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THE HISTORY OF ANAESTHESIA SOCIETY PROCEEDINGS

Volume 44

Proceedings of the Summer Scientific Meeting held jointly with Lad o Pairts at The Royal College of Surgeons of Edinburgh

3rd and 4th June 2011

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HISTORY OF ANAESTHESIA SOCIETY

2011 Summer Scientific Meeting, The Royal College of Surgeons of Edinburgh – held jointly with Lad o Pairts

3-4 June 2011

Organizer: Dr Alistair McKenzie

The Organizer is very grateful for the cooperation of Emeritus Professor Rosemary Mander who organised the Lad o Pairts programme, and also of the Simpson Bicentenary Committee, Royal College of Surgeons of Edinburgh. Thanks are due to Hazel Cherrie for help with mailing, Cindy Middleton and Maxine Pepper for name badges, Moira Walker and Amanda Wilson for registration and Carmel McKenzie for managing the accompanying persons programme.

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HISTORY OF ANAESTHESIA SOCIETY

Council and Officers – December 2011

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Honorary Members Overseas	Prof J Roger Maltby, Jasper Prof John Severinghaus, San Francisco

oooOooo

It is with regret that we report the deaths of four of our members: Dr J Brookes, Dr P Challen and Honorary Members Dr Lucien Morris and Prof Doreen Vermeulen Cranch.

EDITORIAL

The joint meeting with Lad o' Pairts was part of the Simpson Bicentenary Celebration and attracted 95 delegates. Those who were able to attend the Civic Reception on Thursday evening heard the Lord Provost's address and the robust response by Professor Andrew Calder.

Friday began with the (plenary) Blessed Chloroform Lecture delivered by Professor Douglas Bacon (Mayo Clinic). This was also attended by some members of the Edinburgh & East of Scotland Society of Anaesthetists and of the John Snow Society. Then there were parallel sessions for the HAS and LoP delegates in separate halls. Accompanying persons had the opportunity to go on a boat trip on the Firth of Forth in sunshine, specially ordered for the occasion!

The introductory papers by HAS members were on James Young Simpson and chloroform. After coffee there were free papers by five trainees – a miscellany of topics, all of a high standard. As the weather was glorious, many delegates took their plates of lunch into the fresh air outside.

The afternoon included three more papers on chloroform and one on pain management, followed by an update on plans for the ISHA to be held in Sydney in January 2013. The scientific program for the day closed with a plenary book launch for *James Young Simpson – Lad o Pairts*. Every delegate received a copy in his or her bag on registration.

The AGM was conducted expeditiously so that there was plenty of time to change for the drinks reception and symposium dinner which, in a break with tradition, was not black tie. After dinner many enjoyed visiting the excellent museum of the Royal College of Surgeons of Edinburgh where there was a special exhibition for the Simpson Bicentenary.

Saturday again had parallel sessions for the HAS and LoP groups. The HAS audience were treated to a fascinating account of the earliest caesarean sections with detail of the first under general anaesthesia. This was followed by genealogy of the Simpson family and his astrological portrait. Refreshed after coffee, the delegates enjoyed a military paper and then the guest lecture by Dr Morrice McCrae, author of a new biography of James Young Simpson. The HAS scientific program was then closed by our President, Neil Adams.

After lunch about 40 delegates went on an interesting trip to Bathgate including the Bennie Museum and a presentation by David Main – courtesy of the Royal College of Midwives. The coach returned in time for the Simpson Memorial

Lecture delivered by Professor Gordon Williams – on the Addis Ababa Fistula Hospital. This was followed by the Bicentenary Dinner where more than one table was filled by HAS members.

Finally on Sunday there was a procession from City Chambers to St Giles' cathedral, to commemorate both the 400th anniversary of the Society of High Constables and the 200th anniversary of Simpson's birth. The High Constables in full regalia and representatives of four Royal Colleges, University of Edinburgh and HAS in academic gowns processed into the Cathedral for the 11.00 a.m. service. Instead of a sermon there was a tear-jerking address by Dr Catherine Hamlin on the plight of fistula sufferers in Ethiopia and the fine work done at the Addis Ababa Fistula Hospital. A floral wreath was laid at the plaque commemorating James Young Simpson.

Alistair G McKenzie
Hon Editor

FUTURE EVENTS

2012 29-30 June. HAS Summer Meeting, Hilton St Anne's Manor, Wokingham (celebrating the 25th anniversary of the first HAS meeting in Reading)
Contact: Dr Neil Adams (cna.adams@btinternet.com)

2013 22-25 January. 8th International Symposium on the History of Anaesthesia, University of Sydney, NSW, Australia
Visit www.isha2013.com

oooOooo

For more information visit the website: www.histansoc.org.uk

Speakers at Edinburgh

Prof D Bacon

Dr A McKenzie

Dr H Connor

Dr A Padfield

Dr R Pryce

Mr R Barter

Dr Lisa Tharakan

Dr P Featherstone

Dr Jennifer Bain

Dr Christine Ball

Prof JAW Wildsmith

Dr F Casale

Prof JR Maltby

Dr D Zuck

Dr Jean Horton

Dr Y Pole

Prof A Kovac

Dr M McCrae

Members and guests attending Edinburgh meeting

Mr Iain Abbot	Edinburgh	Ms Annie Lau	W Sussex
Dr Aileen Adams	Cambridge	Dr Ronald Lo	London
Dr Neil Adams	Bury St Edmunds	Ms Margaret Lynch	Manchester
Dr K Ahronson	Bangor	Dr David McCallum	Edinburgh
Dr Angela Aitken	Oxford	Dr John McClure	Edinburgh
Dr Janette Allotey	Manchester	Dr Morrice McCrae	Edinburgh
Prof Douglas Bacon	Rochester, USA	Dr Iain Macintyre	Edinburgh
Dr Marg Bacon	Rochester, USA	Dr Alistair McKenzie	Edinburgh
Dr Melissa Bacon	Rochester, USA	Dr Glenys McLaren	Edinburgh
Dr Jennifer Bain	Edinburgh	Dr Ken Macleod	Huntingdon
Dr Christine Ball	Hampton, Australia	Prof Roger Maltby	Jasper, Ca
Mr Ryan Barter	London	Prof Rosemary Mander	Edinburgh
Dr Colin Birt	Rochford	Dr Peter Morris	Holmes Chapel
Dr Tom Boulton	Berkshire	Dr James Mulvein	Bristol
Dr Geoff Bowler	Edinburgh	Dr Jo Murphy-Lawless	Dublin
Dr Elizabeth Bradshaw	London	Prof Malcolm Nicolson	Glasgow
Dr Geoffrey Burton	Bristol	Dr Tony Nightingale	Liverpool
Prof Andrew Calder	Edinburgh	Dr Alison Nuttall	Edinburgh
Dr Roddy Cameron	Blairgowrie	Dr Adrian Padfield	Sheffield
Dr Fab Casale	Colchester	Dr Yash Pole	Manchester
Dr David Chapman	Kalgoorlie, Australia	Dr Russell Pryce	London
Dr Nick Christelis	Melbourne, Australia	Dr Constance Putnam	Concord USA
Dr David Clarke	Edinburgh	Dr Lindsay Reid	Fife
Dr Henry Connor	Hereford	Dr Ann Robertson	Aberdeen
Dr Ian Corall	London	Dr Quentin Robinson	Yorkshire
Prof Alan Dronsfield	Derbyshire	Dr Nigel Rose	Ledbury
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Dr Geoff Hall-Davies	Redditch	Dr Ian Smith	Aberdeen
Ms Victoria Hand	Glasgow	Dr Wulf Stratling	Cardiff
Dr Helen Hannah	Chippenham	Dr Philip Taylor	Hertford
Dr Jean Horton	Cambridge	Dr Lisa Tharakan	Cambridge
Dr Iain Hutchison	Erskine	Dr Georgina Thompson	Melbourne
Dr Mike Inman	Yelverton	Prof J Thompson	Hexham
Prof Anthony Kovac	Kansas City, USA	Dr Marten van Wijhe	Delden
Dr Adrian Kuipers	Shropshire	Dr Barbara Weaver	Winscombe

Prof Lawrence Weaver	Glasgow	Dr Ray Wise	Blandford Forum
Prof Tony Wildsmith	Dundee		
Dr David Wilkinson	Bishops Stortford	Dr Catherine Wisely	Westcliff
		Dr Marguerite Zimmer	Strasbourg
Mrs Patricia Willis	London	Dr David Zuck	London

THE BLESSED CHLOROFORM LECTURE, 2011

JAMES YOUNG SIMPSON – THE JUSTIFICATION FOR ANAESTHESIA AND AN INTERESTING "AMERICAN" BOOK

Prof D R Bacon
Department of Anesthesiology, Mayo Clinic

James Young Simpson is one of the central figures of the mid-nineteenth century discovery of anaesthesia. Yet, as we celebrate the two hundredth anniversary of his birth, what does he and his life story say to physicians in the twenty-first century? Do we really know who he was and his accomplishments beyond the discovery of the anaesthetic properties of chloroform? His book, *Anaesthesia or the Employment of Chloroform and Ether in Surgery, Midwifery, etc.*, was published in the United States in 1849, some two years after Simpson's anaesthetic discovery. Why is this book so compelling to modern readers, and why was it reprinted in 1997?

For Simpson, the discovery of surgical anaesthesia was a revelation. There was no longer pain associated with surgery. What was the best possible use of this new technology? What was his responsibility to his peers, patients and the general public when investigating and using anaesthetic agents? Is there a link between Simpson's actions and professionalism?

A brief biographical overview

James Young Simpson was born in Bathgate, Linlithgowshire Scotland on June 7, 1811 at eight o'clock. He was the eighth child and seventh son of David Simpson and Mary Jarvie Simpson. His mother was a descendant of a Huguenot family that had intermarried in Scotland for a number of years. Because of this circumstance, Simpson was distantly related to Sir William Wallace on his mother's side. He began school at the age of four at the Bathgate Village School. Learning came easily to young Simpson, who worked in the family bakery, and he often spent his free time wandering around the countryside observing nature. This training in observation would serve him well in later years as he honed this skill concerning disease states found in his patients.

With the support of his older brother Alexander and his parents, James entered the University of Edinburgh at the young age of 14. He spent his first two years studying a "classic" education; Latin, Greek and logic. His interest in archeology and things ancient began during his undergraduate days, as well as

an active social life. Many of the leading families of England sent their young men to the University of Edinburgh for two years before entering them in Cambridge or Oxford. Thus, during this time Simpson met many of the men who would become political and scientific leaders during his lifetime.

At the conclusion of two years of study, Simpson had the option of returning to Bathgate and becoming the local school master. However, his family urged him to continue his studies and to become "famous". Thus Simpson began the study of medicine in 1828. Coincidentally, this was at the height of the scandal of Burke and Hare, those two nefarious men who killed individuals to supply cadavers to the anatomy professor at the university for dissection.

During his time at the school of medicine, Simpson studied with many famous physicians. Most notably, Robert Liston was the professor of Surgery, and had Simpson as a pupil. In April of 1830, after nursing his father through his final illness, Simpson passed his final exams. He was a qualified medical practitioner at the age of 18! He applied for a village appointment, but failed to obtain it. With the continued support of his brothers he continued his studies and was awarded the MD in 1832 at the ripe old age of 21. His thesis was entitled *De causa mortis in duibusdam inflammationibus proxima* and was written in Latin as were all of his exams.

The newly minted physician was able to secure an appointment with the Professor John Thomson of Pathology at the university. The assistant's post paid £50 per year and allowed Simpson to be financially independent of his family for the first time. Most of the time as the assistant to the professor, Simpson arranged, classified and described pathologic specimens. He also played a small role in the professor's lectures, occasionally preparing lecture notes. On one such occasion, Simpson prepared a lecture on the use of the microscope, extolling the virtues of this new technological advance in medicine. The professor stood up and gave the microscope lecture from Simpson's notes without reviewing the prepared comments first. Once the lecture was done, the professor told Simpson he didn't believe a damn word of it!

Yet it was Thomson who suggested to Simpson that he spend his time and intellectual prowess working in the field of Midwifery. In the professor's opinion the field was wide open and a place where a junior physician could make a name for himself. Gradually Simpson began to focus on this area of medicine. He was elected president of the Royal Medical Society in 1835 and used his Presidential Address to speak on diseases of the placenta presenting a remarkable paper entitled "Pathologic observations on the diseases of the placenta". By 1838 he was an independent lecturer in Midwifery in Edinburgh.

A year later, the Professor of Midwifery, Hamilton resigned his post. The way was open for Simpson if he could get the town council to elect him to the position. The Chair of Midwifery at the University had been established in 1726, making it one of the oldest in the world. Competition for the appointment boiled down to Simpson and Evory Kennedy of Dublin, Ireland. Simpson spent over £500 in his campaign and also married, for it was not thought proper that a single gentleman could be the professor. On February 4, 1840, Simpson was elected by one vote.

Simpson would develop an extensive practice using his annual salary to support his clinical endeavors so that no patient was turned away. His sitting room was always full of patients and he attended numerous births across the city. Additionally, he wrote extensively about his experiences and tried to convey innovations in the practice of Midwifery he developed. The first was a vacuum extractor which attached to the infant's head and should be used to assist in pulling the baby through the birth canal. In design and appearance it is very similar to those in use on labour and delivery wards currently. The second, the Simpson forceps, likewise is still used clinically.

The Discovery of Anaesthesia

On October 16, 1846, six and a half years after Simpson was elected to the post of Professor of Midwifery, William Thomas Green Morton anesthetized Gilbert Abbott for the removal of a jaw tumor at the Massachusetts General Hospital. Morton used "letheon", whose active ingredient was ether. After inhaling Letheon for a few moments, Abbot lost consciousness, and Morton told the Professor of Surgery John Collins Warren that his patient was ready. During the seven minute procedure, Abbot did not move nor cry out in pain. As the procedure ended Warren uttered the memorable phrase, "Gentlemen, this is no humbug".

News of this great event quickly spread. Yet Morton, ever the entrepreneur, attempted to patent both Letheon and the means to administer it. However, the liquid gave off an aroma that quickly identified it as ether. The physicians at Massachusetts General were thus able to convince Morton to confirm that ether caused the anaesthetic state. Soon letters and articles were written. The first such write up appeared in the *Boston Medical and Surgical Journal* in November of 1846. Steamships carried the news across the Atlantic, and in December of 1846, Francis Boot gave the first anaesthetics in London. Simpson's former professor of surgery, Robert Liston, amputated the leg at the thigh of Churchill, a butler as the first capital operation under anaesthesia in the

British Isles. After Churchill had remained insensible during the operation, Liston remarked, "This Yankee Dodge beats mesmerism hollow".

Simpson, Obstetrical Anaesthesia, 1847 and Chloroform

Christmastime of 1846 found Simpson in London. No doubt he met with his "old" professor and they discussed the implications of ether anaesthesia. Upon his return to Edinburgh, Simpson adopted this new technique. On January 19, 1847 Simpson gave an ether anaesthetic to a parturient that had a contracted pelvis secondary to rickets. This was her second confinement; the first child died *in utero* during labour and was delivered in pieces. Simpson gave the patient an ether anaesthetic for twenty minutes, and a live child was delivered, although the infant passed away several hours later.

While Simpson was enthusiastic about this new method of pain relief during childbirth, his colleagues were less inclined to embrace the idea. There were concerns about the effects of ether on the mother and the child. Did the absences of pain, for example, decrease the force of contraction of the uterus? Would anaesthesia slow or delay delivery? Would the public welcome such an advance?

Simpson was vigorous in his response to these concerns. He published his first case series on obstetrical anaesthesia in March of 1847, detailing the two months' of his experience. He felt that there was no effect on the mother and he did not worry about ether depressing the child. Simpson spent a great deal of time dealing with patient's objections to anaesthesia. Many of these centred on the Judaic-Christian teachings about the necessity for women to bear children in pain as a punishment for Eve's eating of the apple in the Garden of Eden. Simpson began to delineate and reject the religious arguments and published a pamphlet entitled *Answer to the Religious Objections Advanced Against the Employment of Anaesthetic Agents in Midwifery and Surgery*. The publication was aimed at the general public, and contained a well researched, logical argument that answered the question of Eve's "curse".

For Simpson, 1847 would hold two more momentous events; one political, the other medical. The position of Physician to her Majesty became vacant. Simpson became a leading candidate to fill the post. Indeed, until his death, Simpson's was the Physician Accoucheur to the Queen for Scotland. While the political machinations were proceeding toward his appointment, Simpson was searching for a new anaesthetic agent. He was familiar with the shortcomings of ether—prolonged induction, increased secretions, irritation to the bronchial

mucosa to name a few. He sought the ideal anaesthetic agent with a quick onset and offset that did not harm the patient.

On November 4, 1847, after a busy day of clinical practice, Simpson held a small dinner party. With him were several colleagues, and after dinner, tumblers were filled with liquids that Simpson felt held promise as anaesthetic agents. Each new agent was inhaled in turn, but with little or no effect. Finally, a bottle of chloroform, mislaid under some papers, was opened and the glasses filled. After a deep breath in, most of the party awoke on the floor! No member of the group expected this to end Simpson's search, but as the evening wore on and the ladies were brought in to try chloroform as well, it became apparent that this agent held great promise as an anaesthetic.

From that day forward, Simpson championed chloroform. He used it extensively in his obstetrical practice. Simpson advocated placing a small amount in a handkerchief and having the patient inhale while the contraction was on going. He believed that used in this manner only a small amount of the agent would be consumed, increasing safety without compromising patient comfort. Simpson would correspond with the leading figures of medicine and continue to demonstrate the utility of chloroform anaesthesia. But he continued his practice of Midwifery, and did not specialize in anaesthetics unlike John Snow.

The Book

Anaesthesia or the Employment of Chloroform and Ether in Surgery, Midwifery, etc. was published in Philadelphia, Pennsylvania, in the United States in 1849 by Lindsay and Blakiston. It is divided into four parts with a total of twenty-four chapters and is a compilation of all of Simpson's writings on anaesthesia in the three years since the discovery. There are a total of 246 pages. On April 23, 2008 an original copy sold for $13,668.00! The book was reprinted in 1997 making the work more widely available to scholars.

The first part of the tome is entitled "Anaesthesia in Surgery" and discusses the role of anaesthesia in clinical practice. It contains Simpson's answer to the debate about the role of pain in surgery. Simpson quite clearly argues that pain does not aid in the healing from surgery. He also tackles the mortality question. Using statistical analysis, and arguing from the perspective of vaccination, the other great innovation in healthcare in the previous century, Simpson demonstrates that anaesthesia does decrease mortality in surgical operations. His sound arguments and well researched data show an effect despite the lack of understanding of bacterial infections in surgery.

The second section, "Anaesthesia in Midwifery" is the longest in the book and details Simpson's use of anaesthesia in his clinical practice. He answers many of the questions surrounding anaesthesia in obstetrics and includes his now famous pamphlet *Answer to the Religious Objections Advanced Against the Employment of Anaesthetic Agents in Midwifery and Surgery*. This particular writing of Simpson's has engendered much scholarship and speculation.

Simpson reported that there were three distinct groups involved in the discussion: the clergy, patients and physicians. Adams and Maltby have done extensive work examining the writings of the clergy at that time and have not found any objection to the use of anaesthetics. Reports concerning the feelings of patients are very hard to find, and often these reports are anecdotal at best. However, the physician community may be different. In a letter to Simpson from a W. Montgomery of Dublin, dated December 27, 1848, there is a hint from where these objections may have come.

> *Dear Doctor*
>
> *I have to apologize for having so long delayed in answering your last two letters…I now return them safely and with regard to that from Dublin I can only say that your correspondent in telling you that I [ ]that "pain had no effect on the mother" informed you as incorrectly as your other "Dublin man" who reported my opinion on this "religious objections" on which subject you say you were induced to write your "answer" by having informed that I was publicly advocating these so called "religious Objections" and that I had denounced your ex cathedra as acting in an unchristian way in advocating this abrogation of pain in labor by anaesthesia—and that the only reason you had that I did was hearing it "very casually from a Dublin man".*

This letter would indicate that the physician community, classically trained in Greek and Latin with an interest in Biblical studies would have been familiar with the passage concerning Eve, the Garden, God's curse and childbirth. In his argument against the "religious objections" Simpson examines the original Greek of the passage in great detail and discusses why the word "pain" is a mistranslation of the original.

