evans, a widow. She and her son Jim prepared the room for him by brining up the equipment – chair, drill and spittoon – from the cellar where it was stored for the rest of the week, for his weekly surgery. When Mrs Evans died Jim and his new wife Rae continued to host the surgery in Llandysul until Hickey gave up that work in 1956, although he continued in Newcastle Emlyn.

Patients remember him as a tall, well dressed, distinguished looking man with a marked Scottish accent. His Scottish wife, a trained nurse, acted as his nurse-receptionist in Newcastle Emlyn, assisting him when he gave a general anaesthetic. But she did not travel with him to Llandysul. There he relied on the Evanses. His patients recall him with affection as a good dentist. However, he is also well remembered for his singing in local concerts and

amateur dramatics. He had sporting interests, especially encouraging and training local boys in boxing.

He enthusiastically attended local Burns Night celebrations. Nothing is recorded of World War I service by him or his family, but he and his wife were lifelong supporters of the British Legion.

Hickey's practice at Newcastle Emlyn had a well equipped dental laboratory where he did most of his own mechanical work. But in 1949 he employed and trained a Llandysul man, David Harding Jones (known as Harding) as his mechanic. However his heart was not in it. He really wanted to be a farmer. Eventually Harding's parents agreed to finance the purchase of a farm in Ponshaen where he stayed for the next 52 years, finally retiring in 2003 – to a house in Pontwelly only a stones throw from his old home.

Hickey enjoyed his drink. Sometimes he called in at the local inn, the Cilgwyn Hotel owned by his dental mechanic's father, before returning to Newcastle Emlyn. He was very sociable and was known, on occasion, to extract a tooth from a suffering fellow drinker. The pub was opposite Llandysul station and Melrose was by Newcastle Emlyn station. Both stations are now closed.

Hickey continued to practise until about 1970, dying in 1973.

Acknowledgements:

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- Mrs Eira Pitt – documents on John James Thomas
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- Mrs Nina Thomas – memories and documents of J M Thomas
- Mr Lyndell Davies – personal memories
- Mrs Armitage – memories of Brian Armitage
- Mr Islwyn Evans – memories of dentistry past and present
- Mrs Maisie Davies – memories of Ryland Davies.
- Mrs Rae Evans – memories of receptionists/nurses/Hickey
- Austin Davies – memories of Thomas Davies
- Mr D. Harding Jones – memories of Mr Hickey
- Ken Jones and Hanes Emlyn – memories of Mr Hickey.

⁸ *Dentists Register*, 1923.

⁹ *Dentists Register*, 1926.

CRAWFORD DENTAL COLLECTION AT MUSEUM OF HEALTH CARE AT KINGSTON, ONTARIO

Paul Robertson*

The Museum of Health Care at Kingston is excited to announce the arrival of Canada's premier dental history collection, that of the Canadian Dental Association. A gift to the MHC from the CDA's 'Dentistry Canada Fund', this collection represents the most comprehensive cross-section of dental technology and practice in Canada over the past 200 years and greatly enhances our current dental holdings.

We are naming the collection after Dr Ralph and Mrs Olga Crawford to honour their more than 40-year 'labour of love' amassing and curating this extensive assemblage of artefacts and archives. Dr Crawford began the collection as a dental student in the 1960s and originally used the objects to decorate his office in Winnipeg. In 1997 the Dentistry Canada Fund invited the Crawfords to establish the Dentistry Canada Museum at the organisation's downtown Ottawa headquarters. After the closure of the museum in 2008, the DCF offered the Crawford Collection to the MHC.

The collection contains well over 3,000 artefacts and documents. Included are dental chairs, units, cabinets, instruments and supplies, laboratory equipment, books, journals, and ephemera. Representing innovation and ingenuity, the Crawford Collection contains such items as an 1846 finger drill, circa 1912 portable dental chair, 1930s X-ray unit, 19th-century tooth keys for pulling teeth, sets of dentures made of ivory and real human teeth, and modern mouth guards and helmets used to prevent sports injuries. We even have a plaster dental cast of the late Prime Minister John Diefenbaker's teeth!