The third section is entitled "On the Nature and Powers of Various Anaesthetic Agents". The search for anaesthetic medications is described, along with an extensive discussion of chloroform. Simpson speculates on other possible drugs

that will induce the anaesthetic state. In his fourth and final section, "Local Anaesthesia", Simpson demonstrates his knowledge of the ancient world by describing all the known ways to produce anaesthesia. Somewhat incongruously, the section ends with Simpson's response to Philadelphia's Professor of Midwifery, Meigs' objections to anaesthesia in labour and delivery.

On May 9, 1849, the *Boston Medical and Surgical Journal* published a review of Simpson's book:

> *Professor Simpson is regarded as authority not to be questioned, and as an embodiment, therefore, of his experience, opinions, and suggestions cannot be otherwise than well received. The advantage to be realized from this publication, is that having the whole matter brought under the eye of a single book.*

Conclusions

James Young Simpson was a dedicated physician. He worked diligently within the knowledge of his era to advance patient care. Simpson used his position as Professor of Midwifery at one of the most famous medical institutions of his time to promote new ideas and technologies and should be remembered far beyond a pair of forceps for difficult deliveries and a vacuum extractor. His publications and willingness to enter the controversial debate over anaesthesia, at the "dawn" of its discovery is laudable. Extolling the virtues of the technology he embraced, he also studied its usefulness and tried to find ways to maximize anaesthesia's efficacy in labour and delivery. James Young Simpson was, in many ways, the consummate professional.

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GREEK INFLUENCE ON JAMES YOUNG SIMPSON *

Dr A G McKenzie
Consultant Anaesthetist, Royal Infirmary of Edinburgh

James Young Simpson is remembered as the man who introduced chloroform anaesthesia and championed analgesia in childbirth. Greek influence is suggested in many of his publications. This paper assesses the extent of Greek influence in Simpson's work, by the examination of published works of Simpson, biographical material and historical sites in Edinburgh.

When Simpson entered the university in Edinburgh, the city was experiencing a surge in Greek neo-classical style, called for this reason the "Athens of the North". Simpson studied Greek to a senior level, before he decided to study medicine. In 1840, he became Professor of Midwifery, but continued to develop his interest in early medical literature and archaeology.

Simpson was the first to use ether in obstetrics (January 1847). He attacked the view that prevention of pain in surgical operations might be unnecessary and improper, quoting Galen. He searched for a better anaesthetic agent – finding chloroform in November 1847, when he pointed out that the idea of removing the pain of surgery dated back to the (so called) Augustine age authors: Dioscorides, Pliny the Elder and Apuleius. His knowledge of Greek helped him in compiling his *Answer to the Religious Objections*.

In 1848, Simpson experimented with local anaesthesia, crediting this concept to Dioscorides and the "Memphian stone". One of his favourite topics was acupressure – a means of controlling bleeding vessels during surgery by metallic sutures or pins. In an article on this in 1858, he noted that golden thread had been recommended by Hippocrates. In 1860, he published again on archaeology, enthusing on the value of relics of Grecian art.

After his death in 1870, his tomb was surmounted by a butterfly, possibly *Hamearis lucina* – Lucina being the goddess of childbirth. This butterfly became the emblem of the Simpson Centre for Reproductive Health at the Royal Infirmary of Edinburgh.

* Abstract only.
A version of this paper was presented at the 7th International Symposium on the History of Anaesthesia held at Hersonissos, Crete in October 2009.

WAS JAMES YOUNG SIMPSON ASKED TO ADMINISTER CHLOROFORM *à la Reine* IN 1848?

Dr H Connor
Centre for the History of Medicine, University of Birmingham

A surprising report

On 29 January 1848 the *Hereford Times* carried a report taken from the *Edinburgh Witness*, to the effect that Professor Simpson "has received intimation that his services, in conjunction with Dr. Locock, Her Majesty's physician-accoucheur, will be required at Buckingham Palace on an approaching interesting occasion. Professor Simpson leaves Edinburgh for London some time next month, in order to be in attendance on Her Majesty."[1] This report appeared more than five years before John Snow administered chloroform during the Queen's penultimate labour in 1853 [2] and at least two years before he was consulted about the possible use of chloroform for the Queen's labour in 1850.[3]

After I had read the report in the *Hereford Times* in 1994 I discussed it with the late Richard Ellis who had discovered a similar report in the *Boston Medical and Surgical Journal*. This paper is based on my discussions with Richard Ellis, on notes in his papers which are now lodged (but not yet catalogued) in the archives of the Wellcome Institute and on my own researches.

A search of the British Library's digitised collection of 19th century British newspapers shows that the story in the *Edinburgh Witness* was taken up by 8 of the 71 (11 per cent) papers in this sample. Most of them repeated the story *verbatim* but three also mentioned identically worded claims in the *Caledonian Mercury* and *Edinburgh Advertiser*, which were of course rivals of the *Edinburgh Witness*, that they had "authority to state that there is not the slightest foundation of the report published in the *Witness*..."[4] The *Medical Times* seems to have been the only British medical journal to have noticed these reports. It commented that, if the story had been true, it would set an important precedent but that the matter had been ended by the denial in the *Caledonian Mercury*. However, the *Caledonian Mercury* appears to have had second thoughts because, just two weeks after it had published its denial, it carried a report on the relative dangers of chloroform and ether which included the statement that "a Scotch physician of great eminence has been ordered up to be in attendance upon her Majesty with the chloroform."[5] The original report was also noted on

three occasions in the *Boston Medical and Surgical Journal* [6], one of whose correspondents "did not believe one word of it".

Was the report true?

The original report was, however, by no means implausible. In the previous year Simpson had been appointed as one of Her Majesty's physicians in Scotland, probably on the recommendation of his friend, the Duchess of Sutherland, who told him of the appointment before he received the official communication.[7] The Duchess was the Queen's Mistress of the Robes. She had attended the Queen on her wedding day and would be with her at Windsor on the evening of Prince Albert's death. The Queen described her as "the dearest, kindest, truest friend" and obviously trusted her judgement because Mrs Lilly, the nurse who attended at several of the royal births, had previously worked for the Duchess.[8]

Letters in the Royal Archives at Windsor which were transcribed, with permission, by Richard Ellis, show that the Queen and the Duchess discussed the use of chloroform on at least two occasions. The first mention was in a letter written to the Duchess by the Queen on 15 December 1847, at which time she was six months pregnant:

> "My Dear Duchess,
> I have to thank you for a kind letter with Dr. Simpson's curious and interesting pamphlet. I have just had an opportunity of hearing from Lady Normanby the details of Lady Hardwicke's confinement, who had the chloroform, and with whom it succeeded so wonderfully – relieving her of all suffering at the time and also afterwards. How wonderful it is!"

The pamphlet to which the Queen refers might have been either *Account of a New Anaesthetic Agent as a Substitute for Sulphuric Ether in Surgery and Midwifery* or *Remarks on the Superinduction of Anaesthesia in Natural and Morbid Parturition.* The first of these was based on Simpson's presentation to the Edinburgh Medico-Chirurgical Society on 10 November 1847 and was published on the 15 November, though Simpson had circulated copies of the proofs to colleagues two days earlier.[9] The second pamphlet was based on a further presentation to the Society on 1 December 1847.[10] If Simpson had published this second paper as a pamphlet within six days of its presentation, as he did with the first pamphlet, there would have been ample time for the

Duchess to have forwarded a copy to the Queen, for the Queen to have read it and then to have replied to the Duchess by 15 December. It is very probable that the Duchess received copies of the pamphlets from Simpson himself because he certainly sent copies to her eldest daughter, the Duchess of Argyll.[7]

Simpson also published his pamphlet *Answer to the Religious Objections advanced against the employment of Anaesthetic Agents in Midwifery and Surgery* in December 1847. However, the Queen evidently had no religious concerns over the use of chloroform in midwifery because she had been delighted to hear of its successful use by Lady Hardwicke.
The Queen's letter was written just one month before the report in the *Edinburgh Witness*. Although Richard Ellis found no evidence in the Royal Archives to suggest that the Queen had contacted Simpson directly, it is possible that an indirect approach had been made. If so, the Duchess of Sutherland would have been the probable intermediary.

Subsequent events

The Queen's medical advisers would not have shared her enthusiasm for chloroform at this time. The Royal physician, Sir James Clark, was the trusted adviser of both the Queen and Prince Albert and, although he had no obstetric experience, would certainly have been consulted about the use of a new agent such as chloroform. He was, like Simpson, a Scotsman and Edinburgh trained, holding both the MRCS(Ed) and an Edinburgh MD.[11] He might, therefore, have been expected to have had some empathy with the enthusiasm which Simpson's fervour for the obstetric use of chloroform had aroused in Edinburgh. However, he was by nature a cautious man and particularly so in Royal matters. When the Court was scandalised by the apparent pregnancy of the unmarried Lady Flora Hastings in 1839, Clark had procrastinated over a diagnosis and Lady Flora had been subjected to continuing opprobrium as her underlying but undetected cancer grew ever larger. Clark would not have readily accepted an innovation such as chloroform which was outside his immediate field of knowledge and practice.

Charles (later Sir Charles) Locock had been appointed physician-accoucheur in 1840 and was to attend the births of all the Queen's children. Like Clark he held an Edinburgh MD but was essentially a London man, having been a pupil of Brodie and a house pupil at the Westminster Lying-in Hospital.[12] It is unlikely therefore that he had any strong allegiance towards midwifery practices in Scotland. He was certainly cautious in his attitude towards the obstetric use of both ether and chloroform. When Simpson had sent him a copy of his pamphlet

on the use of ether in midwifery (also published in the *Monthly Journal of Medical Science*)[13] Locock had been non-committal, though he did favour its use in dysmenorrhoea.[7] Five years later in 1852 he was still using chloroform only occasionally in labour, as were some other well-established London accoucheurs such as James Reid, while others, like Francis Ramsbotham still thought it too dangerous for use in obstetric cases.[14]

Both Clark and Locock would probably have been horrified by the report in *the Edinburgh Witness* and, just two weeks later, their caution would appear to have been fully justified by the first death attributed to chloroform on 28 January 1848.[15]

The death of Hannah Greener occurred less than three months after the introduction of chloroform and only a few weeks before the expected date of the Queen's confinement. Hannah, like the Queen, was a healthy young woman, who had been given chloroform for a very minor operation, and her death must have had a profound effect on those of the Queen's advisers who knew of the Queen's enthusiasm for chloroform. Even if the Queen herself had still wished to take chloroform, her advisers would no longer have countenanced any such risk. No-one would have forgotten that a generation earlier, in 1817, the blame for the death of Princess Charlotte following a lengthy labour had been laid on the Royal accoucheur, Sir Richard Croft, who subsequently committed suicide.[16]

It is of course possible that the news of Hannah's death led the Queen to change her own mind without any pressure from her advisers. In early February 1848 Lady Stanley of Alderley described how her neighbour Emma Mainwaring, the wife of Sir Henry Mainwaring, had done just that. Emma had experienced several difficult labours and on this occasion was "full of her intention to be delivered without knowing it". She had collected information about chloroform from many quarters and had been encouraged by several medical men as well as by friends who had used it successfully. However, by the time of her delivery on the 24 February "she had been dissuaded from trying it". Lady Stanley noted wryly that she had "the best and shortest labour she ever knew" but that, had she had the chloroform, "they would have given all the credit of her good time to that".[17]

Throughout 1848 the personal columns of the *Times* recorded a steady number of births where the happy parents thought it appropriate to record that chloroform had been used, but there is no doubt that the weeks after Hannah Greener's death were marked by a note of caution. In mid-February the *Lady's*

Newspaper was relieved by the denial in the *Caledonian Mercury*, and wrote of the obstetric use of chloroform that:

> "for whatever may be the ultimate benefit derived from the inhalation of chloroform where it is desirable to deaden sensitivity to pain, as yet we know so little of its operation on the human frame, that we deem its use quite inadmissible in cases where pain has to be endured for a season, extending, according to constitutions, from a few minutes to several hours duration."[18]

The Second Royal Letter

In November 1849, when the Queen was five months into her next pregnancy, she wrote once more on the subject of chloroform to the Duchess of Sutherland. The Duchess's second daughter, Evelyn, had inhaled chloroform during her recent delivery and the Queen wrote that:

> "Your accounts of the chloroform are very interesting and the mode of giving it in such a small dose and with so good an effect, and yet without the loss of consciousness sounds most satisfactory and I should think this would become very general..."

As has been noted, Snow was consulted during this pregnancy about the possible use of chloroform by the Queen. What is not known, however, is why it was Snow and not Simpson who was now consulted, who consulted him and what advice he gave. Three years later, prior to the Queen's penultimate confinement, Snow was summoned to a consultation with Prince Albert but Richardson does not record who it was who sought his opinion in 1850.[3]

In 1850 Snow's obstetric experience with anaesthetic agents was still very limited. Prince Arthur was born on 1 May 1850 so Snow would presumably have been consulted at least one month before this date. His surviving Case Books start only on 17 July 1848 and they do not record all of the anaesthetics which Snow is known to have given after that date. They do, however, record the very great majority and it is striking that between 17 July 1848 and 31 March 1850 these records show only thirteen administrations of chloroform or Dutch Liquid for obstetric purposes. Of these thirteen cases, three appear to have been normal but particularly painful labours, three were prolonged labours and the remainder were either abnormal presentations or forceps deliveries.

This matches his stated belief at this time that, in addition to its use in labours requiring manual or instrumental assistance,

> "a medical attendant acquainted with the action of chloroform, and the mode of applying it, might administer it with propriety in all cases in which pain was either severe or protracted, whether they fell within the division called natural labour or not."[19]

By contrast Simpson had, from the very start, advocated the use of ether and, later, chloroform in all labours. For Simpson the relevant question was not "In what circumstances is it justifiable to use chloroform?" but "Are there any circumstances which can justify withholding it?"[13] And, as Simpson had complete faith in the safety of chloroform as administered by him, his answer was "No". By October 1848 he had used ether and subsequently chloroform in his own midwifery practice on about 150 occasions,[20] and this number might well have doubled by the early months of 1850 when Snow was first consulted.

That Simpson's advice was not sought in 1850, despite his great wealth of practical experience, suggests that the royal medical advisers lacked confidence in his opinion. As Shepherd has noted, Simpson had one great weakness in relation to chloroform and that was his obstinate refusal to admit that the drug could be dangerous.[21] If chloroform did ever cause death, then Simpson attributed it to "the reckless manner in which it is so often given."[22] The Royal doctors probably preferred Snow's carefully argued analysis of the cause of Hannah Greener's death, which Snow attributed to the chloroform itself,[23] to Simpson's dogmatic insistence that death was not due to the chloroform but to asphyxia caused by the attempts at resuscitataion.[24] It is therefore ironic that, in this particular instance, Simpson may have been correct.[25] Nevertheless, London doctors continued to criticise Simpson for what they regarded as his one-sided promotion of the virtues of chloroform,[26] and their opinion of him cannot have been enhanced by his outspoken criticism of the way in which they administered chloroform.[27]

The war of words between London and Edinburgh intensified in the closing months of 1849, just as the Queen was writing her second letter to the Duchess of Sutherland, with the publication of a paper by Robert Barnes, a London physician-accoucheur. Barnes published figures which purported to show that maternal mortality in Edinburgh was greater than that in London. He did not try to explain the excess but indicated that it was due to "remediable causes, and affords ample scope for the exercise of the talents of its obstetric practitioners."[28] Others drew their own conclusions. An anonymous correspondent attributed the alleged difference in mortality to the greater use of

chloroform in Edinburgh. He also quoted a report from the *Record* newspaper to the effect that pregnant ladies were coming to stay in Edinburgh so that they could be sure of receiving chloroform when in labour and that:

> "Professor Simpson's share in its introduction is operating favourably on his own position and on that of the city. The Duchess of Argyle and Lady Blantyre are both expecting their confinement ere long, and with their mother, the Duchess of Sutherland, have taken large mansions in the town or neighbourhood. Besides these, there are others, titled and not titled, who have done the same, so that Edinburgh will be the gainer." [29]

Although Simpson was entirely sincere in the beliefs which underpinned his extensive use of chloroform, there is no doubt that his practice brought him immense financial benefit. In 1852 he came to London

> "to deliver one of your great folks who wishes chloroform but who cannot get down to Edinburgh for her confinement"[14]

and the next year he wrote that

> "one of your high English folks has come here to have it [chloroform] next month because in London they would not give her enough."[14]

Although the editor of the *London Medical Gazette* subsequently conceded that it "does not appear that the alleged increase of deaths in the obstetric practice of Edinburgh was due to chloroform",[30] the mud had been thrown and doubts had been raised. The Queen's medical advisers must now have insisted on the opinion of a London doctor. As previously noted, Snow's experience of obstetric use of chloroform in 1850 was still very limited. However those London doctors with considerably greater experience, such as Protheroe-Smith, Baker Brown and Greenhalgh,[19] were all accoucheurs. To have involved them might have been seen as usurping the position of Locock and of his deputy, Robert Ferguson, as accoucheurs to the Queen.[31] No such conflict of interest applied to Snow who, if lacking in practical experience of obstetric anaesthesia, had the additional advantage of being the pre-eminent scientific authority on anaesthesia and who, by the beginning of 1850, had already published twelve of his fifteen landmark papers *On Narcotism by the Inhalation of Vapours* in the *London Medical Gazette.*

When consulted in 1850, Snow would still have advised that the obstetric use of chloroform be restricted to prolonged or especially painful labours or to those

where obstetric intervention was needed.[19] Whether he was placed on standby in case of such an eventuality is not known, but certainly his services were not required in 1850. By April 1853 Snow had, according to his *Case Books*, given chloroform or Dutch Liquid during labour on only a further ten occasions making a total of twenty-three in total. However he was by now convinced of the safety of chloroform when used in labour, writing that:

> "...when the patient is anxious to be spared pain, I can see no valid objection to the use of this agent, even in the most favourable cases."[32]

So it was that on 7 April 1853 he administered chloroform for 53 minutes during the Queen's normal labour.[2] Simpson would have been delighted when he received formal notification of the event in a letter from Sir James Clark written twelve days later.[7] He would probably have chuckled when he heard that Snow had administered the chloroform on a handkerchief rather than by using his preferred method with an inhaler. Yet his joy must have been tinged with some regret that it was Snow and not he who had given the chloroform, and perhaps he pondered how it might have been had Hannah Greener not succumbed to chloroform until after the Queen had given birth in 1848.

Acknowledgements

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DR JOHN WEBB WATKINS (1833-1903)
an early example of self-experimentation with chloroform

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This paper came about because I've been involved with three other 1961 Barts' graduates - arranging our 50th anniversary celebration on 14th May 2011. Peter Watkins, one of our group and formerly an eminent diabetologist at Kings College Hospital, had written his medical family history (now published in the *Journal of Medical Biography* [1]) and showed it to me. I was immediately struck by the early days of Peter's great-grandfather; John Webb Watkins (JWW) and his use of chloroform.

I bought a CD copy of JWW's MD thesis from Edinburgh University at no little cost. That, together with some basic research, forms the following paper. I looked on line into the Simpson papers held by the College and by Edinburgh University but could find no other references to JWW's collaboration with Simpson. Although *The Medical Times and Gazette* of the period 1855-60 contains many papers by Simpson, I found none relating to research about chloroform. Neither could I find any reference to this sort of experimental work in any of the Simpson biographies I've read. The only evidence there is of the work done by JWW with Simpson is contained in his thesis and some of JWW's letters. However, I think confirmation will be found by an image at the end of this paper.

Early years

John was the youngest of Thomas Watkins' three medical sons, born in 1833 eleven years before his father's death – see Figure 1. He was educated at Brackley Grammar School, Northants and apprenticed to his brother Robert Webb Watkins for 5 years (fulfilling the conditions of the Society of Apothecaries to become a yeoman by servitude). In 1855 he passed MRCS Eng. from University College Hospital and in 1857 LSA; the 'College and Hall' qualification. He started his medical career as assistant to Dr William Percival of Northampton, at the same time attending Northampton General Infirmary. In 1855, in the foot-steps of his grandfather Timothy, who had studied midwifery under Professor Thomas Young (predecessor of Sir James Young Simpson), he travelled to Edinburgh. There he investigated chloroform anaesthesia under the tutelage of Simpson, graduating MD by thesis in 1856 (before being granted LSA). However, JWW had used chloroform from 1850, before he qualified.

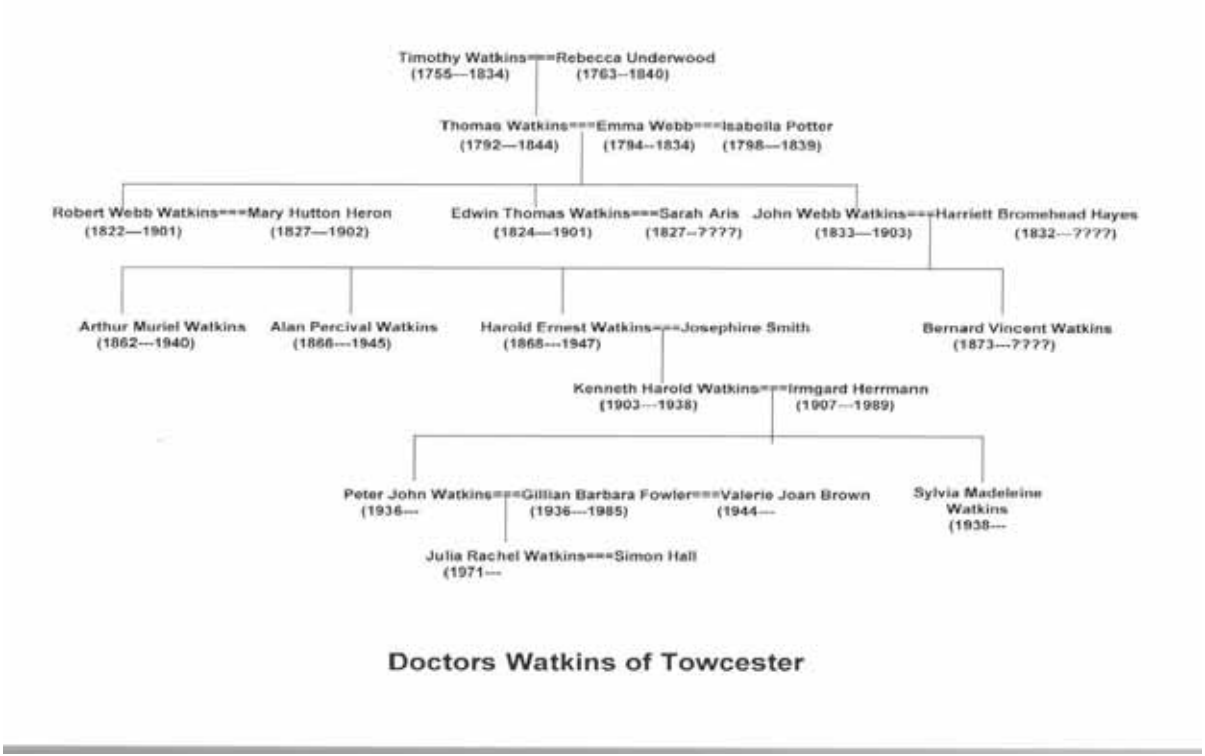

Fig. 1 Watkins family tree

He wrote[2]:

> *"I frequently administered chloroform in the operating room in the Northampton General Infirmary, as well as in cases occurring in private practice. Since the winter 1852 to 1853 I have frequently employed anaesthesia in midwifery practice – chiefly in cases of natural labour'.*

Opposition to Chloroform

The initial opposition to the use of chloroform in childbirth has been extensively described. JWW suggested that the *"arguments vigorously waged against the employment of chloroform in labour - religious, moral and medical - have been confuted. We are not likely to see a revival of such an argument as that the pain of labour is a part of the primeval curse…. Such reasoning is mostly only of "small theologians", fanatics and old maids".*

He had much more to say on general opposition to innovation:
"I believe because it [chloroform] is a sweeping innovation. "Is it new?" -- "yes"…. Such has ever been the fate of great discoveries…such was the case when the immortal Jenner made known his discovery of vaccination; so it was when the humane Connolly took off the shackles and manacles from restrained lunatics; so in like manner did the same spirit of opposition hail the introduction of such a widely beneficent agent as chloroform" . He goes on to argue that should an agent be discovered as *a "potent specific in that dire – dreadful and deadly disease - cholera - I dare venture to predict that notwithstanding the advance…. there will be many narrow-minded men who would vigorously oppose the adaptation of so magnificent a discovery"* (this recalls that he had assisted his brother Robert during the Towcester cholera epidemic in 1851[1]).

Experimentation

John (Figure 2) described in detail his personal experience of anaesthesia:
"During the first moments of inhalation of chloroform a slight oppression supervenes, sometimes even cough – but it is very momentary – then quickly following this comes tinnitus aurium—painful or pleasurable – sounds of music or singing, or of countless hammers clashing upon countless anvils—sounds probably never alike in two persons, but of an invarying character in the same individual (at this period sensation is diminished but neither volition nor consciousness is impaired), an overpowering lassitude steals over the frame, generally beginning in the lower extremities – it is a negative sensation – neither painful nor pleasurable – but absolutely indescribable power of motion

thus becomes affected, but still volition remains. I can hear noises or answer a question coherently and even reflect slightly upon what I am doing. The vision now becomes dim, perception very obscure and reflection lost – the impressions at this stage are very momentary—I have always felt when I was becoming insensible, but my effort made to oppose it is fruitless for sleep has supervened – common special sensations are annulled—motion is completely abolished, perception, reflection and volition are lost and have become merged in a tumultuous dream of ethereal delight, unhappily never remembered when consciousness returns. Such is the order of phenomena and the impressions which I have noted when I have been anaesthetised—now forty or fifty times – and I doubt not that they closely approximate those in other people".

Fig. 2 John Webb Watkins
Photograph courtesy of Dr Peter Watkins

Why?

But why did he want to undertake this research, given that he already had considerable experience in the use of chloroform? The answer in his own words was *"to add a few grains of material in the way of evidence in proof of what Professor Simpson had so long and fervently advocated, --viz. —the safety and great utility of anaesthesia in natural labour"*. He wanted *to "enunciate principles which I have confirmed by actual experience"....* rather than *"reading up the works of standard authors…. Besides it is well known that the curriculum of medical education is now so extensive as to leave but little or no leisure time to the student for the pursuit of original observation. I feel proud to acknowledge my obligations and to dedicate this thesis as a great tribute to Professor Simpson – by whom I was first taught the principles of anaesthetic midwifery"*.
JWW also listed the advantages of the use of anaesthesia in parturition:

1) Abolition of physical suffering and mental anxiety.

2) Shortening of labour especially in primipara.
3) Improved post-partum recovery.
4) Aid to early and accurate diagnosis of foetal position, &c.
5) Simplicity, certainty and safety of chloroform.
6) Particularly useful for reserved and hypersensitive ladies; '*obviating any injury to their exquisitely refined delicacy'*!

He added a seventh: that patients have a better attitude in future.

Simpson presented a gold ring (Figure 3) to John Webb Watkins presumably in recognition of his collaboration in chloroform research. The badly damaged inscription on the inside of the ring, reads "JWW from JYS 1855". The provenance of this ring is provided by Peter Watkins as follows.

> "Provenance of the ring came from my grandfather Harold Ernest Watkins (HEW), who took over the practice of his father John Webb Watkins in Newton-le-Willows. In a letter to me (Peter John Watkins) dated 18th May 1973, from HEW's nephew Geoffrey Watkins, when he gave me the ring, he wrote: *The rather dilapidated article in the box ... is the ring given by Sir James Young Simpson to John Webb Watkins for undergoing chloroform as an experiment, according to your grandfather, JW's third son.*"

Fig. 3 Gold ring presented to John Webb Watkins by Sir James Young Simpson. The crest of a cockerel with a feather in its mouth was used by the Watkins family in the 19th and early 20th century.
Photograph courtesy of Dr Peter Watkins

There is, as far as I can find, no other evidence about JWW's experimental work with chloroform. I could find nothing relevant in the long list of Simpson material in the Royal College of Surgeons, Edinburgh – not even a bill for the ring. I've looked in vain at various biographies and Guthrie's account: *100 years of Chloroform* [3]. I could find nothing of relevance in the Medical Times & Gazette of the period where Simpson published many articles mainly about obstetrics. If anyone can provide further leads I shall be most grateful.

John Webb Watkins was erroneously described in his *Lancet* obituary as the "first person" to whom chloroform was administered by Sir James Young Simpson in Edinburgh [4], and although he certainly experienced chloroform anaesthesia as a guinea pig "*40 or 50 times*" [2] of course, he was by no means the first person to receive it.

Was John Webb Watkins unique in his self-experimentation? He may have been lucky to survive *'40-50'* administrations of chloroform but some may have been less than full surgical anaesthesia.

I have found no evidence of any other young doctors who collaborated with Simpson in this way. The chance nature of my discovery of JWW thesis may suggest it would be interesting to look at other MD theses of this period with chloroform and/or parturition in the title. It is well known that Thomas de Quincy's son wrote his Edinburgh MD on chloroform.

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COCAINE: A GIFT FROM GOD WORTH $400 BILLION PER YEAR *

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The Ancient Incas of Peru believed cocaine to be a gift from the gods. Today, attitudes towards cocaine have changed dramatically. Aside from alcohol and tobacco, cocaine is the most common cause of drug-related Emergency Department visits in the United States.

Cocaine is a naturally occurring ester derived from benzoic acid. It is extracted from the leaves of *Erythroxylon coca*, which is a shrub indigenous to Peru, Bolivia, Mexico, West Indies and Indonesia. It is rapidly absorbed by mucous membranes and is used therapeutically as a local anaesthetic. Due to its highly addictive nature, it is now a popular drug of abuse. Initially it blocks the inhibitory pathways, allowing its user to become euphoric, hyperthermic and hallucinate. This can lead to convulsions. Higher doses can also block the facilitatory pathways, causing central nervous, respiratory and myocardial depression.

Cocaine's mind-altering properties have been known since 2000 BC. For centuries the plant was reserved for Inca royalty, where it was chewed for social, mystical, medicinal and religious purposes. It was also introduced to the natives where its stimulant properties prevented fatigue and hunger, enhanced endurance and promoted a sense of well-being. Although initially banned by Spanish invaders, it was discovered that without it, the natives could not work the fields or mine gold. Consequently it was brought back to Europe by the Spanish and introduced as "an elixir of life".

Cocaine was not isolated from coca leaves until 1860 by Albert Niemann. In 1863, a wine fortified with cocaine was marketed in France. In 1886, John Pemberton responded by developing Coca-Cola, a non-alcoholic version of French Wine Coca. In 1903 cocaine was removed from the drink but it still contains coca flavouring today.

In 1884, William Stewart Halsted performed the first nerve block using cocaine as the anaesthetic. Halsted subsequently became the first cocaine-impaired physician on record. Leo XIII, Sigmund Freud and Queen Victoria are other renowned icons known to use cocaine. Robert Louis Stephenson wrote 'The Strange Case of Dr Jekyll and Mr Hyde' during a 6 day binge.

* Abstract only

By 1893, occasional reports of fatality were associated with cocaine use and in 1895 *The Lancet* reported a series of 6 deaths. Consequently the Harrison Narcotics Act of 1914 banned the non-prescription use of cocaine-containing products. However the 1970s saw a further influx of cocaine use, where crack cocaine became fashionable.

10 years ago, cocaine cost around £70/gram - now a line costs under £1 making it cheaper than lager and wine. Over 1 million people were thought to have used cocaine in the UK last year. Its use has doubled in the last seven years and more than 5% of all British banknotes are thought to have been used to snort cocaine. Deaths related to cocaine rose by 20% last year.

The illegal cocaine market is worth $400 billion dollars per year. Despite having a desirable therapeutic effect, especially in Ear Nose and Throat Surgery, this ester is becoming a serious socio-economic problem in the UK.

THE RISE OF THE GASMAN

The development of the anaesthetist as a medical specialist in Britain 1900-1950

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Ever since the introduction of anaesthetic agents to medical practice in the mid-nineteenth century, there have always been doctors like John Snow who have dedicated a large part of their work to the understanding and practice of anaesthesia. However Britain has a long history of resistance to specialisation in medicine for fears it divides the profession and its associations with quackery.[1] It might at first seem obvious that as more complex anaesthetic techniques and equipment developed, specialist doctors in this field would emerge. But in fact anaesthetists faced considerable opposition to their claims to be specialists from 1900-1950. This paper will examine the steps anaesthetists took to advance the status of the specialty and the obstacles they had to overcome. Then it will explore how the Second World War and creation of the National Health Service firmly cemented the place of the anaesthetist as a medical specialist in Britain.

Anaesthetics Bill 1909

Anaesthetists, concerned about safety, first tried to define their specialty by law when deaths under anaesthetic had become unacceptable to the medical profession and public alike.[2] Dr Frederic Hewitt proposed the Anaesthetics Bill in 1909 banning anyone but registered medical practitioners from administering anaesthesia. [3] At this time a nurse or medical student might give the anaesthetic with grave consequences but no legal repercussions. Later revisions included a clause stating that a doctor separate from the surgeon performing the operation must administer the anaesthetic.[4] This would have created a need for an anaesthetist at every operation by law but unfortunately the Bill was not passed by Parliament.

The organisation of health care in Britain before the Second World War and creation of the NHS meant that outside the well-developed hospitals of the larger towns and cities, one was unlikely to find a doctor solely specialising in anaesthesia. General practitioners provided medical care to the majority of the population in small practices, patient's homes and cottage hospitals managing almost all medical problems and performing basic surgery. GPs generally administered their own anaesthetic for small operations and childbirth as patients could barely afford to pay the small fee to the doctor let alone another practitioner entirely.[5] To introduce strict laws controlling anaesthesia at this

time would have prevented many poorer people from receiving surgical treatment from their GP.

Resistance to specialisation

Before the creation of the NHS, doctors who wanted to become anaesthetists often could not for economic reasons. Training posts were generally unpaid so only those who could afford to support themselves financially through training could become a specialist.[6] Staff posts at voluntary hospitals were also expected to be unpaid with practitioners needing to acquire a large private practice through the posting to earn a living. Anaesthetists were lucky to earn 10% of a surgeon's fee so most had to keep a general practice alongside their anaesthetic work.[7]

Anaesthetists faced harsh opposition in the period over their claims to be specialists. GPs objected to the fragmentation of medicine into sub-fields because they lost business when patients went to see a specialist.[8] Throughout the nineteenth century, reformers had tried to unite physicians, surgeons and apothecaries into one single medical profession and to some, specialisation threatened to divide the profession once more.[1] One scathing letter from a GP to the *BMJ* as late as 1940 claimed:

For some little time there has been a feeling that anaesthetists are getting ideas quite beyond their station. Some anaesthetists have even gone so far as to make the monstrous suggestion that anaesthesia is actually a special branch of medicine and that the skilful administration of the anaesthetic is of importance equal to the skilful performance of the operation.[9]

This GP viewed anaesthesia as only one skill of many that a doctor must be capable of in general practice and considered the job of the anaesthetist as that of a technician and not a medical specialist.

Surgeons continued to place themselves at the centre of all aspects of the operation and called for the simplification of techniques so that all junior doctors could be taught to administer anaesthesia under direction from the surgeon.[10] There remained a culture of long lists and quick operations and surgeons did not want anaesthetists spending all their time preparing for the operation. "I have heard one surgeon say to the anaesthetist under such circumstances [of taking too much time]: 'All right, Dr. X., if you don't mind I'll start now and you can pass your little tube afterwards'" wrote one doctor to the *BMJ* [10] There were reports of anaesthetists willing to practice but being "kept in their place" by surgeons who wanted to maintain that they were the only

specialists in their area.[11] Specialists could demand more for their fee and anaesthetists had the potential to alter the power structure in theatre because there was another doctor present rather than the usual nurses and students whom the surgeon was omnipotent to.

Anaesthetists viewed their role as peri-operative physicians similar to today - assessing the patient beforehand to understand their medical history and then using a broad knowledge of the different anaesthetic methods to provide the safest and most appropriate anaesthetic.[12] They argued that surgery is not limited by the abilities of the junior house surgeon so the same should be for anaesthesia.[13] By 1939, pre-medication with atropine to reduce mucus secretions and possibly a sedative was standard practice.[14] Examining the patient before the operation and giving pre-medication took the anaesthetist's job outside of the operating theatre and extended their role. Anaesthetists by 1942 had such a choice of gases and routes of administration that it had become "public menace" that anyone but a specialist doctor should administer anaesthesia.[13] One simple method could not be used to anaesthetise every patient anymore and GPs were criticised for their attitude that medical men could apply themselves to every aspect of medicine with the same success. [10]

World War Two

By the Second World War, anaesthetists were considered as specialists by the Army whereas in the Great War they were not.[15] This was not only because of the development of more specialised techniques and equipment but as a result of active steps anaesthetists took to improve their status within the medical profession. Most newly developed specialties such as cardiology or plastic surgery branched out from within either medicine or surgery and so naturally had a well-established base on which to build. These specialties could exert their influence through the centuries old Royal Colleges of Physicians and Surgeons. Anaesthetists were working in a completely new field with only a very recent history and so had to construct their pillars of influence from scratch.

Collectively, the founding of the *British Journal of Anaesthesia* in 1923; the Association of Anaesthetists in 1932; and Diploma in Anaesthetics in 1935 not only brought the specialty of anaesthesia together and helped develop the ideas within it but also convinced the rest of the profession of its standing as a specialty. Money and patronage are crucial in advancing any field in science but its effect is no more pronounced than in the advancing the specialty of anaesthesia. In 1936 the University of Oxford announced that it was opening a new postgraduate medical school for teaching and research. It was to consist of four departments, each with a Professor chair – medicine, surgery, obstetrics

and gynaecology and surprisingly anaesthetics. Before this point anaesthetics did not have a broad scientific foundation like other specialties and there was a widespread feeling that it did not require support at such a high academic level.[16] It was only at the insistence of Lord Nuffield who was funding the school that a Department of Anaesthetics was included.

War is an extremely specialised environment and this is reflected in the Army with its division into specialist regiments and battalions. With each unit fully committed to their specific role, there is the belief that together they are a more effective force. This philosophy was extended to the medical services and in 1939 the Army was keen to recruit doctors with anaesthetic experience to anaesthetic postings with the immediate rank of Major.[15]

The unique pressures of war changed the relationship between the anaesthetist and surgeon considerably. The sheer number of casualties and type of traumatic injuries meant that both surgeons and anaesthetists had to work together more than ever to achieve the best surgical results for the injured troops. Advances in surgery required corresponding developments in anaesthesia. For example, neurosurgery and especially maxillo-facial surgery made use of techniques such as endotracheal anaesthesia that had been available for a while but not widely used. One maxillo-facial surgical unit in the Italian campaign had only four surgeons but five anaesthetists that they shared between them and neuro-surgery. [17]

Advances in anaesthesia like creating positive lung pressures from the Boyle anaesthetic machine allowed surgeons to perform more complex operations like removing part of a lung relatively safely.[18] By the end of the war, anaesthetists were considered a crucial part of the surgical team and one very senior surgeon in the armed forces, Major-General Philip Mitchiner, gave a particular “word in praise of the anaesthetists who are doing magnificent work to assist their surgical colleagues in all parts of the world.” [19] Anaesthetists had also received many appointments and promotions across the campaigns in advisory roles and field hospitals.[20]

Back in Britain, it was increasingly recognised throughout the country that the best surgical results were obtained when the anaesthetist and surgeon formed part of a highly specialised team.[21] Indeed during the war, in some doctors’ experience the power relationship between surgeon and anaesthetist had shifted even more dramatically. With surgeons attempting longer, more complex operations in severely maimed war casualties they came to rely on the greater skill of the anaesthetist to keep the patient alive throughout the operation. One anaesthetist even asked “who has not tired at the constantly repeated 'Is he all

right, doctor?' from over-anxious surgeons?" [13] This is a huge contrast to the previously held belief that surgeons were in the best position to oversee the anaesthetic.

The nature of war on the battle front meant anaesthetic kits needed to be mobile and equipment sometimes had to be abandoned. Flammable gases like those used in anaesthesia were especially dangerous in the environment of war. Sodium thiopental, an intravenous anaesthetic, had been discovered some years previously and used by some anaesthetists in teaching hospitals, but gained particular popularity during the war. Despite first seeming of little use in haemorrhaging and shocked patients, once dosage had been corrected it became a very safe and acceptable method of anaesthetising soldiers on the battlefield. One senior anaesthetist, Stanley Rowbotham, wrote of its benefits:

In addition to its portable qualities, Pentothal is quick in action and non-explosive, and non-flammable and pleasant for the patient and gives no after effects - recovery is quick and patients do not require so much supervision after operation. [22]

Intravenous anaesthesia became the defining technique for anaesthetists as it had enough advantages to warrant its widespread implementation but was even more dangerous than inhalation methods if used by an unskilled practitioner.