Not since 2002, when we accepted the 4600-item University Health Network collection of 18th to 20th century health care artifacts and archival materials (originally assembled by the Toronto Academy of Medicine), has the MHC been offered a collection of such size, scope, and quality.

Further information can be seen at the Website, <http://www.museumofhealthcare.ca/research-and-collections/dentalcollection.html>

*Mr Paul Robertson (Curator) and Ms Catherine Toews (Museum Manager) can be contacted at the Museum of Health Care at Kingston, Ann Baillie Building National Historic Site, 32 George Street, Kingston, ON K7L 2V7, Canada; email: museum@kgh.kari.net

REPORTS FROM SOCIETIES

Annual Conference of the Lindsay Society For The History Of Dentistry Stuart Geddes and Brian Williams

The annual meeting of the Lindsay Society for the History of Dentistry took place in Winchester, Hampshire, from 1 to 3 October. The venue was the Winchester Royal Hotel. The fact that a number of people arrived early and stayed afterwards showed the popularity of the venue; a fascinating town surrounded by beautiful countryside. Forty members and guests attended the meeting.

The event commenced on Friday evening with convivial drinks and a fish dinner at the nearby Loch Fyne Restaurant. There were lectures on Saturday and Sunday mornings. Fortunately the rain held off for the Saturday afternoon given over to exercise. John Fielding, one of Winchester's official guides, took us on a fascinating one and a half hour walking tour of the City, which goes all the way back to Alfred the Great. The annual conference dinner of the Society took place on Saturday evening. The Hotel did us proud with extremely good food and service. New friendships were made with old ones renewed and strengthened. The Society's AGM took place on Sunday morning.

On Saturday morning, following a welcome from the chairman, Professor Robin Basker, Dr Roger Forshaw of the Centre for Biomedical Egyptology at the University of Manchester presented a fascinating paper entitled 'Dental health, disease and dentistry in Ancient Egypt'. He described the modern technology for examining mummies before moving on to a brief history of Egypt from 3,100 BCE to 30 BCE, when the country was absorbed into the Roman Empire. Egypt has, because of a combination of its burial customs and climate, presented researchers with a wealth of material. One site in Nubia revealed over 27 thousand skeletons. From these and from the paintings in tombs, preserved papyri and stele – ancient stone slabs – it has been possible to gain an insight into the life and death of these people. Tooth wear, probably caused by sand in their food, is seen on most skulls, often so severe that pulpal exposure resulted. Abscesses formed and in some cases progressed to osteomyelitis which may have resulted in death. Early material shows little evidence of caries, as diets were low in carbohydrates, or of periodontal disease. Skulls from around 4 BCE do show decay, foods such as honey and fruits having been introduced into the diet.

Dr Anish Gopakumar from the University of Liverpool presented two short papers on anaesthesia. In her first paper she gave an account of Charles James Fox and his contribution to dentistry and nitrous oxide anaesthesia. He recognised the disadvantages of chloroform anaesthesia and decided to investigate the properties of nitrous oxide, having been aware of the work of Horace Wells. Fox found a company which could compress and store nitrous oxide in cylinders and also developed a face mask which allowed it to be mixed with oxygen.

In her second paper Dr Gopakumar spoke on Stanley Drummond Jackson. He is mainly remembered for his associations with his use of methohexitone sodium and with the Society for the Advancement of Anaesthesia in Dentistry (SAAD). A review of his technique in a paper published in 1968 started a debate on the safety of the technique which ended up with a libel case at the High Court in 1972. The trial lasted 38 days,

one of the longest libel suits in history. It was eventually settled because of the mounting costs. The paper sparked a lively debate among the delegates with some having personally known Drummond-Jackson during his life time.