War provided an opportunity for anaesthetists to reach a consensus about their practices. The Anaesthetic Advisor and other members of the Central War Medical Committee visited all the military hospitals and many of the civilian hospitals around the country. They noted that there were several officers in anaesthetic posts for which they were not qualified or experienced enough, and alternative postings were made.[22] They also made inspections of equipment and made several changes. Robert Macintosh, Chair of the Nuffield Department of Anaesthetics and Air Commodore did the same with RAF hospitals - standardising connections for valves, tubes and cylinders on machines and teaching that someone must maintain the airway at all times, bringing all doctors in the RAF who were to administer anaesthesia up to the same standard. [23] This marked a step in beginning to standardise the practice of anaesthetics throughout the country and specifying who exactly should be an anaesthetist based on their qualifications and experience.

National Health Service

The problems that anaesthetists had faced before the war – inadequate training, pay and conditions and the inevitable draw towards general practice – were

largely diminished after the war due to plans for the National Health Service. Chaired by Sir William Spens and popularly known as the "Spens' Report," the "Report of the inter-departmental committee on the remuneration of consultants and specialists" tackled the question of consultant and specialist pay within the NHS. [6] For the first time emphasis was placed on the training period preceding the attainment of a consultant post which had previously received little recognition or remuneration. To encourage potential specialists to train, the committee recommended that trainees receive a reasonable living wage while training in recognition of the responsible work they undertake and as part training grant.[24] This marked a major shift towards encouraging specialisation in Britain after it had worked so effectively during the war.

On the committee were members of the Royal Colleges of Physicians, Surgeons and Obstetricians and Gynaecologists so there was still a huge potential for bias towards the traditional elites that those organisations represented. The report aimed to propose pay scales based on data of private earnings in 1939 before the war but at the same time consider how the war had increased the specialisation of medicine. The committee asked for evidence from the profession and in response to this the BMA and Royal Colleges jointly set up an ad hoc committee to consider what evidence to present to the report. The Association of Anaesthetists were not invited to this but the Spen's Committee invited them independently to give evidence directly in order to fairly assess the situation.[25] The Association was then able to prepare a statement arguing for equal pay and status in the NHS like they had received during the war based on the complex and crucial nature of their specialty and long training involved.

This culminated in "Equality of status between different branches of specialist practice." [6] The committee had lengthy discussion about whether different specialties should have different ranges of pay but concluded that:

in view of the standards of qualification and the length of training now proposed for the various special branches it would be unfair to recommend that any specialty should be relegated to a subordinate place in Medicine by denying its members access to the highest levels of remuneration.

The new egalitarian principles of the NHS extended not only to the patients but the medical profession too and all consultants were given access to the same ranges of pay. Pay was now in theory based on a doctor's responsibilities and experience rather than the specialty they were in.

Conclusion

The development of the anaesthetist as a medical specialist was not straight-forward in Britain. Despite advances made in the techniques and equipment used in anaesthesia, resistance to specialisation extended well into the twentieth century. However, the unique environment of war favoured specialisation and the use of intravenous anaesthesia, changed the relationship between anaesthetists and surgeons and was an opportunity to begin standardising anaesthetic practice around the country. Finally the new National Health Service recognised anaesthetists as medical specialists and offered them employment in hospitals all around the country at the same rates of pay as all other specialists.

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   "Death Under an Anaesthetic" *The Times* August 10th 1908
   "Death Under an Anaesthetic" *The Times* October 7th 1909
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THE HISTORY OF ANAESTHETIC RECORDS

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"At first, those in the surgery felt that I was delaying the work when I took the blood pressure on each patient and demanded the chart before starting the anaesthetic. However, the surgeons politely consented to pamper me."- John S. Lundy, Seattle, Washington, 1924. 2
"The anesthesia record also reflects the competence of an anesthetist; an illegible, incomplete, unorganized record suggests irresponsibility and a lack of vigilance."- Sechzer PH., Anesthesia documentation and evaluation. Quality Review Bulletin 1981;7:28-34

Introduction

The anaesthetic record is an integral part of anaesthetic practice. It forms an essential part of the patient's medical record and includes documentation of preoperative anaesthetic assessment, events when a patient is under anaesthesia and the patient's vital signs throughout surgery. It is important for continuity of care in the post-operative period, and is a useful source of information for future anaesthetics. It can be used as a source of data for research. The recorded information can also be used for medico-legal purposes if any legal action arises from the care of the patient.
The anaesthetic record came to routine use in the UK long after the first anaesthetic was administered. The purpose of this paper is to investigate the origins and the evolution of the anaesthetic record charts with particular reference to the UK.

1892 After the Hyderabad Chloroform Commissions

The Nizam of Hyderabad financed two commissions in 1888 and 1889 at the request of Surgeon Major Edward Lawrie to examine the hazards of chloroform. Following this in 1891, the British Medical Association elected a national committee, which requested all anaesthetists in Britain to record their cases during 1892 to obtain evidence on relative safety of various anaesthetics used.[1] Theatre registers were drawn up containing columns for noting the consecutive number, date, hour, age, sex, general state of the patient, nature of operation, anaesthetic employed, method, duration, quantity used, source where the anaesthetic agent was obtained from and after-effects in each case. In January 1893, 136 books were returned with details of 25920 cases in hospital and

private practice. The final report was not submitted until 10 years later, though it was vague and there were no definite conclusions.

The purpose of maintaining anaesthetic records may have been different then, however the universal use of an anaesthetic chart to record each anaesthetic took a long time to be adopted in the UK. Patient's records and theatre registers had notes such as "ACE" or "GOE" to indicate the anaesthetic administered, but rarely included the name of the anaesthetist.

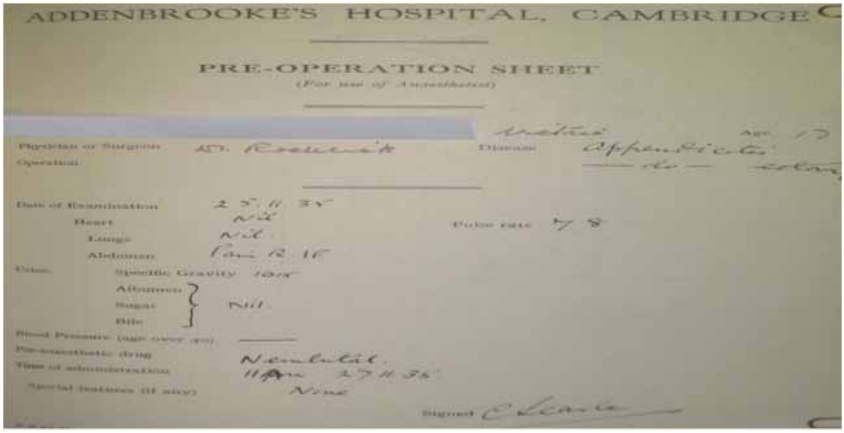
1894 Codman and Cushing

In America, the use of anaesthetic records was advocated by two Harvard medical students, Ernest Amory Codman and Harvey William Cushing in 1894 at the Massachusetts General Hospital, just under 50 years after the first anaesthetic was administered.[2] They saw patients die under anaesthesia which prompted them to devise the ether record so they could train to become "good etherizers".[3] They recorded pulse rate, respiration, depth of anaesthesia, and the amount of ether given on "ether charts" believing that the practice would lead to safer anaesthesia. In 1903, Cushing published his influential paper "On Routine Determinations of Arterial Tension in Operating Room and Clinic" in the *Boston Medical and Surgical Journal*[4], which then led to the addition of blood pressure readings to these charts. An amusing anecdote has been quoted in Fulton's biography of Cushing. An inexperienced student nurse who was standing in for a nurse anaesthetist, when told to take a blood pressure reading during an operation, was tugging at Cushing's leg to put the cuff on him![5]

1930's Pre-operation Sheets and Punch-card System

In the 1930's, pre-operation sheets (Figure 1) were included in medical notes for the anaesthetist's use. These included findings of systemic examination and premedication. As Nosworthy noted, little importance was given to keeping routine anaesthetic records in the UK.[6] He advocated the use of anaesthetic records for continuity of patient care and for statistical, medico-legal and teaching purposes. Anaesthetic charts were drawn up in various hospitals in the UK. However the practice of maintaining routine anaesthetic records was not uniform and many charts fell into disuse.

In 1932, Tovell and Dunn adapted the Hollerith punch-card for recording anaesthetic data at the Mayo Clinic.[7] The punch-card was used with a sorting and tabulating machine. Though an expensive and complicated system, it was widely used in the US and adopted by the American Society of Anesthesiologists in 1937.[8]


ADDENBROOKE'S HOSPITAL, CAMBRIDGE

PRE-OPERATION SHEET

(For use of Anæsthetist)

Physician or Surgeon: Dr. Rowntree — Disease: Appendicitis

Operation:

Date of Examination: 25.11.35

Heart: N.S.

Lungs: N.S.

Pulse rate: 78

Abdomen: Pain R.I.F.

Urine: Specific Gravity: 1014

Albumen: Nil

Sugar:

Bile:

Blood Pressure (age over 50):

Pre-anæsthetic drug: Nembutal

Time of administration: 11 Am 25.11.35

Special features (if any): Nine

Signed: C. Clarke

Fig. 1 Pre-operation Sheet (Courtesy: Archives of Addenbrooke's Hospital)

1940s Nosworthy Card

Anaesthetic report forms, similar to the pre-operation sheets described above, were filled out by medical officers to inform the anaesthetist of the nature of the proposed operation and of the patient's physical condition.[9] In the 1940's, some anaesthetists kept simple anaesthetic charts to record vital signs, others preferred detailed record systems using codes and symbols, including documentation of pre-operative and post-operative complications. It has been noted that some anaesthetists found it difficult to keep routine records during the wartime as it was tough for them to travel to hospitals and at the same time, keep routine records.[10]

In 1943 Nosworthy put forward his special card system (Figure 2) to record anaesthetic details.[11] On one side of the card was a series of factors each opposite a perforation near the edges of the card. The other side had a chart to record the pulse and blood pressure during the operation. The anaesthetist encircled the relevant factors on the card and returned it to the anaesthetic department after the operation. Each card was given a serial number. The serial number, patient's name and operation were entered in a card index. The holes corresponding to the encircled factors were converted into V-shaped slots using a pair of scissors and the corner of the card was cut off for filing. The cards were easily sorted using a knitting needle. [12]

The Association of Anaesthetists of Great Britain and Ireland (AAGBI) sponsored a scheme whereby teaching hospitals in the UK kept a combined

chart and Nosworthy card index for anaesthetic records. This was aimed to promote the collection of large mass of valuable data in anaesthesia which otherwise would have been lost.[12]

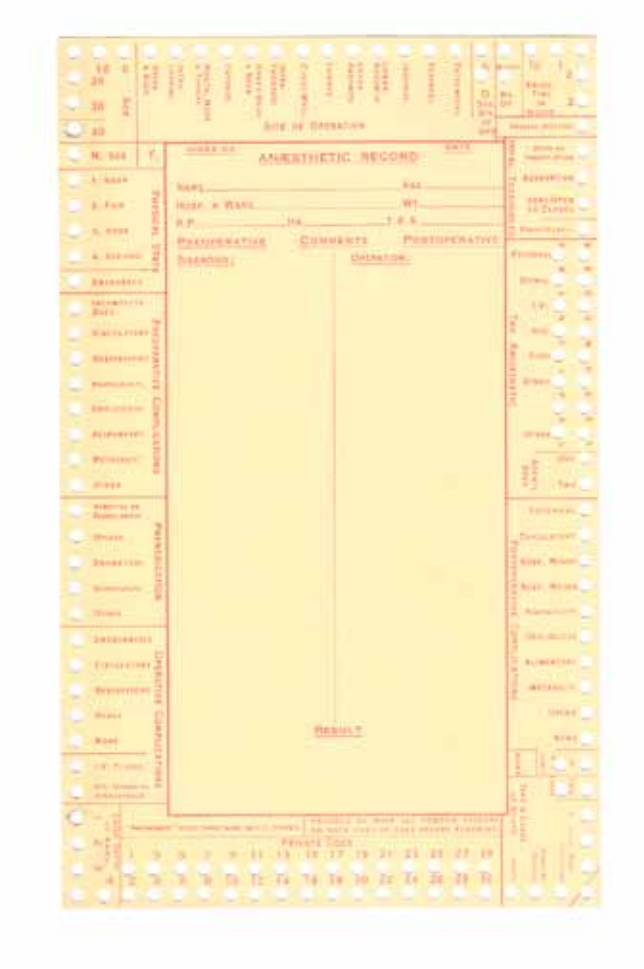


Fig. 1a Front of the Nosworthy Card (Courtesy: Dr Jean Horton)

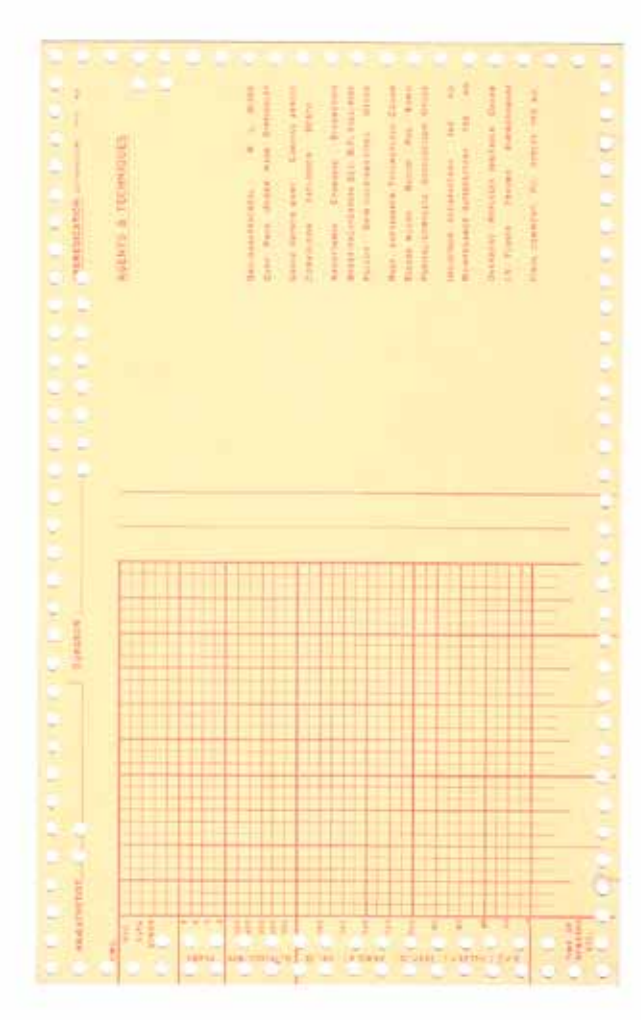


Fig. 2b Back of the Nosworthy Card (Courtesy: Dr Jean Horton)

1950s Cardiff Anaesthetic Record and Cumulative Anaesthesia Record

Professor William Mushin, Dr. L. Rendell-Baker, Dr E. Lewis-Faning and Dr. J. H. Morgan described the Cardiff anaesthetic record system, a four-page, self-coding record to collect valuable data for statistical purposes. They believed that data that was collected had to be analyzed and reported. They therefore involved a statistician in the team from the very beginning. The process required the efficient collaboration of anaesthetists, records officer and statistician. The data on the record form were transferred by hand to a Hollerith punch card. The punch cards consisted of codes and were analysed periodically by a statistician.[13]

On April 10, 1953 a discussion on anaesthetic records under the auspices of the Royal Society of Medicine was presided by Dr. M. D. Nosworthy. The discussions emphasised the educational and medico-legal value of anaesthetic records. While Dr Mushin and Dr Rendell-Baker spoke of the success of their record system, Dr Nosworthy, Dr H J V Morton and others supported simple anaesthetic records with clear documentation.[14]

Fig. 3 The Cumulative Anaesthetic Record (Courtesy: Dr Jean Horton)

In 1958, Harry Middleton described a cumulative anaesthesia record system (Figure 3). The permanent information of the patient was entered on the front of the card where a separate form for each anaesthetic was added. The back of the card carried the consents for the anaesthetic and the operation. Postoperative instructions were also included in this record to ensure continuity of treatment in the immediate postoperative period.[15]

1960s A New Combined Anaesthetic Record and AAGBI's Standardised Record

A new type of combined form for anaesthetic records was designed by Dr K W Oldham in 1963.[16] The sheet had A4 size measurements and with its right-hand corner marked in red, it was easily identifiable in the patient's case notes. It had space for details of anaesthetic and operative procedure.
In 1965, the Ministry of Health issued a memorandum to the Association of Anaesthetists (AAGBI) regarding the standardisation of hospital medical records. The Council set up a sub-committee including Professor W W Mushin, Dr H J V Morton, Dr A.H.Galley, Dr P J Helliwell and Dr R A Binning to decide the data that should be routinely recorded by anaesthetists.[17] In 1966, a simple form of anaesthetic chart was submitted by the sub-committee which was intended for use by anaesthetists who did not have anaesthetic record forms in their hospitals. This chart was not meant to replace charts that were already proven to be useful.[18] The chart was of A4 size, colour coded, had a grid for recording vital functions against time and space for the postoperative recovery period.

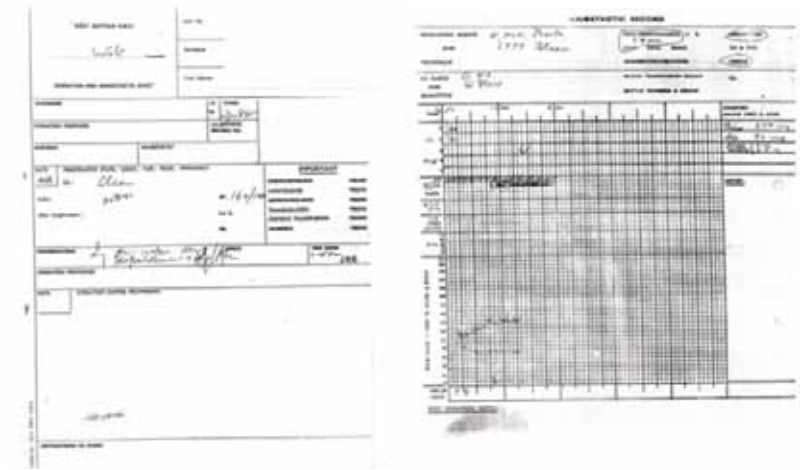


Fig. 4 Anaesthetic Chart used in 1968, West Suffolk Hospital (Courtesy: Medical Records Office, WSH)

Figure 4 shows an example of the anaesthetic chart used in 1968 at the West Suffolk Hospital in Bury St. Edmunds. It is possible that the recommendations highlighted by the sub-committee have been considered in the making of this chart.

1976 and 1988 Surveys of Anaesthetic Charts

A survey to assess the practice of keeping anaesthetic records in the UK in 1976 showed that while important aspects were omitted in some record forms, other forms had too many options not relevant to the anaesthetic.[19] It was recommended that the anaesthetic form should be simple and adaptable to be used in all kinds of anaesthetic situations.

In 1988 another survey in Yorkshire found out that only few anaesthetic record forms had incorporated the recommendations set out 20 years ago.[20] Colour coding was not adopted widely. 86% of charts were A4 size, 63% had details of the whole perioperative period and less than 50% had space for postoperative instructions.

1996 RCoA and AAGBI Recommendations

The Royal College of Anaesthetists and the AAGBI, in 1996 put together recommendations for the contents of the anaesthetic record chart.[21] As an essential part of good patient care, the RCoA advised that anaesthetists should keep clear, accurate and legible records, including relevant clinical findings, investigations undertaken, drugs prescribed, information given to patients, decisions made and treatment offered.

2008 Computerized Anaesthetic Record-Keeping System

The NHS recommended the widespread adoption of electronic health-care records in its Information for Health Strategy in 1998. Ten years later, the Association of Anaesthetists (AAGBI) and the Royal College of Anaesthetists recommended that every anaesthetic machine should ideally be equipped with a computerized anaesthetic record-keeping system. Anaesthetists need ready access to patient's clinical information, clinical decision support and reference services to treat patients effectively.[22] An automated record samples data more frequently and more accurately. Therefore it is considered to be significantly superior to the hand-written record.

Financial constraints and technological barriers have been obvious barriers to adopting the anaesthetic information management system.[23]

2010 and the Future

The AAGBI in collaboration with the National Patient Safety Agency has proposed a national anaesthetic record that is the same in every NHS hospital in England, and maybe even Wales, Scotland and Northern Ireland.[24] A national record would enable one to get information quickly, make audits of records easier and allow anaesthetists rotating between hospitals or undertaking locum work to be familiar with the chart.

Conclusion

It would be fair to conclude that there was little enthusiasm amongst the anaesthetists in Britain to keep routine records of anaesthesia in the early part of 20th century. The recommendations put forward by the Faculty of Anaesthetists and the AAGBI were not universally adopted. The modern anaesthetic record in the UK has come to existence long after various forms of records were introduced.

Although there is no legal statute that requires an anaesthetic record to be kept, the General Medical Council states that clear and accurate record keeping is a requirement of Good Medical Practice.

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MULTUS SANGUIS FLUIT

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Quotation

'I think it ought to be an accepted aphorism in medicine *that no one should be permitted to die of haemorrhage.* We should never rest until the means of preventing dangerous losses of blood, and of restoring those who are in danger from such loses, shall be brought to perfection.'[1]
Robert Barnes 1869.

Introduction

Since the origins of mankind, pregnancy and childbirth have posed a significant threat to maternal life. This is no more clearly demonstrated than by figures from the developing world where it is estimated that almost half a million mothers die each year in pregnancy[2] and maternal mortality ratios as high as 1400 per 100,000 live births have been reported.[3] Sadly, more than 140 years since Robert Barnes proposed the noble maxim above, massive haemorrhage remains the leading cause of maternal mortality worldwide, accounting for more than 25% of all deaths and as many as 75% of all cases of severe maternal morbidity.[4] Fortunately for mothers in the United Kingdom the risk of dying from exsanguination is now minimal; the mortality ratio due to haemorrhage reported by the Confidential Enquiry into Maternal Deaths for the triennium 2006-2008 was 0.39 per 100,000 maternities.[5] However, rates of maternal death in this country have not always stood at such low levels. As little as 80 years ago in England and Wales the mortality rate from all causes of maternal death was approximately 400 per 100,000 births (Figure 1) – a level that had not changed significantly since the mid 1800s when James Young Simpson practiced obstetrics. Then starting in 1935 there began a sudden decline in maternal mortality that continued well into the 1970s. If subdivided into underlying cause and plotted between 1935 and 1975 (Figure 2), rates of maternal death due to puerperal sepsis, toxaemia, abortion and haemorrhage can be seen to follow similar downward trends. Whilst the reduction in mortality due to the first three aetiologies can be largely explained by the introduction of sulphonamides and penicillin, improvements in the antenatal diagnosis and treatment of pre-eclampsia and legalisation of abortion,[6-8] the factors accounting for the reduction in deaths due to haemorrhage are less clearly defined.[7-12]

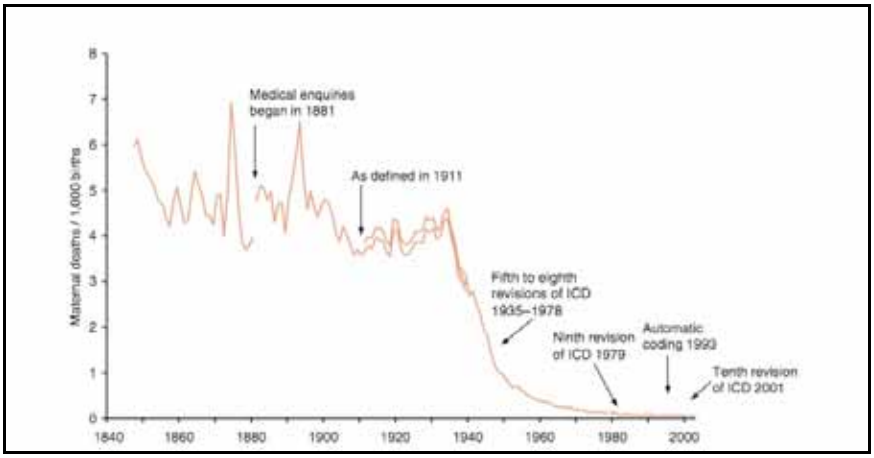

Fig. 1 Maternal mortality: England and Wales 1847-2002. Source: General Register Office, OPCS and ONS mortality statistics reproduced in *Birth Counts*. Tables A10.1.1 – A10.1.4.[8]

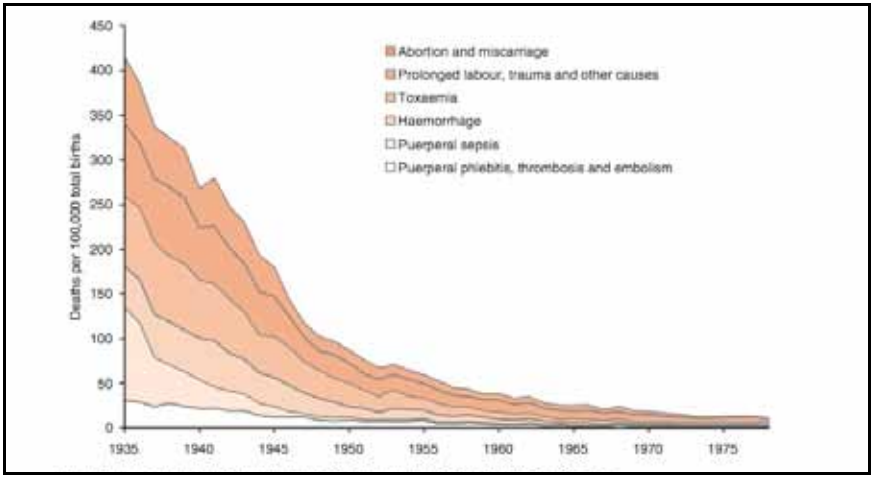

Fig. 2 Maternal mortality by underlying cause: England and Wales 1935-1978. Source: General Register Office, and OPCS mortality statistics reproduced in *Birth Counts*. Table A10.1.3.[8]

This paper begins by reviewing our evolutionary predisposition to maternal haemorrhage and summarising historical methods employed in the management of the condition before seeking to explain why mortality rates remained elevated for such a protracted period in the United Kingdom and attempting to untangle the strands of scientific and medical endeavour that finally, perhaps serendipitously, combined to save so many mothers lives from haemorrhage from 1935 onwards.

Placental physiology and the risk of maternal haemorrhage

When compared with the multi-layered epi- and endothelialchorial placentas of other mammalian species, the highly-invasive, two layered haemochorial placenta with which *homo sapiens sapiens* evolved 200,000 years ago predisposes the female of our species to massive haemorrhage.[13] Capable of abnormal implantation, morbid adherence and premature abruption, the complete detachment of a normal placenta at term gestation leaves a 20cm diameter wound on the wall of a viscus to which blood flow can exceed half-a-litre per minute. Records demonstrating our susceptibility to maternal haemorrhage can be traced back for thousands of years. These suggest that the underlying causes of haemorrhage have remained relatively constant throughout history and as the following description from 1844 demonstrates, have been understood for centuries: [14]

'Uterine haemorrhage is usually divided into that which takes place in the early months, and that which takes place in the latter months of gestation. The latter class is again subdivided into what are called accidental haemorrhages, unavoidable haemorrhages, and the after haemorrhages. Accidental haemorrhages are those which arise from accidental causes; unavoidable haemorrhages are those which arise from a particular location of the placenta in the immediate neighbourhood of the *os uteri*; and the after haemorrhages are those which take place after the delivery of the child, and may occur either before or after the expulsion of the placenta.'

Historical perspectives on the management of maternal haemorrhage

The use of agents to promote uterine contraction to either induce labour or abate postpartum bleeding can be traced as far back as ancient Egypt where juniper berries, hemp in honey, celery in milk and fly excrement were utilised for such purposes.[16] In the 1st century AD Dioscorides suggested that the cyclamen plant possessed similar properties and Soranus of Ephesus wrote that mothers suffering haemorrhage should 'lie down in a relatively small, dark and moderately cool room upon a hard bed…raised a little at the foot…and the

extremities should be gripped tightly and bandaged, for the compression resulting from this squeezing is transmitted all the way to the affected part.'[16]
Early obstetric strategies for the management of antepartum haemorrhage depended on the state of the cervix and gestational age of the foetus. Whilst minor bleeding with a closed *os* might be treated with vaginal packing or cervical plugging, major bleeding necessitated cervical dilatation, artificial rupture of the membranes and delivery of the foetus by a variety of means.[1, 17] In cases with an open cervix most obstetricians advocated membrane rupture, though for some women with placenta praevia, the technique of plugging with a half-breech - in which the obstetrician passed a finger through the low lying placenta before internally rotating the baby and bringing a leg down through it into the vagina - might be employed.[18]

Strategies for postpartum haemorrhage included manual removal of the placenta, application of abdominal compression devices, insufflation of the bladder with saline and the administration of opioids and alcohol.[1 17 19] Some authors recommended emetic agents, noting vomiting to be 'often beneficial.'[1]
In 1752 the Scottish obstetrician William Smellie noted that postpartum bleeding was 'occasioned by everything that hinders the emptied uterus from contracting…in these cases such things must be used as will assist the contractile powers of the uterus.'[19] Whilst bimanual massage, cold water and ice were commonly employed for such means,[20] compounds such cinnamon, borax, cinchona, strychnine, turpentine and perchloride of iron were also advocated.[1 17 19] Fortunately there existed one agent which was to prove a most effective oxytocic – ergot of rye.

Oxytocic medications

Ergot
Following infection with the fungus *Claviceps purpurea*, cereal grasses develop characteristic black spurs, the ingestion of which may precipitate peripheral vasospasm and convulsions. Epidemics of Ergotism have occurred in Northern Europe for more than 1000 years following serious fungal infestations of the rye crop.[21] During such episodes it was observed that pregnant women were prone to miscarriage and as early as 1582, German midwives utilised a crude preparation of ergot prepared by grinding the fungus into a powder to augment uterine contractions in cases of non-progressive labour – *pulvis ad partum*.[15]
From 1800 onwards the use of ergot became more widespread, both for augmentation of labour and in the management of postpartum haemorrhage - for which it was deemed to 'always prove an effectual preventative.'[22] However as experience with the drug widened, it became clear that it could precipitate rapid, unpredictable and sustained uterine contractions resulting in cases of stillbirth

and maternal death. Writing in 1822 one author was to rename the powder '*pulvis ad mortem*.'[16] As a result the use of ergot for the induction of labour fell out of practice though its employment in the management of postpartum haemorrhage continued to be advocated.[22-24] In the early 1900s the Scottish obstetrician Berry Hart recommended its routine use with delivery of the baby's head, stating that 'one should not wait for haemorrhage before injecting it'[24]

Around the same time, Henry Hallett Dale and George Barger of the Wellcome Physiological Laboratories in London began analysing the complex chemical structure of ergot– opening what Dale would later describe as 'the Pandora's box of pharmacology'. [25] The pair succeeded in isolating an impure alkaloid with oxytocic properties (ergotoxine) and in 1918 researchers in Switzerland discovered another oxytocic alkaloid – ergotamine.[26] Both agents underwent clinical trials at University College Hospital, London in 1932 overseen by John Chassar Moir, First Assistant in the Department of Obstetrics and Gynaecology. Utilising a kymograph with minute markings to record changes in intrauterine pressure measured by a small balloon attached to a manometer, Moir recorded the strength and duration of contractions in relation to breastfeeding and the two alkaloids. Of note, both ergotoxine and ergotamine were slow to take effect, suggesting the rapid and sustained contractions seen with crude preparations of ergot might be due to an as yet undiscovered alkaloid.[25] [26] Moir and Dale subsequently enlisted further assistance in the form of biochemist Harold Ward Dudley, who in 1935, a matter of months before his untimely death aged 47, succeeded in isolating a pure alkaloid with strong oxytocic properties and a rapid onset of action – ergometrine.[27] [28] The drug was rapidly employed in clinical practice and within a decade studies demonstrated significant reductions in blood loss and the incidence of postpartum haemorrhage when utilised routinely during the third stage of labour.[29] [30]

Posterior Pituitary Extract and Prostaglandins

In addition to his work with ergot, Dale investigated physiological responses mediated by the pituitary gland.[31] In 1909 he demonstrated that infundibular extracts possessed oxytocic effects and later that year, William Blair Bell, Assistant Gynaecologist at the Royal Infirmary, Liverpool became the first to utilise posterior pituitary extract in clinical practice, recording its beneficial effects in three cases of postpartum haemorrhage due to uterine atony.[32] Though Bell went on to comment that 'I have for some time carried it in my obstetric bag, and would not willingly be without it',[32] subsequent cases were accompanied by significant vasopressor side effects, and like ergot a century earlier, episodes of maternal and foetal death.[16] In 1928 American researchers demonstrated that posterior pituitary extract comprised two fractions - oxytocin and vasopressin[33] and in 1953 Vincent Du Vigneaud at Cornell University

formally identified the chemical structures of both compounds.[34] Oxytocin was subsequently synthesised and employed widely in obstetric practice for both the prevention and treatment of postpartum haemorrhage. Soon after, Sune Bergstrom and colleagues successfully identified the prostaglandins[35] and by 1968, 15-methyl-prostaglandin F2α, better known as carboprost, was introduced into clinical practice.[16]

Today, postpartum bleeding due to uterine atony remains the leading cause of massive obstetric haemorrhage in the UK. Ergometrine, Syntocinon and carboprost remain in clinical use and their introduction played a significant role in reducing maternal deaths due to haemorrhage in this country. These drugs however provide no assistance in the management of severe hypovolaemia and whilst we now take for granted the ready availability of packed red cells, intravenous fluids and equipment with which to administer them, history reveals that this has only recently become the case.

Transfusion of blood and fluids

Following William Harvey's theory of the circulation in the early 1600s, Richard Lower performed the first animal-to-animal transfusion in 1665. Two years later Jean-Baptiste Denis conducted the first animal-to-human transfusions as part of a series of controversial experiments aiming to cure or ameliorate psychiatric disorders.[36] When Denis' third patient died he was accused of murder and though later exonerated, transfusion was banned throughout much of Europe.[37] It would be almost 140 years until a 28-year old lecturer in obstetrics and physiology at Guy's Hospital, would re-awaken interest in the technique – James Blundell.

James Blundell

Born in London on 27th December 1790, Blundell graduated from Edinburgh University with an MD in 1813.[38] Four years later he was called to see a woman exsanguinating from obstetric haemorrhage and later recorded that 'though the discharge had stopped before my arrival, her fate was decided, and notwithstanding every exertion of the medical attendants, she died in the course of two hours. Reflecting afterwards on the melancholy scene…I could not forbear considering, that the patient might very probably have been saved by transfusion.'[39]

The following year Blundell presented a series of experiments to the Medical and Chirurgical Society of London in which he demonstrated that exsanguinated dogs could be revived by the immediate transfusion of either arterial or venous blood from another dog and highlighted the dangers of cross-species

transfusion, stating that 'there seems reason for surmising that the blood from one class of animals cannot be substituted for that of another without impunity.'[39]

On 22nd December 1818 with the help of surgeon Henry Cline, Blundell carried out the first human-to-human transfusion on a terminally ill patient with 'scirrhosity of the pylorus'. [40] Though his condition improved for a short time, the patient died 56 hours afterwards. Some seven years later Blundell performed the first successful human-to-human transfusion when called to the bedside of another woman dying from obstetric haemorrhage. The patient received eight ounces of blood from Blundell's assistant over the course of three hours after which she 'expressed herself very strongly on the benefits resulting from the injection of the blood.[36] Utilising novel apparatus such as his Impellor[41] (Figure 3) and Gravitiator[42] (Figure 4), Blundell transfused ten patients *in extremis* between 1818 and 1829. Four cases were successful,

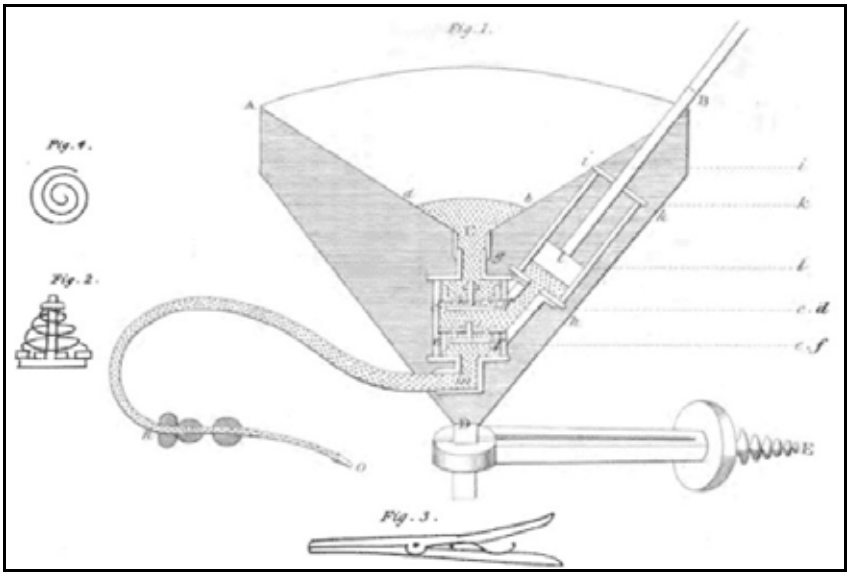

Fig. 3 Diagram of Blundell's Impellor device for blood transfusion.[41]

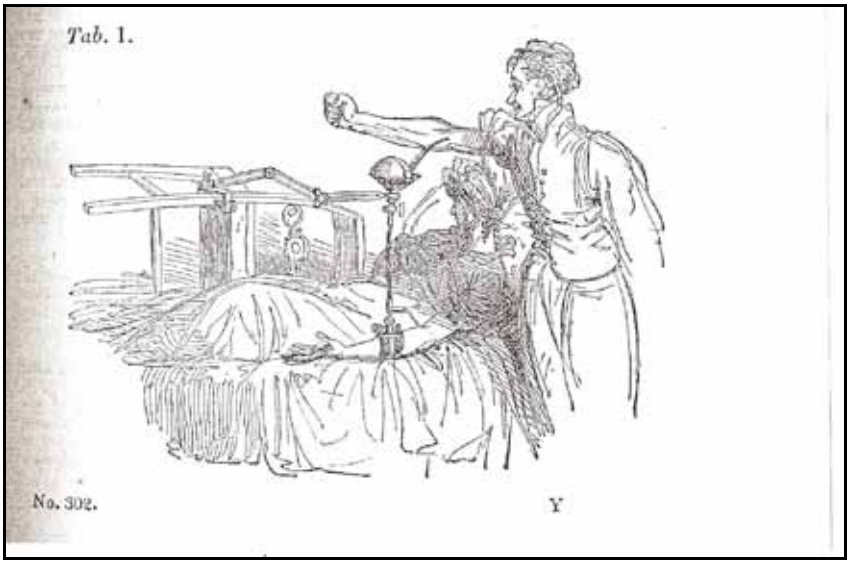

Fig. 4 Illustration of Blundell's Gravitator device for blood transfusion.[42]

including three of post-partum haemorrhage. Whilst other obstetricians such as Waller, Doubleday and Aveling followed suit, transfusion continued to generate considerable controversy amongst the medical community.[36] Of even greater concern to its protagonists was the prevention of coagulation, which proved a significant and temporarily insurmountable obstacle. Whilst some utilised defibrination, in which blood was collected into an open vessel and stirred to promote clotting and others sought in vain for a suitable anticoagulant, [43] interest in blood transfusion waned during the final quarter of the 19th century.