Dr John Bradley illustrated his talk on Nelson with pictures painted by contemporary artists. He explored the type of right eye socket damage which could have produced the characteristic orbit deformity seen in many of Nelson's paintings which have previously been unexplained. Letters to Mrs Hamilton discuss "being much bruised about the face". Later he says he is much better but "the right eye is nearly deprived of sight". The cause of the injury was shale and stone thrown up by shots fired by the French at the siege of Calvi.

Dr John Beal traced the devotion of toothache sufferers through the images of St Apollonia, a third century Christian martyr, in Medieval Churches throughout England but especially in the South West and East Anglia. His account of her life was profusely illustrated with portraits and pictures of stained glass windows and other church furniture, stamps and relics which usually depicted her holding a large pair of forceps with a tooth. She is sometimes confused with St Agatha who suffered the fate of having her breasts torn off and is often depicted holding a pair of similar forceps!

Sunday morning had an early start. First there was a request from Dr George Camilleri for information about the UK careers of dentists who had, for some part of their lives, lived and worked in Malta.

Dr Paul Riley's *tour de force* on the 'Development of the oral care industry from the early 1900s' was a comprehensive and attention-holding account of the development and marketing of toothpastes and powders over the last century. Early products were developed by dentists and pharmacists and sold locally to their own patients or customers and often sold in elaborately decorated ceramic pots, the lids of which are now very collectable. Colgate was one of the earliest companies to enter the field and was the first to use collapsible tubes although these did not become universally available until the 1950's. Various substances have been added to toothpastes: pepsin, chlorophyll, peroxides and urea but most effectively, fluorides. The first fluoride paste introduced to the UK was Gibbs' stannous fluoride. Unfortunately it stained and later was replaced with sodium monofluorophosphate.

The early emphasis of advertises was on hygiene - 'prevents bad breath', changed to strengthening teeth - fluorides, improving gum health, 'preventing tartar' then to being a beauty product 'whitens teeth', 'better smile' whilst still preventing cavities but now also protecting teeth from erosion! Dr Riley doubted there would be many future changes in the formulation of pastes as the regulatory framework has become much more difficult to try and test new products and chemicals.

Miss Melanie Parker, Education Officer at the BDA Museum, celebrated the 125th anniversary of the death of Sir John Tomes with a history of his life and works, paying particular attention to his inventions; ranging from forceps and elevators to a machine for carving ivory dentures and a device for helping horse to pull carriages up steep hills. She noted that Tomes was one of the first examiners for the LDS examination in London and was the first registrant on the Dentists' Register. She reminded us that he was the first dentist to be elected a fellow of the Society on the basis of his dental research. Tomes was knighted in 1886 and died in 1895.

Professor Stanley Gelbier gave an entertaining talk about the life and loves of John Hovell, a consultant in oral surgery and orthodontics who had a very interesting professional and personal life! His wartime career led to developments in the treatment of severe facial injuries and he wrote papers on the control of sepsis and the treatment of trismus. He was Dean of the Faculty of Dental Surgery at the Royal College of Surgeons of England, helped to found the BDA Hospital Group and was first chair of the Central Committee for Hospital Dental Services.

The final presentation of the conference was by Mrs Rachel Bairsto, Head of Museum Services at the BDA about a 1929 painting entitled 'The Dentist' by Sir John Lavery which is currently on view in the BDA library. It depicts a dentist, Dr Conrad Ackner, treating a patient (Mrs Lavery) at his practice in Welbeck Street and is one of very few paintings that depict a dentist at work. Sir John was an Irish painter best known for his portraits and is associated with the 'Glasgow School'. In 1888 he was commissioned to paint the state visit of Queen Victoria to the Glasgow International Exhibition. Not only was it a fascinating talk about the artist and the dentist depicted in the picture but also a plea for help in raising sufficient funds to purchase this important work of art for the museum.