Alternatives to human blood

During this period a number of alternatives to human blood were suggested. Cross-species transfusion was briefly revisited and there was a short spell of enthusiasm for the transfusion of milk – a technique that had been first attempted by James Bovell and Edwin Hodder in Toronto in 1854.[44] Both however were to prove inferior when compared with another emerging solution – saline. Intravenous crystalloids had been first used during the cholera epidemics sweeping Europe in the early 1830s but had failed to gain medical acceptance.[45] Now their use flourished and in time commercial solutions became available.[46] By the 1930s glucose saline or gum infusions were commonly utilised in the management of obstetric haemorrhage.[47]

Further advances in blood transfusion

The discovery of blood groups[48] and sodium citrate[49] in the early 1900s kick-started the modern era of blood transfusion. For the first time donation and transfusion could be separated in time and place and safety was radically improved by cross matching. Following the lead of Percy Lane Oliver who established the first panel of blood donors who could be contacted at short notice in 1921, donor lists were established throughout the UK and by the late 1930s blood banks emerged.[50] Despite these advances, transfusion remained underutilised in obstetric haemorrhage. In 1939, John Stallworthy, First Assistant in the Nuffield Department of Obstetrics and Gynaecology highlighted the fact that one woman died every day in England and Wales from haemorrhage in childbirth and noted that it was surprising 'to find how seldom an attempt was made in these cases to restore the blood loss even in circumstances which might be considered ideal from the point of view of treatment and facilities.'[51] Stallworthy stated that many resident medical officers were not 'transfusion minded' and regarded the giving of blood as a 'difficult and laborious procedure.' There is also evidence that some remained opposed to blood transfusion. In a 1938 paper discussing the management of ectopic pregnancy one author stated that 'patients have been killed by transfusion in this condition and I should like to utter a warning against indiscriminate blood transfusions and emphasise the value of submammary and rectal saline, glucose and coffee.'[51]

During the 1940s and 1950s advances in plastics manufacturing began to impact on the field of blood transfusion. For decades intravenous access had been obtained via surgical cut down onto a vein or the percutaneous insertion of a re-usable steel needle.[47, 52] Though reliable, surgical cut downs were time consuming and usually meant sacrificing the vessel after transfusion, whilst steel needles required hand sharpening prior to use, were at risk of migration through the vein wall and required careful immobilisation.[52] In 1950 David Massa, chief anesthesiology resident at the Mayo Clinic produced the first modern plastic cannula[52] - a device which would revolutionise intravenous therapy forever – and soon after, plastic blood bags and giving sets replaced the breakable glass bottles and reusable rubber sets which had been introduced in the 1930s.[50]

Like oxytocic medications, transfusions of blood and intravenous fluids have saved countless mothers lives. To be truly beneficial however, mothers must have rapid access to these treatments. The development of effective transfusion methodologies was not enough to improve maternal mortality alone; significant

changes in the logistics and distribution of maternity services, as well as improvements in the training of those delivering them, would be necessary.

Maternity services in England and Wales

During the 1800s more than 95% of woman gave birth at home under the supervision of a general practitioner or midwife.[53] There existed few hospital specialists and though the concept of the Lying-in hospital was adopted in the mid 19th century, by 1904 there were just 38 such hospitals throughout the country.[54] Despite their intention to provide a safer place for delivery and postnatal care, these institutions were plagued by puerperal sepsis and in many cases, the risk of death far outweighed any potential benefit to the mother. Though the introduction of antisepsis and asepsis went some way to ameliorating mortality in these hospitals, it would not be until the introduction of antibiotics in the late 1930s and early 1940s that the situation improved significantly.[53] During this period obstetricians became more adept and proficient in Caesarean section – a procedure that had previously carried a fearful mortality – and their training was better regulated under the auspices of the newly established Royal College of Obstetricians and Gynaecologists.[54] For the first time in history it was safer for women at risk of obstetric haemorrhage to be confined to hospital.[55] Following the introduction of the National Health Service in 1948 the number of obstetricians and maternity beds increased across the country and along with it the number of women delivered in hospital as criteria for admission were expanded.[53] By 1955 more than half of births in Britain took place in hospital and figures continued to increase during the 1960s[56] (Figure 5).

Obstetric flying squads

For those mothers remaining in the community, emergency obstetric flying squads were championed by E Farquhar Murray, Honorary Assistant Gynaecologist at the Royal Infirmary Newcastle-upon-Tyne, who in 1929 commented that 'the profession cannot allow the continued high morbidity and mortality rate to become commonplace.'[57] The first operational squad was formed in Bellshill, Lanarkshire in 1933 where the team comprised two doctors and two nurses travelling to the patient in a motor car with a 'complete outfit for the carrying out of a blood transfusion or intravenous saline.'[58] The squad had access to twenty-five universal blood donors who could be 'brought with the minimum of delay'[58] if the need for transfusion arose.

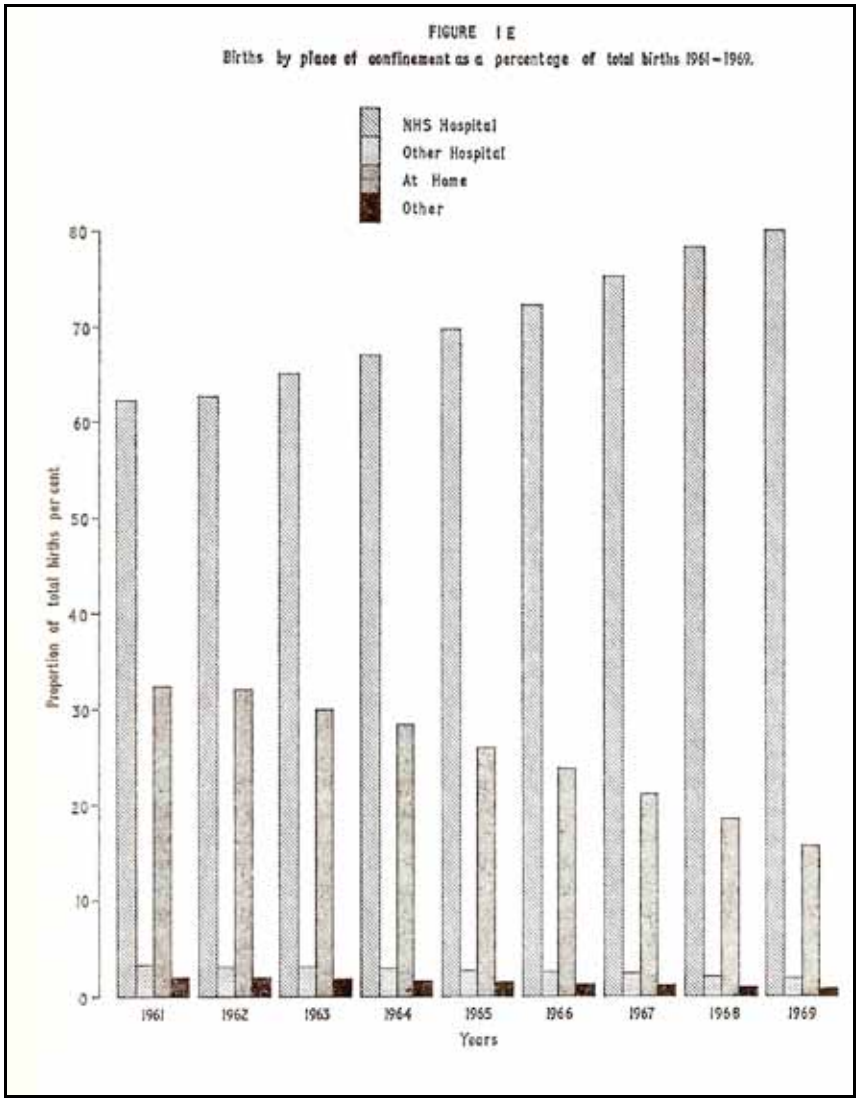

Fig. 5 Births by place of confinement as a percentage of total births in England and Wales 1961-1969.[56]

The flying squads kept pace with transfusion technology and by the late 1940s the Birmingham unit carried 3 pints of Group O Rhesus negative blood, 3 pints Group O Rhesus positive blood, 2 pints dried plasma and 1 pint of glucose saline.[58] Whilst teams answered many hundreds of calls in their early years of service, by the 1970s their value was questioned as numbers of home births dwindled.[59] A survey of 180 squads in 1980 found that more than half answered 10 or less calls per year and most were subsequently disbanded.[60]

Recent interventions in the United Kingdom

By the mid 1970s maternal mortality ratios due to haemorrhage were a fraction of those in 1930 (Figure 2) and after 40 years, the major battle against haemorrhage in Great Britain was almost won. More recently further reductions in mortality rates have occurred as a result of continuous confidential death audit, the development of novel medical, surgical, radiological and haematological interventions, [61] as well as closer multidisciplinary working practices and the implementation of national guidelines [62] and local protocols

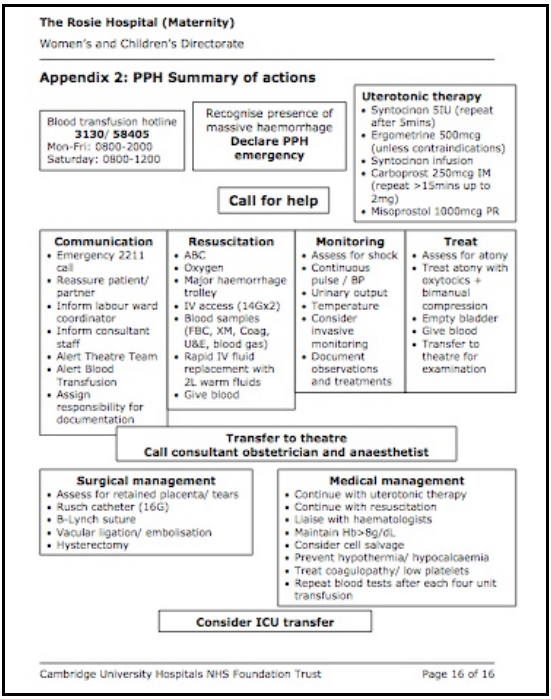

Fig. 6 Local protocol for the management of postpartum haemorrhage. Cambridge University Hospitals NHS Foundation Trust, 2010.

(Figure 6). Anaesthetists have established a key role in the management of massive haemorrhage, providing expertise in fluid management, transfusion therapy and care of the critically ill patient.[61] Between 2006 and 2008 haemorrhage fell to the sixth leading cause of direct maternal death in the UK.[5] Indeed with so few deaths occurring, mortality has become a very crude tool for assessing the quality of care received by women with haemorrhage and contemporary research is focused on elucidating the incidence of 'near-miss' events and cases of significant maternal morbidity.[5]

Haemorrhage in the developing world

Sadly the picture in the developing world is very different. Across the globe one woman dies of a pregnancy-related complication every minute of every day – a quarter or more of whom die from haemorrhage and its complications.[54] In many developing countries logistical issues pose huge barriers to progress. Many women face journeys lasting hours or even days to reach basic trained assistants, let alone facilities with surgical equipment, oxytocic drugs, intravenous fluids and blood. Recent strategies for reducing maternal mortality include the orally administered prostaglandin E_1 analogue misoprostol, and the use of non-pneumatic anti-shock garments (NASG). [13] Developed in the 1990s, misoprostol is cheap and effective when administered orally[63] or rectally,[64] can be stored at room temperature and has a long shelf life. NASGs comprise a lightweight, re-usable lower body suit made up of articulated neoprene segments that when closed with Velcro, applies 20-40mmHg circumferential counter-pressure to the lower body.[65] They have shown promise in pilot studies conducted in Pakistan[65] and Egypt[66].

Conclusion

Today haemorrhage remains an ever-present threat to maternal wellbeing in all corners of the globe. Though mortality due to the condition has been all but conquered in this country, it remains a very real problem in the developing world. More than 140 years since their publication, the words of Robert Barnes remain a poignant call to arms.

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ANAESTHESIA FOR DUMMIES –
A History of Simulation Training in Anaesthesia

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Simulators are designed to generate specific conditions or characteristics of real processes or machines[1]. In medicine they may be simple rubber mannequins for teaching venepuncture, or advanced models replicating the challenges of surgery or resuscitation. In this era of competency based training they are useful for teaching, training and appraisal, all of which utilise their abilites to realistically and repeatedly model complex scenarios.

Addressing medical errors by simulation

In the United States, medical errors are thought to result in up to 98,000 deaths per year[2], with many critical events being attributed to poor communication and lack of experience. There is some evidence that simulation training leads to better outcomes for patients, with improvements in medical knowledge and comfort during procedures[3]. Many specialities have embraced simulation training: surgeons use laparoscopic simulators, respiratory physicians learn bronchoscopy, and resuscitation teams use CPR simulation. Anaesthesia, however, was the first medical specialty to embrace simulation. Critical life-threatening events are rare but have potentially disastrous consequences and simulators help in training for these without risk to the patient. There are few other specialties where recognition of problems and acting to remedy them are so time critical. With regards to the general public, relatively simple simulation is used to teach Cardiopulmonary Resuscitation. Whilst there are no exhaustive studies on how effective this intervention is in terms of saving lives, anecdote suggests that people are more likely to 'have a go' if they have been exposed to mannequin training.

Despite the advantages outlined above, simulation training has its critics. Commonly cited problems include 'the 'patients' don't look real', and 'it (the simulator) makes you look at the monitor rather than the patient'. Simulator scenarios do not always reflect the constraints of clinical practice and are often expensive to run and maintain[4].

Early use of simulators

Simulators were first used in the aviation industry, with Ed Link from Binghamton, New York, developing 'The Link Simulator' in 1929[5]. It was initially developed as a way of teaching pilots to fly by instrument. It displayed

realistic data and responded to the pilot's manipulation of the controls. The simulator garnered popularity during World War II and nearly every combatant nation invested in the technology. In the post-war era, the demand for a simulator capable of training large numbers of people in short periods of time diminished and further simulation development was felt unnecessary.

First simulator in anaesthesia

The first true anaesthetic simulator was not built until 1969 by Denson and Abrahamson[6]. Named 'SIM1', it was developed as a joint venture between the University of California Medical School and Aerojet General Corporation. It consisted of a mannequin that was intubatable, with an upper torso and arms. It was capable of simulating respiration, coughing and blinking, all driven by a series of valves and pumps. It also had reactive pupils. Unfortunately, despite its popularity in some academic circles, it was vastly expensive to use and maintain, and development was therefore abandoned due to cost constraints.

Impact of computer technology

There was then an extended hiatus in further development until the 1980s when computer technology began to play an important part in medicine. Simulators moved away from the purely mechanical towards the integration of newly developed computer processing and programming. Pioneering models included the 'SLEEPER' and 'BODY' systems which were entirely computer based. Developed in San Diego by Smith and associates[7], 'SLEEPER' was derived from work modelling the cardiopulmonary system and drug distribution. These models were combined with a graphical representation of the patient and physiological data on a computer screen, allowing the student to react to changes. 'SLEEPER' evolved into 'BODY' when the developers combined forces with the electronics company GE Marquette. 'BODY' was more flexible in the scenarios available to participants and was the first simulator to make use of bona fide anaesthetic monitors rather than standard computer screens. Both SLEEPER and BODY were used mainly to teach physiology and pharmacology and were touted as inexpensive and flexible to use.

NASA – Crew Resource Management

Following their success, screen based simulation moved away from teaching physiological and pharmacological principles and into training in crisis management. The 'Anesthesia Simulator Consultant' was developed from the SLEEPER/BODY simulators, with inital work being done by Howard Schwid, a fellow at the University of California, San Diego[8].

In 1978, the National Aeronautics and Space Administration (NASA) took up the study of factors behind aviation accidents. It found that more than 70% of accidents were the result of human error[9], rather than mechanical failure and,

working with the aviation industry, began to develop systems to combat such errors. In the 1980s this culminated in the launch of 'Crew Resource Management (CRM)'[10] in conjunction with Gaba and DeAnda at Stanford University. CRM was initially developed to aid pilots' understanding of emergency situations, and the human factors involved in managing these[11]. It took into account the central tenets of Situational Awareness, Self-awareness, Planning, Decision Making, Communication, Leadership, Emotional Climate, Stress Management and Assertiveness Training[12]. It helped teams to realise that they underestimated stress and fatigue and often overestimated their abilities. By reviewing their own performance, they were helped to explore the feelings of invincibility that were often encountered at critical moments. CRM was the first system of its kind that allowed a team to work together in such a holistic way and is now a compulsory part of training for airlines in 185 countries[13]. It was not long before other environments saw the benefits of this approach to team training. Other settings adopting the methods included military establishments, civil maritime organisations, nuclear power plants and offshore oil facilities.

Comprehensive Anesthesia Simulation Environment (CASE)

The medical establishment also became interested in the Crew Resource Management model. Anaesthesia was still at the forefront of such medical developments and research was earnest, culminating in the development of the full scale simulator model 'Comprehensive Anesthesia Simulation Environment (CASE)'. CASE was developed with similar goals to CRM in mind.

The CASE system was the first to provide an immersive experience in anaesthesia simulation. It consisted of a mannequin with a thorax and a trachea that allowed tracheal and oesophageal intubation, as well as the potential for regurgitation of gastric contents. All standard monitoring equipment was provided, including an ECG to generate arrhythmias in response to particular interventions. Each simulation was run to a script which differed depending on the scenario, with flexibility provided by overall control being taken by a 'simulation director'. These initial versions of CASE used state of the art technology but still had significant limitations. In particular the mannequins did not move or provide convincing clinical signs[14]. At times the clinical signs demonstrated proved positively confusing. Like CRM, CASE was designed to provide an immersive operating environment. It attempted to simulate the mechanics of working with a patient and colleagues in the same way that CRM was designed to help crews work together.

As technology progressed in the 1990s, European interest heightened and the 'Team Oriented Medical Simulations (TOMS) system was developed by Helmreich and Schafer at the University of Basel[15]. The main emphasis of this system was the concentration on the operating team as a whole, rather than the

anaesthetist as an individual. All routine peri-operative care was performed as standard in the simulation and animal organs were often used to provide realistic laparoscopic views.

As the 21st century has progressed, technology has continued to evolve. Whilst relatively 'low-fidelity' simulators are still in use (e.g. synthetic arms for teaching venepuncture), increasingly complex simulators are becoming more widespread. Dedicated centres including the Stirling Simulator Centre (see Figure) provide staff from all walks of healthcare with the opportunity to hone their skills in a realistic environment and receive feedback. Increasingly junior anaesthetic trainees are expected to complete a 'Skills and Drills' course, dealing with life-threatening scenarios including laryngospasm, 'Can't Intubate, Can't Ventilate' drills and obstetric emergencies. Although no replacement for real, 'on the job' training, such simulation exercises help to consolidate knowledge and skills, whilst minimising risk to patients and staff.

The Stirling Simulator Centre (Courtesy of Dr Nikki Maran, Director, Scottish Clinical Simulation Centre)

New technology

The future of simulation training will likely continue apace with the advancement of technology. At present simulation remains expensive, with a high-end commercial simulator often costing tens of thousands of dollars[16]. Given that there is little definitive evidence for the effectiveness of simulator training, these costs can be difficult to justify, especially in the current financial climate.

New technologies already being used in some areas include 'Haptic technology'. This is a type of tactile feedback which relies on a user's sense of touch, working by applying forces and motions to the user[17]. Devices incorporating such systems are currently being used by surgeons practising minimally invasive procedures[18]. In anaesthesia, Haptic technology is currently being trialled in the field of regional anaesthesia[19]. Other advancements in simulator training may take place in specialist medical fields, with those involved in battlefield anaesthesia, hyperbaric medicine and field medics treating the victims of chemical warfare showing interest in simulator techniques.

Compared with other fields, simulation training in anaesthesia is still in its infancy. How it develops will depend on the continued and prolific education and training of current and future generations of anaesthetists.

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CHLOROFORM FOR THE KING? *
Joseph Clover, Henry Thompson and the King of the Belgians

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In 1830, Belgium declared independence from the Netherlands and the following year, on the 21st July, Leopold George Christian Frederick of the House of Saxe-Coburg-Saalfield was sworn in as the new King of the Belgians. His reign was mostly peaceful and he seems to have enjoyed great popularity. His family had widespread influence throughout Europe and particularly in Britain where his niece, Victoria, became Queen. It was Leopold who engineered her successful marriage to his nephew, Prince Albert and he was of great diplomatic and emotional assistance to her, especially after Albert's death.(1)

Leopold was in England when his illness began(2). It was 1862, he was 71 years old and he was visiting Queen Victoria at her residence in Osbourne. For four years he had suffered with intermittent, low grade bladder symptoms, especially in cold weather, but nothing serious enough to require treatment. On this occasion the symptoms persisted and the Queen suggested that, on his way back to Belgium, he should stop at Buckingham Palace and seek assistance from her doctors. Sir James Clark, her Majesty's physician, was summoned to the palace and he consulted Sir Benjamin Brodie, then surgeon to the Queen, but quite elderly. Brodie diagnosed bladder stones but he did not want to operate himself. He felt immediate intervention was not required and they would be better managed in Belgium. Clark suggested that they discuss the matter with Henry Thompson, then the assistant surgeon at University College Hospital (UCH), who had a special interest in urological surgery. After much discussion between these eminent men, King Leopold was advised to return to his home in Laeken, Belgium and seek the advice of Jean Civiale, the most experienced urologist in Europe and, according to Henry Thompson "...not only skilful but kind."(2)

Civiale had been Thompson's teacher and had revolutionised surgery for bladder stones. Bladder stones were an ancient problem causing immense distress to patients; more common in males and consisting largely of calcium deposits, they were especially seen in areas with a high concentration of calcium in the ground water.(3) The stones were seldom innocuous, once they reached a certain size they became unendurable - urination became agonizing, lying down

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impossible and life intolerable. But generally patients would have to reach this point before they would subject themselves to the operation of lithotomy.