Annual General Meeting of the Lindsay Society Brian Williams, Hon Secretary

The 48th AGM was held on Sunday 3 October. Present were the chairman, Prof Robin Basker and 37 members. Apologies for absence were received from Muriel Cohen, Bernard and Jane Donnelly, Brian Gillard, Audrey Noble, Ian and Joan McIntyre and Rufus Ross. The minutes of the previous AGM were accepted as a true record.

Prof Basker reported on another successful year for the Society. The excellent Lilian Lindsay Memorial Lecture presented in Liverpool by John McCabe on 'Dental Materials - lessons from the past and future prospects' was well attended by both members and guests. He thanked the committee members for their continuing hard work on behalf of the Society and said he had greatly enjoyed his two as chairman which was now ending.

The treasurer, Dr Peter Frost, presented the audited accounts. He stressed the annual conference should be self financing, leaving the reserves untouched. A possible increase in the subscription rate would be discussed at the next committee meeting. He thanked John Vesty for auditing the accounts.

The editor, Prof Stanley Gelbier, reported on *Dental Historian*. The two issues since the last AGM had been well received. A number of articles were ready for the January 2011 issue but more are always needed.

The honorary secretary, Dr Brian Williams, confirmed that Prof Tara Renton, Professor of Oral Surgery at King's College London Dental Institute, would present the 2011 Lindsay Memorial Lecture at the BDA Conference in Manchester on Saturday 21 May 2011. The title will be 'Treatment of oral pain through the ages'.

It has been proposed the next annual conference would be partly a joint venture with The Henry Noble Group and the Department of Medical History at Glasgow University. The venue would be the Outreach Campus of the University in Dumfries. The members were happy for the committee to continue to explore this possibility.

Progress is being made with the hoped-for erection of an English Heritage Blue Plaque for Lilian Lindsay. Hopefully an announcement will be made soon.

Dr Stuart Robson assumed the chairmanship of the Society, Prof Basker is immediate-past chairman, Dr Peter Frost was re-elected as Treasurer and Dr Ian McIntyre was re-elected to the committee.

Dr Gordon Watkins proposed setting up a members' e-mail discussion forum which he would be happy to organize. This was readily agreed.

Dr Leslie Cheeseman asked whether it would be possible to 'protect' John Tomes' grave stone now the care of Lilian Lindsay's stone had been taken over by the BDA Museum.

An extensive discussion took place about acquiring Sir John Lavery's painting 'The Dentist' for the BDA museum. To be successful the BDA must raise £7,500. The Conference finished on a 'high' with the delegates pledging their support for a contribution from the Society's reserves to 'kick start' the appeal [this was later agreed by the committee]. A letter will be sent to all Lindsay Society members to suggest individual donations to the buying fund.

Prof Stanley Gelbier was congratulated on becoming the first UK honorary Professor in the History of Dentistry, at King's College London' Dental Institute.

The next AGM will take place in conjunction with the 2011 annual conference.

The Henry Noble History of Dentistry Research Group **Rufus M Ross, Chairman**

The Group Autumn meeting incorporating the Menzies Campbell memorial lecture was held in the Lecture Theatre of the Dental Hospital and School on 20 October. It attracted a record audience of forty people. Dr Judy Miller, delivered an absorbing account of the results of her researches on an appraisal of the skulls and dentition of ancient Egyptians' or, on a lighter note, 'Down in the mouth in ancient Egypt, her thesis which led to the award of a PhD from the University of Manchester. Following a question and answer session, the audience, members staff and students was invited to partake of light refreshments. Dr Miller was assisted in the outstanding, power point presentation by her husband, Professor Victor Miller.

The Spring lecture in 2011 will be delivered by Melanie Parker, Education Officer at the British Dental Association Museum. She will deal with the distinguished dental reformer, John Tomes. It is expected that this will be held in the Royal College of Physicians and Surgeons of Glasgow. As usual it will be followed by a sandwich lunch.

Group members were invited to attend the book launch in the RCPSPG of one time executive committee member, Edna Robertson, whose book entitled *Christie of Zanzibar – Medical pathfinder*, was finished only weeks before her untimely death.

Arrangements for the one day Symposium to be held at the University of Glasgow's Crichton Campus, Dumfries are now under way. Professor McGowan and John Craig have visited the site with Lindsay Society members, Stuart Robson and Robin Basker. It is envisaged that the Department of the History of Medicine of the University of Glasgow will play an important role and an outline of the proposals have been submitted to the

Wellcome Institute. Detailed planning will take place shortly and obviously a great deal of work will be needed in the coming months.

Transcripts of the 'Witness Seminar' held in May 2010 have now been distributed to the participants for editing and a copy of the entire recording will be placed in the Library of the University of Glasgow for the use of dental history researchers.

250TH ANNIVERSARY OF THE DEATH OF PIERRE FAUCHARD **(1678-1761)** **(XXI^e congrès Société française d'histoire de l'art dentaire)**

On 1-2 April 2011 the French Society is commemorating the anniversary of the death of Pierre Fauchard, highly revered by both French and English-speaking dentists. It is clear from the programme below that it will be an excellent meeting. Anyone interested in attending should contact Micheline Ruel-Kellermann - 01 45 44 00 87 - ruelkellermann@free.fr



Vue de l'École de médecine, 1^{re} moitié du XIX^e siècle (Musée d'histoire de la médecine, Paris)

PARIS 1-2 avril 2011

Salle du Conseil de l'ancienne faculté de médecine

12, rue de l'École de Médecine, 75006

en partenariat avec la BIUM

(bibliothèque interuniversitaire de médecine et d'odontologie)

Université Paris-Descartes,

Commémoration du 250^{ème} anniversaire de la mort de Pierre Fauchard
(1678-1761)

Renseignements : Micheline Ruel-Kellermann - 01 45 44 00 87 -
ruelkellermann@free.fr

PROGRAMME SCIENTIFIQUE DU CONGRES SFHAD 1^{ER}-2 AVRIL 2011

Vendredi matin

9h00 accueil des congressistes
 9h15 allocution de M. Guy Cobolet, directeur de la BIUM
 9h30 allocution de Mme Danielle Gourevitch, président de la SFHAD
 9h45 Pierre Baron, Xavier Deltombe : Les portraits de Pierre Fauchard (1677/1678 - 1761)
 10h00 Henri Aronis : Les timbres à l'effigie de Pierre Fauchard
 10h10 Micheline Ruel-Kellermann : À propos des biographies de Pierre Fauchard
 10h35 pause
 10h50 Julien Philippe : *Le Chirurgien Dentiste ou Traité des dents* de Pierre Fauchard. Une comparaison des trois éditions
 11h15 Gilles Henry : À propos de divers occupants du 14 de la rue de l'Ancienne-Comédie, en 1720
 11h40 Henri Lamendin : Phytothérapie de Fauchard
 12h05 Xavier Deltombe : Pierre Fauchard et Jean-Baptiste Fauchard de Grand-Mesnil : les relations d'un père et de son fils.
 12h30 questions regroupées
 12h45 déjeuner buffet

Vendredi après-midi

14h30 Claude Rucker : Une intervention préventive à l'âge du Bronze
 14h55 Francis Janot : Une prophétesse copte au musée de Grenoble ?
 15h20 Javier Sanz : Le dentiste français Pierre Abadie et son *Tractado d'odontalgico* (1764)
 15h45 Michel Mailland Qui était William Rogers ?
 16h10 Paolo Zampetti : Législation de l'enseignement dentaire en Italie. Évolution historique
 16h35 Philippe Charlier : Une dent d'Henri IV : paléopathologie et prothèses au XVII^e siècle
 17h00 questions regroupées
 17h15-18h00 visite du musée d'histoire de la médecine