Operations for this condition were first described by Celsus in the first century A.D. (4) He carefully described positioning the patient: "two strong men are seated on stools, side by side, and both the stools and the adjacent legs of the men are lashed together"(5). The patient was then seated on this impromptu operating table, one leg held by each man and "...the patient pulls upon his own hams...they press downwards with their chest upon the patient's shoulders." The stone was then manipulated with the surgeon's fingers in the rectum into the neck of the bladder. Once secured there, an incision was made in the perineum and the stone extracted, sometimes with the use of a scoop. If the patient survived this ordeal, in order to prevent bleeding and inflammation the patient was seated in a "bath of strong vinegar to which a little salt has been added". (5)

This procedure remained essentially unchanged for the next 1500 years.(4, 6) Early in the sixteenth century, a new method was devised by Mariano Santo of Barletta which involved introducing instruments into the urethra and incising the urethra anterior to the bladder neck. This operation reportedly caused less damage to the prostate. A few years later Jacques de Beaulieu developed the technique of lateral cystostomy, a variation of the trans-perineal operation which he practiced with speed and efficiency. But, regardless of the technique used, the operation remained a painful, disfiguring one, often complicated by sepsis, fistulae, incontinence and death.

In 1813, Franz von Gruithuisen, a Bavarian physician proposed a plan for seizing a stone through the urethra and reducing it to powder with a drill.(7) His rather barbaric instruments were prototypes only and were never used clinically. In Paris, Jean Civiale pursued this idea and designed his first instruments in 1817. Other such as Leroy d'Etoilles and Amussat also produced instruments but the first successful use of the technique was by Civiale before the committee of the French Academy in 1824. He practised this technique, known as lithotrity, extensively from then on.

And so it was Civiale who was suggested as the most appropriate man to treat the King of the Belgians. Leopold returned to his palace in Laeken and Civiale conducted his first bladder examination in March 1862.(2) He found nothing. Three days later he repeated the examination and found a small fragment which he crushed causing a great deal of bleeding. In accordance with the pattern established for this surgery, Civiale then conducted several more "sittings" and finally, on the 15th April, believed he had removed the entire stone as the King was now free of pain.

Two weeks later the pain returned and Civiale came back from Paris. Early in May a large stone was discovered and crushed with a great deal of bleeding and pain, and further procedures followed in an attempt to empty the bladder of the debris. Leopold became increasingly ill and on June 4th it was believed that he would die of pneumonia. Despite his recovery from the chest infection he remained extremely unwell with a chronic urinary tract infection and Civiale refused to perform any further surgery, ordering daily bladder washouts and morphine. By October the King was ready for another opinion.

This time advice was sought from Germany from Bernhard von Langenbeck, Director of the Clinical Institute for Surgery and Ophthalmology at the Charité in Berlin. He was summoned to Laeken and performed his first operation on the 29th December, removing a small piece of calculus. Over the next three months he returned to the palace for a week at a time making explorations of the bladder with no further sign of calculus. By the end of March he had been dismissed.

Sir James Clark, the Queen's physician, had followed the progress of this illness and communicated all the developments to Henry Thompson. Leopold's condition was becoming unendurable; for weeks, unable to lie down, he had been sleeping standing with his head resting on a pillow fixed to the wall, and his weight supported by two vertical mattresses under his armpits. His family and physicians were becoming desperate. They wanted another opinion and, on this occasion, especially wanted to know if anaesthesia would be of assistance.

Two opinions were sought, from Henry Thompson at UCH and Sir William Fergusson at King's College Hospital, and the patient remained anonymous although it must have been clear to both men who he was. The letter they were sent read as follows:

> " A gentleman aged 73 has a calculus indefinitely said to be at the neck of the bladder - part has been removed by lithotrity - the operation cannot be renewed nor even a sound introduced for the perfect examination of the bladder in consequence of the severe suffering any instrumental manipulation occasions.
> Your opinion is desired as to the propriety of performing lithotrity while the patient is under the influence of chloroform. It is especially desired to know if you have yourself performed lithotrity on a patient insensible from chloroform - and if the difficulty or dangers of the operation are increased by the insensibility.
> It is also desired to know if your own experience leads you to consider the administration of chloroform more dangerous in any special diseased state eg. disease of the heart, of the lungs, the brain, kidneys. etc."(2)

Thompson's reply was that he saw no objection to an exploration under chloroform, providing it were given by an experienced administrator, such as Mr Clover, who "indeed was generally believed at that day to have no living equal". (2)

Two weeks later, on the 19th April, Thompson was instructed to visit Bagshot Park without delay to confer with Sir James Clark and Dr Jenner. There he was informed that their advice was that he should proceed to Brussels and perform whatever operation was necessary "...of crushing or even cutting if necessary to terminate the long series of painful and dangerous disorders which had attended the case hitherto." Thompson also noted "At the same time I begged permission to stipulate for the presence of Mr Clover at Brussels should chloroform be required. All this was ultimately agreed to..." (2)

This statement in Thompson's biography has led to a widespread belief that Clover administered chloroform to the King of the Belgians for the operation that ultimately relieved him of his stones and his suffering. (8-10) But a letter from Henry Thompson to Joseph Clover, found amongst Clover's papers in the British Columbia University of Vancouver raises some questions about this event.

The letter is dated the 2nd June 1863 and begins:
Au palais du Roi
Laeken
Tuesday June 2. 1863

My dear Clover

I have not written you before because I could make no diagnosis. I have presumed that my silence w^{d} intimate that I had nothing that I could say & that Mrs Thompson would tell you why.
I sounded HM yesterday. I found hypertrophied prostate - considerable - contracted bladder. 10 inches from ext: meatus to neck of bladder.
On entering it on left side (his left) I felt a resisting body. I struck it sharply & got a dull thud for my pains. After exploring I struck it again several time & got an audible sound (to bystanders) like a stone wrapped up in chamois leather.

That is all. Then the King stood up, made water, less than usual pain & not a trace of blood.
I passed a gum catheter & found about 3 rims, thick ammoniaed urine behind.
I told him there were three conditions
(a) Hyp° prostate (b) inability of bladder to empty itself (c) a hard body of wh^{h} I would not say more until another examination.

I advised gum catheter 3 times a day & washing out with small quantity of water once after each time.

To sound again in 5 or 6 days (11)

It is clear from this letter that Thompson had performed the first examination of the bladder without chloroform on the 2nd June. He stated that he planned to sound the bladder again in five or six days and that: "on the first indication for chloroform we shall depend on you but I have seen no signs of it at present. But it is impossible to tell. If I were to find any sized stone at all above small or medium I shd incline to cut rather than to crush and then we shall have want of it."

The definitive operation was performed four days later on the 6th June and it is not immediately clear from Thompson's account whether any chloroform was given. After the operation he wrote:

"We saw the King at 9. I injected the bladder..." A description follows of the procedure to crush and remove the stone, then "...my blades were full, I screwed home tight and withdrew them full with a good quantity of phosphatic debris. After waiting 15 minutes and chatting with His Majesty about the Warrior (and) the American rifled guns I injected again at his wish..." (2)

There is no mention of chloroform or of Clover and the patient is clearly awake and conversant. This does not necessarily preclude chloroform administration, it could have given intermittently, essentially as an analgesic, allowing him to regain consciousness in between administrations.

But in the four days between Thompson's letter to Clover and the definitive operation what would have happened to make them believe chloroform was necessary? There is no reason to suspect that there was any change in the King's condition and also no way to explain how Clover could have reached Laeken in time if he was in London. The letter dated the 2nd June is not addressed so it is not clear whether it was sent to Clover in London or to some unknown location in Belgium. Thompson states that Clover should gain further information from Mrs Thompson who he is writing to every day. Is it possible that she was also in Brussels having travelled across the channel with her husband?

Buried in his biography we find the answer to this question. Henry Thompson was a close friend of the novelist, William Makepeace Thackeray and, writing about his friendship with Thackeray, he remarks on his time in Laeken

"Thackeray, as many of my friends did, called every few days to hear news of me direct from my wife - for the fact of my visit to the King and its object were frequently named in the medical and other journals..."(2) So Mrs Thompson was in London, and therefore, so was Clover. The letter was written on the 2nd June and would not have reached Clover until the 3rd. For another letter to have reached him in time for him to get to Laeken for the operation on the 6th it would have had to have followed close on the heels of the first -and there is nothing to suggest that there was any reason to send such a letter.

We must conclude that chloroform was not given to the long suffering King of the Belgians. But why not? Thompson states in his letter to Clover that he would require chloroform if he were to perform lithotomy but he clearly did not think it was required for the transurethral surgery, despite the original consultation letter specifically requesting information about anaesthesia.

By 1863, anaesthesia was used regularly for many procedures – but it was still not common practice to use it for lithotrity. Many operators, it seems, were anxious to have a cooperative patient so that they could tell if they were seizing a stone or the bladder wall. Thompson was scathing about this practice "…the operator's ability to ascertain, by his patient's expression of suffering, when the coats of the bladder are seized instead of the stone! Slender, indeed, must be the chance of the patient's recovery, whose consciousness is needed to impart such information to the surgeon"

Thompson had other reasons for avoiding anaesthesia "But the pain arising from Lithotrity, properly performed, is really not much… [If] it's slightest movement aggravates the pain, and any attempt to proceed evidently causes him much suffering…the instrument should be withdrawn at once. If it be persisted with in spite of this warning, a rigor may follow, and some cystitis will perhaps, be set up." And later, "Suffering is always a sign, in these cases, of some evil which it is desirable to avoid." It was fever and infection that he feared and this, it later transpired, was the reason for the King's reluctance to undergo further surgery. If we return to the original letter sent to Thompson by Jenner it states

> " … a calculus indefinitely said to be at the neck of the bladder - part has been removed by lithotrity - **the operation cannot be renewed nor even a sound introduced for the perfect examination of the bladder in consequence of the severe suffering any instrumental manipulation occasions.**"(2)

Suffering in this case refers not, as we might expect, to operative pain and a need for anaesthesia, but to the postoperative fevers and rigors which resulted. Thompson firmly believed at this time that anaesthesia increased the chances of

postoperative infection and so was understandably anxious to avoid it if possible.

And so he proceeded with caution. He arrived at Laeken on the 18th May, he met the King the following day and was allowed to perform a cursory external examination. Then he was kept waiting in splendid isolation for nearly two weeks, presumably while they assured themselves that no fever would develop. He wrote to Clover "I have had to spend a fortnight fighting for an examn of the bladder wh: H.M had determined shd not be done again as he always got bad rigors".He would have been anxious to avoid using chloroform under these circumstances. During this time he wrote lengthy, lonely letters to his wife, dined alone with only the servants for company - and waited. Finally on the 1st June he was allowed to examine the bladder, which he did by introducing a sound and establishing the presence of a stone, as described in the letter to Clover. He planned another therapeutic procedure a few days later, if the King remained well. Thompson had an anxious wait. Writing to his wife later he stated "I slept about 1 ½ hours last night…No one knows how anxious but those who are placed in like circumstances."(2) Miraculously, no fever ensued from this procedure and Leopold submitted to the definitive procedure on the 6th of June with no anaesthesia.

It was many years before the real reason for Thompson's success was known. Once Lister's antiseptic principles were accepted, Thompson reanalysed this case. "…was doubtless due to my having employed new instruments never before used in order to meet a peculiarity I had observed in the diagrams at first sent me. Hence unwittingly these new instruments were absolutely free from any trace of bacterial taint through previous use for other patients."

"It was to this happy accident that my success was greatly attributable" (2)

This case was the turning point in Thompson's career. The King was greatly improved and, after another quick procedure a few days later, was pain free for the remainder of his life. Thompson's fee for this operation was £3000 and, for a follow up visit and one examination a year later, he received £1000.

Clover meanwhile waited patiently in London, ready to attend the King if necessary – receiving no fee or glory for these weeks on call. Indirectly he did benefit from his association with Thompson; he was his anaesthetist and theirs was a true partnership. Thompson documented many of his operative cases in his book *Lithotomy & Lithotrity* and, most of the anaesthetics were given by Clover. One patient is recorded as being "conjointly under the care of Mr. Clover and myself. Success perfect." Clover, although spending much of his

career as an anaesthetist, had trained as a surgeon, obtaining his FRCS in 1850 and developing a special interest in urology. He had travelled to Paris in 1849 and seen Civiale operate "I was much amused and instructed also by seeing M.Civiale perform the operation for crushing a stone in the urinary bladder. He has a decided improvement in the movement which I should feel disposed to adopt if I had a case to operate on."(12)

Throughout his anaesthetic career, Clover maintained an active interest in the surgical treatment of the patients, regularly attending surgical meetings and meetings of the dental association. He is well known for designing anaesthetic equipment but his name is also associated with a number of surgical developments, especially in the field of urology(13). Clover's crutch, a vice like apparatus for maintaining patients in the lithotomy position looks barbaric now but was used from 1860 until the late 1950s.(14) He also developed a bladder evacuator which was used to wash out the debris from the crushing of the stones.(7, 15) Henry Jacob Bigelow is widely credited with the invention of this device but, although his device was an improvement, the concept was invented by Clover. Thompson used this device extensively "Mr. Clover states that he has seen me use his apparatus some sixty or seventy times, and I must have used it at least two or three hundred times, so that I have a tolerably fair acquaintance with the instrument and with its capabilities."(7) Clover was perfectly placed to invent surgical equipment; he had an creative mind and the ability to design and make equipment – and he had a virtual monopoly with many of the surgeons of his day "I venture to make these remarks having witnessed the operations of most of the London surgeons who practise lithotrity…"(16)

Joseph Clover and Henry Thompson worked together for Clover's entire career. Clover treated many influential people, including Florence Nightingale and, together with Henry Thompson, Napoleon the Third, but he did not administer chloroform to the King of the Belgians. He should, however, get some credit for the influence that this case had on Thompson's career as it was Thompson's confident reporting of his anaesthetist's skill that earned him the job in the first place.

Acknowledgements

My thanks, as always, to Jenny Jolley and Laura Foley, the librarians at the Australian and New Zealand College of Anaesthetists for their unfailing support. Also to Louise King, at the Royal College of Surgeons in London, who provided access to the papers of Henry Thompson and uncovered some additional papers relating to Joseph Clover, Lee Perry, at the Woodward Biomedical Library in British Columbia, who kindly provided me with copies of

Clover's papers, which have formed the basis of much of my research, and the staff at the Norfolk Record Office, who are always welcoming and helpful.

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THE SIMPSON CHLOROFORM BOTTLE

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An object known as the "Simpson chloroform bottle" (Figure 1) is held in the Department of Anaesthesia at the University of Edinburgh. Through the 1980s this was kept in a drawer in the office of Prof AA Spence. It provided a talking point from time to time. After Prof Spence retired, the bottle was kept in the Old College until the appointment of Prof Ian Power, when it was returned to our Department. In 2002 Prof Power had the idea of making replicas of the bottle and also getting the leather holder restored. He asked me to help with this.

My investigations eventually led me to Caithness Glass (Perth) and Charles Laing & Sons, brass and iron founders in Edinburgh. The plan was for Mr A MacIntosh of Caithness Glass to make a plaster mould, from which Andrew Laing would make a metal mould. However, it was decided to *not* take the risk of damage to the bottle by pattern making.

Fig. 1 The Simpson chloroform bottle and holder

How would the bottle have been made?

The answer to this question is GLASS-BLOWING. Early hand-made glass bottles were made by blowing the shape in a mould, transferring the bottle to a punty iron, which held the base, and then finishing the top hot. The mould would be highly polished metal. Such a mould would be made by a brass & iron founder. The rim was often of extra glass cast on and run in the dies. The stopper would have been press-moulded.

Holder
We did proceed to get the holder restored.

PROVENANCE

My attention was then focussed on the provenance of the object. There were two main questions:

1. Could the origin be traced back to James Simpson's time?
2. Was the object typical of chloroform bottles used in Simpson's time?

Investigation of origin

Step 1

The Secretary of the University of Edinburgh directed my inquiry to the Archivist, who confirmed that the bottle had been donated, but the records had been lost. However he provided an article in *The Journal of Obstetrics and Gynaecology of the British Commonwealth*, March 1972, which had some information about this donation. This was the 11th J Y Simpson Oration of 24 September 1971, delivered by Prof AS Duncan, [1] who made the following statement.

...chloroform bottle which only last year was bequeathed by Miss LMC Logan to the University of Edinburgh as the original bottle used by Simpson. It is not possible to prove authenticity, but I am indebted to Mr JR Cameron, immediate past-President of the Royal College of Surgeons of Edinburgh and a member of the Simpson family, for the following comments:

> "There is no doubt it is of construction contemporaneous with the first half of the 19th century – and I have compared it with medicine bottles which I have in the house and which belonged to my grandfather, John Simpson about 1860. ……..Robert Logan, Miss Logan's grandfather, was a contemporary of J.Y.S. Further, Robert Logan practised surgery and it seems most likely that Simpson would give him a bottle of chloroform…."

*With the bottle came a copy of a letter which Miss Logan always kept beside the bottle… with the heading "*Dalkeith, 5th January1848" *...from Mrs Catherine Graham* (née Peddie) *... to her brother John* (ship's surgeon on a vessel which sank; hence the letter was never delivered … and was returned to sender). The relevant part of this letter reads as follows:

> "A great discovery has been made in alleviating or rather preventing all pain in surgical operations by the inhalation of two or three units of new liquid preparation called Chloroform. Ether was first tried but did not succeed in every case & sometimes proved hurtful, but Dr. Simpson, Professor of Midwifery, Edinburgh, has made the great discovery & written several very able pamphlets on it and it is used in all hospitals in England, Scotland, the Continent of Europe and America and wherever it is known. Fortunes are making in the preparation of the anaesthetic, which is made from Chloride of Lime.
>
> "Limbs are amputated, teeth extracted, the most tedious and intricate of operations performed without the slightest pain, the person waking from a very pleasant dream. Veterinary surgery is practised in the same way and the suffering brute creatures who came in for a share of pain as part of the primeval curse are thus made partakers of this boon which God in his providence has vouchsafed to man.
>
> There are thousands of cases now on record: Those of Midwifery being some of the most extraordinary. I fear the Devil will tempt sinners to make bad use of such a powerful and cheap agent."

Step 2

The Medical Register of 1860 showed the residence of Robert Logan as 12 Castlegate in Lanarkshire, his qualification being Licentiate of the Royal College of Surgeons of Edinburgh (RCSE), 1829. [2] The archives of RCSE confirm that Robert Logan became a Licentiate on 20 May 1829 and also that James Young Simpson obtained the same qualification in 1830 – so the two would have known each other as students.

Step 3

The 1841 Census (obtained from ScotlandsPeople website) [3] confirmed that Robert Logan (age 40) was in that year a surgeon in Lanark.

Step 4

The 'Scotland's People' website was searched for deaths in Edinburgh in 1970 (since Duncan had said in the Simpson oration of 1971 that the chloroform

bottle "last year was bequeathed". This drew no hits. Trying again for 1971 was successful: Lucy Maria C Logan, aged 91, had died in Edinburgh. The Death Certificate was ordered and it revealed the following further information about her.

Full name: Lucy Maria Courtayne Logan
Date of death: 7th January 1971
Date of birth: 28/5/1879
Father: Robert Logan Logan (Tea Planter)
Mother: Lucy Jane Logan (née Leighton).

Step 5

Genealogy links from Miss Lucy Logan to Robert Logan (the contemporary of JY Simpson) were explored through the Lanarkshire Family History Society. [4] The following documents were found.

- 1841 Census showing Catherine Logan (age 25) residing at Braehead (Carluke Parish) with her two children, Robert (2) and John Orr (four months), as well as Jennet Orr (her mother)
- 1851 Census showing Robert Logan (46) residing at Castlegate, Lanarkshire with his wife, Catherine (43) and five children: Robert (12), John (10), Edward (8), Dill (3) and daughter LM (three months)
- Marriage certificate: Robert Logan (Surgeon) to Catherine Dunsmure Orr 24th June 1838
- Marriage certificate Robert L Logan (Tea Planter, son of Robert Logan and Catherine D Logan née Orr) to Lucy J Leighton 1874
- Death certificate Dr Robert Logan 20th May 1884
- 1891 Census showing Robert L Logan (51) residing at New Lanark with his wife Lucy J (43) and three children: Elizabeth C (13), Lucy MC (11) and Robert L (8) as well as brother John O Logan
- Birth certificate of Lucy Maria Courtayne Logan 28th May 1879
- Death certificate of Robert L Logan 13th November 1910

From the above the family tree could be drawn – see Figure 2.