20h00 dîner optionnel au Procope (13, rue de l'Ancienne Comédie 75006 Paris)

Samedi matin

9h00 accueil des participants
 9h15 Jean Granat, Évelyne Peyre : L'histoire des dents de l'Homme et l'histoire de l'origine du genre *Homo*
 9h40 Évelyne Peyre, Jean Granat : L'occlusion dentaire chez *Homo*. Ses rapports avec les angles de la mandibule
 10h05 Jean Romerowski : Quelques curiosités dans l'histoire des articulateurs
 10h30 Alex Peregudov : L'articulateur individuel de Khaït I.M.
 10h55 Gérard Braye : L'art dentaire et les couteliers chirurgicaux du quartier des Cordeliers à Paris au XIX^e siècle
 11h20 Jean-Pierre Fournier : Les dentifrices du Docteur Pierre
 12h10 Yves et Liliane Vanbesien : Chirurgie dentaire et philosophie dans une œuvre de Günter Grass
 12h35 questions regroupées
 12h50 clôture du congrès par le président

Speakers at the Lindsey Society conference

Mrs Rachel Bairsto

Dr John Bradley



Dr Anish Gopakumar

Dr John Beal

Ms Melanie Parker



Dr Roger Forshaw

Prof Stanley Gelbier

Dr Paul Riley



LETTER TO THE EDITOR

Dear Sir,

As someone who was fortunate to have been taught both by James Scott and Barry Brown at Queen's in the early 1960s I was particularly pleased to read the latter's evocative account of the former.

According to a family friend and contemporary of James Scott, intellectually he was a 'graduate' before he entered University.

Although he kept his lectures as short as possible (not much more than what he considered to be the average student's attention span of 20 minutes) he was more than willing to devote his time to individual tuition to those requiring it.

I well remember his dark, wood-paneled classroom which accommodated the years of no more than 20 students at that time, the body for dissection at one end and his office, a small annex at the back, heated by a small gas fire.

As well as his book on *Dental Anatomy, Anatomy for Dental Students* (Scott & Dixon) and *Dento-facial Growth and Development* were standard undergraduate and postgraduate texts. The latter was a cutting edge publication in its day.

His humour was well known and his sayings legion, but the one which best characterized his disdain for the technical side of dentistry was that "chimpanzees could be taught to fill teeth".

Yours sincerely,

John Kerr (Prof)

SEATED DENTISTRY

Rachel Bairsto, Stuart Robson, John Craig and Ian McIntyre

Editor's introduction

This correspondence started with a letter written by Rachel Bairsto, Head of Museum Services at the BDA, to members of the Lindsay Society Committee. Replies were received from a number of people, three of which are reproduced below.

Rachel Bairsto

We are looking at putting a selection of stools that we have in the museum collection on display in our wonderful McKechnie display case outside the lecture theatre. We have a Murray operating stool, Sterling stool, one acquired from dental showcase of a very modern variety and a wooden one which looks like a milking stool (not sure whether this would have been used by a dentist!). I am having trouble tracking down information about the introduction of seated dentistry. The Murray stool was first manufactured in 1953 and is the first operating stool. From the picture and instruction manual it attached to the unit and enabled the dentist to sit down put practise at standing height. The Sterling stool is fixed to the ground and its height is fixed too and only offers minimal movement. Can anyone point me in the right direction of more info about this? I am interested to know when dentists became more worried about the effects of standing up for so long. I presume that flat feet, curvature of the spine and varicose veins were the prime health concerns. Also, presumably, the operating stool allowed dentists to operate 4-handed dentistry and increase efficiency. Any ideas gratefully received.

Stuart Robson

When I was a student in Newcastle in the early 1960s, some of the surgeries used by the senior staff in the conservation department had Murray Stools – ie stools attached to the base of the dental units which could pivot around the unit in an arc of about 70 degrees or thereabouts. I am fairly sure they were a prototype being trialed, before they went into full production.

When I went onto my first practice job as an associate, the practice principle was enthusiastic about these stools and all three surgeries in the practice had them. OK for conservation, but no good for prosthetics, and also in those days we did a lot of general anaesthesia and minor oral surgery and these stools attached to the units were a real nuisance as they got in the way of the GA machine. Unfortunately when they were attached, it was a difficult job to unbolt them (we tried once and it took about 90 minutes). In the end we used a bit of string and extending the pivot arm as far as possible, tied the wretched thing back to a cabinet handle partially out of the way. Snag was the poor dental nurses kept tripping over the string as they reached for scalpels etc. Quite funny, and no 'health and safety then!! About

1970 we scrapped them and moved onto independently stools on castors made by SS White. Much more flexible and we could then have the patient in the prone position for 4/6 handed dentistry. Also was much better for GA/Surgical procedures whilst being safer in these specialities for the patients. And being congenitally lazy, I've been sitting down ever since. The Dental Trade Association has an archivist. He may have more information.

John Craig

It's an interesting question. I qualified from Glasgow in 1966 and did all my training standing up although there was talk about moving to seated dentistry (or as it was called in those days "low seated dentistry"). In my final year Ash were co-operating with Glasgow in the development of the Ash Satellite unit which although not specifically intended for seated dentistry was a move in that direction as it brought the instruments more over to the dentist's right side.

Undoubtedly some practitioners were already practising seated although it tended to be in the three quarter position with a few "extremists" or "pioneers" having the patients completely flat. One particular chair, the Morita Spaceline, was literally a flat board with the handpieces incorporated into the head end of the chair right next to the patient's ear. The dentists who used it tended to be fanatical converts to it and it was very expensive. The company still manufacture an almost identical chair to this day. As Stuart said there was the famous Murray Stool but it had its drawbacks (as Stuart points out) and again it was mainly used in the three quarter position or indeed with the chair in an upright position. As Rachel said it was actually designed to allow seated dentistry on a conventionally seated patient.

I worked standing up until 1968 when I moved to a practice of my own. It wasn't just the seats of course it was all the ancillary equipment which was lacking. Suction was in large bulky mobile cabinets and was high vacuum/low volume as opposed to later equipment which was low vacuum/high volume. Even cabinetry was in the wrong place (generally too far away) and often there was no room for the nurse to get access from the patient's left. Most of the drills and early air rotors were attached to the unit and one had to reach across the patient to get at them. I remember making up a mobile unit carrying an air rotor and a 3 in 1 from one of those bedside tables on castors which can be raised to varying heights and swung across the bed. It meant that the instruments were on my right side and the tray part was used for the tray with the mirrors, probes, pluggers etc. It was a bit Heath Robinson but it worked but the cables trailed across the floor. Even then I still had to use the conventional pulley drill on the unit for slow speed work.

I remember going to the BDTA exhibition in the Alexandra Palace in 1967 (I went almost every year throughout my working life) and drooling over the new chairs, cabinetry etc for seated dentistry. It was all very expensive and, as I said above, it wasn't just about the chair. One basically had to completely re-equip the whole surgery to do it properly and even then not all

the equipment had really been thought through and there were a lot of fairly useless bits of equipment peddled by the Dental Trade. One way many dentists changed to seated was to buy, or get fitted, conversion kits which were essentially padded overlays which fitted over the seat and backrest of a conventional chair and "converted" it to a chair suitable for low seated dentistry. It wasn't ideal (e.g. one generally couldn't get the chair low enough, even for taller dentists) but it was an economical half way house. There used to be many firms advertising this service in the journals and having a look to see when these were most current would help to date things.

One aspect no-one has mentioned is how difficult it was to persuade the patients to accept being put in the prone position. This was particularly true of older patients (as you might expect) and it was some years before patients really accepted it as the norm.

As for the dentists, all the diseases Rachel mentioned were a concern for standing dentists. It wasn't just the bending of the spine caused by bending and twisting to get access to the mouth. The use of foot controls in a standing position meant that, to operate the control, one had to take the weight off your right foot and transfer it to the left (or vice versa depending on the foot control and the dentist's preference) so that the right foot could move the control lever. Therefore, the torsion on the spine was considerable in several different planes. The change to seated dentistry was no doubt a good thing but I do remember commenting at the time that it was merely a way of shifting the site of one's varicose veins from your legs to your backside.

Ian McIntyre

This correspondence does stir up some memories! I qualified at Newcastle shortly after Stuart and all of my instruction was conducted on the cons floor where there was standing room only, then as a house surgeon for 6 months I do recall treating children while seated when in the senior staffs' clinical side rooms ordinary sort of stools much like the later Murray Ranger. I then joined the RAF and spent 3 years in Germany in Germany with a very old Mobilactor (cotton wool rabbits chasing each other on the slow hand-piece cord) and a stand alone Borden air-rotor.

In 1971 I was posted to RAF Church Fenton where I had an operating stool fixed to the floor by a ring under the dental chair, there was a fixed plate for the left foot about 12" above floor level and a mobile arm that carried the operating stool and a platform for the right foot and the foot control. The chair had a very good height control, was very comfortable to use and easy to adopt 4-handed although the DSA had to stand. I can't remember its name but hope that my description might jog a memory. Unfortunately, despite my enthusiasm it was not a success. The RAF had given it to an ambidextrous male dentist to trial who had, like me, praised it. However, it was impossible for a left-handed dentist to use it which severely limited the posting plot or required expensive surgery rebuilds. It was also rejected by many female dentists who considered (quite rightly) that the distance between their knees when working on it in a skirt lacked decorum.

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WORK IN PROGRESS

George Camilleri's research is focussed on British dental surgeons or dentists who came to work for varying lengths of time in Malta in the nineteenth and early twentieth century. Their origin in Britain and former practice address is often known so that it may be possible to obtain information on the British side. This data will appear in regular short notes in *Dental Historian*. He would be willing to send all his details on specified persons if requested.

At this stage there are three Guy's graduates he would like to study further in conjunction with somebody in Britain:

John Eskdale Fishburn studied at Guy's (conjoint) up to 1917 when he joined the Royal Navy as an Acting Probationary Junior Sub-Lieutenant and a ship's surgeon serving in the Mediterranean. At that time he became the first Dental graduate of the University of Malta. (See Articles in *Dental Historian* and *Malta Medical Journal*). He was Secretary of the Guy's Hospital Dental Students Association. I have no proof that he ever qualified in Medicine or Dentistry in England as I could not find his name in the relevant registers. He never practised dentistry. I have details and photos given to me by his son, John Dudley Fishburn (a former MP and under Secretary in Mrs. Thatcher's Government).

A B Wills Rust (1879-1959) LDSEng 1902. Appointed Temporary Lieutenant for service abroad in the RAMC (before the RADC was established). Remained in the RADC, retired probably as Colonel. Was the first Army dental surgeon to serve in Malta and an examiner for Fishburn's examination.

Harry Bannar Martin (1880-?) LDS 1905. Demonstrator in the Conservation Room at Guy's in 1903 and Dental House Surgeon in 1904. Instructor in Dental Surgery to the Junior Medical Officers at Haslar. Came to Malta as a private practitioner in 1910. Lapira, who was to become the first Dean of the Dental School in Malta, was articulated with him up to 1922. Left Malta in 1929, presumably returning to England.

Details and possibly photographs of their student days, as well as later photographs and information of their activities on returning to England would be much appreciated. I feel their history would be of interest to anybody studying the early days of the RADC and who has experience of the Dental Museum at Aldershot.

Prof Camilleri would be delighted to hear from anyone with information or thoughts on this topic by e-mail at: george.e.camilleri@um.edu.mt