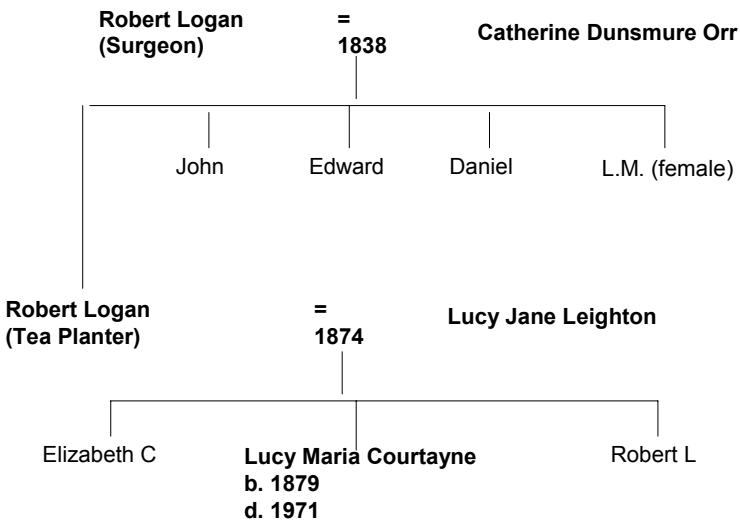

Fig. 2 Logan family tree

Investigation of vintage

Step 1
The bottle was compared with photographs of other chloroform bottles:

- Duncan and Flockhart relic from Crimean War c. 1855 [5]
- English bottle with leather case (1850-1900) held by Science Museum, London [6]
- Skinner's chloroform bottle 1862 [7]
- Bottle in the Macbeth painting of JY Simpson [8]
- English (?) bottle with ground glass stopper (cased, 1871-1930) held by Science Museum, London [6].

Skinner used coloured glass (actinic green) "to preserve the contents from the questionable action of light" and leather covering "to protect it from the heat of the hand". [7]

Step 2

I sought the opinion of the Wood Library Museum, home of the Eric Webb chloroform bottle collection, said to be the largest in the world. [9] George Bause

(Honorary Curator) declared there was nothing to disprove appropriate vintage of the Simpson chloroform bottle (personal communication, Dr George Bause).

Conclusion

Genealogy links from Miss LMC Logan, who bequeathed the chloroform bottle and holder, to Dr Robert Logan, the first owner in the family and a contemporary of James Young Simpson, were proven. Based on comparison with other chloroform bottles and expert opinion, the vintage of the Simpson chloroform bottle seems within JY Simpson's lifetime. Thus the provenance of the Simpson chloroform bottle is satisfactory.

Acknowledgements

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ADDENDA

Phosgene

Phosgene was discovered in 1812 by Sir Humphry Davy – synthesised by exposing a mixture of carbon monoxide and chlorine to sunlight.

As indicated by Skinner's paper, the need to preserve chloroform from questionable action of light was raised as early as 1862 – he employed actinic green glass for his bottle.

By 1903 Adrian [1] described the main change as oxidation:
$2\ CHCl_3 + O_2 \rightarrow 2\ COCl_2 + 2\ HCl$.
Thus it was recognised that ordinary chloroform slowly decomposes in the presence of air and light, forming highly toxic carbonyl chloride (Phosgene), HCl and under some conditions Cl_2. From then, Pharmacopoeias stated that chloroform should be stored in well-closed, glass-stoppered bottles, protected from light.
Adrian also noted that small quantities of alcohol exert an apparently remarkable preservative action on chloroform. Hence the official BP preparation came to be chloroform to which 1.0 – 2.0% v/v of ethyl alcohol has been added.

It was realised that carbonyl chloride was dangerous if present in chloroform intended for anaesthetic use. Phosgene was used as a poison gas in World War I. It is listed on Schedule 3 of Chemical Weapons Convention.

1. *Journal de Pharmacie et de Chemie* 1903; **vi**: 18

Restoration of the (leather over card) holder

The holder was restored by Theo Sturge (Sturge Conservation Studio, Northampton), who provided the following information. He noted that the top half had been crushed, and both the leather and underlying card were badly distorted. In addition, almost half of the domed top was missing. Part of the remaining section was loose. The seam around the bottom of the lower half was coming away. The surface of the leather was scuffed. See Figure 3.

Treatment

The hard, distorted section was relaxed by putting wet cloth inside a piece of Sympatex, and then inserting this inside the distorted section. Sympatex is a semi-permeable membrane which allows water vapour to pass but not liquid water. This softened the card and the leather sufficiently for almost all of the distortion to be removed. To hold it in shape as it dried, a wooden block, cut to fit precisely inside the top, was inserted – see Figure 3.

The missing section was built up using the wooden block, covered in cling film, as a former. The missing card was replaced with layers of acid and bleach free artists' water colour paper. This was attached with Lascaux 498HV, an acrylic dispersion. This was also used to secure the loose sections of the original. The missing leather was replaced with new vegetable goat, which was suitably coloured. The new leather was wet moulded over the wooden block to give it its shape. The edges of the new leather were skived down to give a smooth join with the original. The leather was attached with a mixture of Lascaux acrylic resins.
A wash of paints was used to tone down the scuffs. See Figure 4.

Holder for Simpson chloroform bottle. Conserved during March 2003 by Theo Sturge, Sturge Conservation Studio, 6 Woodland Avenue, Abington, Northampton, NN3 2BY. sturge@primex.co.uk

Fig. 3 Holder before and during restoration, 2003

Fig. 4 Holder after restoration, 2003

HWC GRIFFITHS, CHLOROFORM AND ITS LAST (?) USE IN EDINBURGH

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Professor Emeritus, University of Dundee

Chloroform was first used clinically by James 'Young' Simpson on November 8th, 1847, and was used frequently and widely for most of the next 100 years. Thereafter it disappeared quickly from the scene, displaced by a combination of progressive recognition of its side effects and the introduction of newer agents, particularly halothane, perceived to be safer. HWC Griffiths, consultant anaesthetist to the Regius Professorial Surgical Unit in The Royal Infirmary of Edinburgh (RIE) from 1948 until 1980, and known universally as 'Griff', was one of the great clinical anaesthetists in the period after the Second World War. His career and major activities, including his truly pioneering work on induced hypotension and the development of intensive care, have been described to the Society previously (McKenzie 1998) [1], but with only passing mention of his use of chloroform. This paper expands on that aspect of his career.

Comparison of chloroform with halothane

When halothane was undergoing clinical trials before marketing, a former Edinburgh anaesthetic trainee who was working with ICI confided in him that there was some anxiety about its similarity to chloroform although it was hoped that 'modern' methods of administration would provide a margin of safety. Chloroform, of course, sensitizes the myocardium to adrenaline, and sudden cardiac arrest must be an almost inevitable consequence of crude methods of use. This analysis led Dr Griffiths to theorise that:

1. Exactly the same would happen with halothane if it was used inexpertly (the late history of general anaesthesia in dental practice (Wildsmith 2006) [2] arguably proving him right); and
2. If halothane could be used safely with modern techniques, why not chloroform?

To answer this question he started to use chloroform for routine general surgical procedures, administering it in exactly the same way that others were using halothane, that is as a supplement to nitrous oxide and with a high percentage (50%) of oxygen. He found it an excellent agent, tachycardia and hypertension occurring, but only in those surgical *and* anaesthetic colleagues who were concerned by what he was doing! The regularity of the patients' cardiac rhythms confounded the cardiovascular concerns, but anxieties about the effect on liver function were also raised. Thus, a comparative study of liver function was

performed, but showed no difference between halothane and chloroform (Griffiths & Ozguc 1964). [3] The relevance of the simple clinical tests of dysfunction that were performed would be queried today, but in over 20 years of use he did not have a single patient develop jaundice which could be attributed to chloroform.

Griffiths' clinical acumen

Spending a day in theatre with Dr Griffiths was always hugely educational given his interest in induced hypotension, promotion of chloroform and extensive clinical experience. Table 1 provides an example, showing the operating list for my first day in anaesthesia, but the details also illustrate the cautions he applied in his use of the drug.

Table 1 Theatre list, wards 7/8, Royal Infirmary of Edinburgh, 1st October, 1970

Procedure	**Anaesthetic sequence**
Breast Biopsy	Thiopentone, Suxamethomium, N_2O, O_2 & chloroform
Vagotomy & drainage	Thiopentone, suxamethonium, N_2O, O_2 & halothane, δ-tubocurarine
Groin dissection	Thiopentone, Suxamethomium, N_2O, O_2 & chloroform Hexamethomium for hypotension
A-P excision of rectum	Thiopentone, Suxamethomium, N_2O, O_2 & halothane High spinal with hyperbaric nupercaine

Endotracheal intubation was routine to ensure a clear airway and allow ready support of ventilation so that that neither hypoxia nor hypercarbia could complicate administration, and chloroform was not used for intra-abdominal procedures. This was so that there could be no diagnostic confusion if the patient became jaundiced postoperatively - or (put more robustly) so that the surgeon didn't have an excuse if the patient developed jaundice! With continued good experiences, he used chloroform regularly throughout his career, up to and including his last working day before retirement, an event which was recorded photographically (see Figures).

Fig. 1 Dr HWC Griffiths' last use of chloroform: induction

Fig. 2 Dr HWC Griffiths' last use of chloroform: maintenance

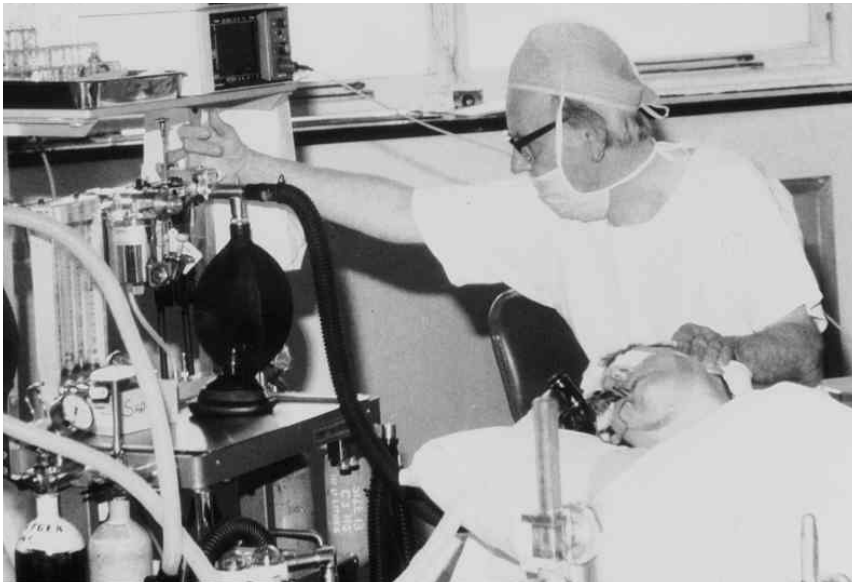

Fig. 3 Dr HWC Griffiths' last use of chloroform: end

After that retirement his consultant sessions passed to a younger, somewhat more cautious member of the department (me!) who decided that chloroform should retire with 'Griff' so the remaining supply was returned to the pharmacy. Claims for priority should always be made with caution, but it is indisputable that James 'Young' Simpson was the first to use chloroform as an anaesthetic, and that the administration was in Edinburgh in 1847. It cannot be claimed that the event described and illustrated here was definitively the 'last' use in the city, but it is the last *recorded* use which I am aware of.

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DOMICILIARY CAUDAL EPIDURALS
?.... Where angels fear to tread

Dr F F Casale
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Some may consider performing a Caudal Epidural, in a patient's own home away from the Hospital's safe environment as foolhardy, just as much as my standing here not extolling Edinburgh and its famous son James Young Simpson. However I feel that it might be of historical interest that over approximately 30 years the two Consultants at the Colchester Hospital Pain Clinic performed circa 2,500 Caudal Epidurals in the patients' own homes as part of 14,000 or more done mainly during the hospital outpatient clinics, for the treatment of lumbago and/or sciatica. We always used Procaine 0.5% with Depo-medrone.

Dr Alan Thorogood, FFARCS,BTA,R (Been To America, returned) – he did not progress like many others to ST (Stayed There) – he spent a year in Seattle and worked with Daniel Moore and John Bonica and was Consultant Anaesthetist at Colchester from 1961 to 1991.
I, F.F. Casale, FFARCS, WIA (Worked In Africa) joined him as Consultant Anaesthetist in 1975.

Having qualified from Cape Town Medical School, set up in 1910 under the auspices of this esteemed University of Edinburgh, I was required to give 25 anaesthetics, under supervision, during my Surgical Housemanship which I did in Northern Rhodesia (later Zambia) where I had spent the latter part of my youth. I thus unwittingly became considered an anaesthetist by the rest of the British-trained Medical staff. I administered many GAs and spinals (heavy Nupercaine), proceeding to perform the operation i.e. hernia, Caesarean section, when I was stationed as the only doctor in rural hospitals. A chance encounter with Aileen Adams, on one of her many international trips, brought me to Addenbrookes hospital, where, on my first night on call as a lowly anaesthetic SHO, I caused consternation by proposing to perform a then banned, dangerous, procedure called a Spinal for a compound 'tib and fib'.

Colchester Pain Clinic and the Intractable Pain Society

This was in 1967 at the time when Alan Thorogood was establishing the Colchester Pain Clinic and the Intractable Pain Society was being formed, mainly by FFAs whose close proximity with the surgeons at their College, made them adapt their motto: "When in doubt, cut it out" to "When in doubt, get the

needle out". Because Pain Clinics were a novelty, their proponents had to fight for sessions, outpatient and theatre space (usually at the end of a Surgical list), and ask Radiologist colleagues to screen for their chemical sympathectomies in the X-ray department. There was a pioneering spirit "make do" mentality of the war years, typified by the surgeons' response in 1957 to the sudden cancellation of the newly planned Colchester Hospital - dragging the anaesthetists with them, they opened operating theatres in any available space: in the Psychiatric, Poorhouse and Infectious Diseases Hospital. For the next 25 years we were providing anaesthetic services to 6 different sites in this, then small, rural town. These conditions and attitudes will be familiar to the senior members of this Society and took a long time to change, sometimes with unfortunate results, as at Bristol. We eventually got our new hospital 30 years later in 1985.

Early Intractable Pain Society meetings mainly discussed various procedures for the relief of cancer pain with intrathecal phenol or alcohol, encouraged by the work of Dr Robert Maher, because opiates were sparingly used so as to avoid the patient becoming addicted: a poor consolation to those involved to know that the that the patient died in pain but did not die a heroin addict!

Our Pain Clinic also dealt with acute or chronic pain problems i.e. lumbago, sciatica, arthritic pain, fractured ribs, trigeminal neuralgia, etc all of which were amenable to injections administered immediately or in the patient's home when possible.

Procaine

PROCAINE 0.5% proved to be the ideal drug, with DEPO-MEDRONE (Methyl Prednisolone 40 or 80 mg) considered beneficial in the treatment of disc problems. It came in 50ml but later a 25ml ampoule, which became the standard amount used (we must have used 400litres of it). It is true that being an amino-ester local anaesthetic, anaphylactic reactions have been reported, but both we, and James Cyriax, Orthopaedic physician at St Thomas'(said to have personally performed over 30,000 caudals) did not see any major severe reactions to Procaine. Its bad reputation, following its synthesis by Einhorn in 1904, may have been due to the large doses administered, often under pressure, causing systemic absorption and its toxic effects being misdiagnosed as allergic or hypersensitivity reactions. Procaine 0.5% does not cause any motor nerve block, thus the patient is immediately ambulant. The nerve roots being blocked at the dural sleeve, relieves the pain and breaks the pain cycle. It is not cardiotoxic but may cause vasodilatation, thus hypotension may delay early ambulation. It is the least toxic of the local anaesthetics on the Central Nervous System but light

headedness, dizziness, visual disturbances, muscular twitching of the face, progressing to generalised convulsions can occur. Because it is rapidly metabolised, any systemic effects, if inadvertently injected intraosseous or intravenous, are transient and short lived.
Fainting may occur, but having seen two patients, faint while supine, one of them convulsing after just taking blood, it is too simple to put the blame on the Procaine.

Procedure for caudal epidural

We followed the same procedure in the Domiciliary as in the Outpatient practice. A history was taken to exclude patients with severe allergic conditions, diabetes or on anticoagulant therapy. Bladder problems would alert us to possible Cauda Equina compression (which was revealed on 4 occasions) which, together with undiagnosed fractured neck of femur and abdominal masses, were all elicited on the physical examination that we routinely performed. Blood pressure measurement and IV cannulation were not routinely performed. After explaining the proposed procedure and obtaining verbal consent, the patient was turned prone with a pillow raising the pelvis, to facilitate the location of the sacral hiatus which was cleaned with alcohol swabs. Sterile gloves were not worn but meticulous attention to asepsis was observed in the drawing up of the Procaine and Depomedrone in the 30 ml syringe. A 21 or 23 gauge needle, attached to a 5 ml syringe (partially filled with air) was introduced into the caudal epidural space (once through the sacro-coccygeal membrane the needle does not need to be advanced). After aspiration for blood or CSF (which Dr Thorogood found on TWO occasions due to the epidural space extending down to S 5), a few millimetres of air was injected to ensure no resistance was encountered and the "Whoosh Test" [1 2] performed, (listening for its sound at T 12), thus confirming the correct placement of the needle which was then connected to the 30 ml syringe and the injection started. Exacerbation of the root pain invariably occurred and required slow intermittent injection until the nerve root was desensitised, all the while checking that there was no extravasation of the injectate near to the needle. Continuous conversation was maintained with the patient. The occurrence of headache or dizziness, would slow the rate of injection. If nausea or slurring of the speech occurred, the procedure would stop, he would be turned on his back, elevating the legs and/or given oxygen, which would quickly settle the problem. Patients were encouraged to get up and move about, often to their utter amazement especially those who had been suffering from acute discogenic pain for some days. We would then leave the patient in the care of a relative or kind neighbour, after ensuring that he was comfortable and free from any ill effects from the procedure.

Domiciliary Consultation

This is a visit to the patient's home at the request of a G.P., normally in his company, to advise on diagnosis and treatment on a patient who, on medical grounds, cannot attend hospital. 'Domiciliaries' became very popular for psychiatrists and geriatricians, so much so that the NHS had to limit them to 250 per annum. They were supposed to be performed outside one's working hours, so a fee was payable plus extra for a procedure i.e. ECG, injection, etc., on completion of the apposite form. Because the payments were somewhat erratic, I decided to keep a simple record ,unfortunately only from 1983 to when I retired in 2003.During that period I visited 1125 patients in their home, averaging 100 a year from 1983 to 1989, dwindling to 15 in my last year. A caudal was performed on 46% of my recorded visits. From these figures a very conservative estimate of 2500 caudals performed during the 5000 domiciliary visits by the two of us, although Dr. Thorogood performed the greater number. Requests for domiciliaries decreased once GP's became fund-holders as the fee came out of their budget plus the improved facilities at the new hospital. Today not even GPs perform domiciliary visits!

When requesting a visit the GP surgery would phone our secretary, at the time shared with the paediatricians (the anaesthetists had no secretary or office till 1986). She had to ensure that we had accurate instructions on how to get there (looking for "Mon Repos" in a country lane in rural Essex can be rather daunting), she had to ensure that another person would be there and that a telephone was available in the home or at an immediate neighbour (there were no mobile phones then). These requirements were learnt very early in my domiciliary days: a Gladstone doctor's bag got you immediate entry, whereas my wife's borrowed large travelling bag kept you at the door : "no, I am not trying to sell you anything!" ; secondly on a visit to a small house in the centre of Colchester, up some narrow stairs I visited a large lady in her sixties reclined on a sofa " I'm in terrible pain doctor, it's me back, doctor" after a lot of to do I finally began to inject only to abort the proceedings as she began to wheeze "don't worry doctor, it's me asthma, doctor" which persisted despite her using various inhalers and a judicious dose of Diazemuls injected through a butterfly I had inserted expecting the worst. I asked her husband, who was watching all this totally unconcerned, to phone for their doctor "we haven't got a phone, doctor" can you go to your neighbours and ask them to phone; "I've just had an operation on my feet, I can't walk doctor." Looking out of the window for inspiration, I called to a hospital nurse luckily passing by on her way home: "what are you doing there, doctor?" I was wondering that myself! Anyway with her help we got the patient to Casualty, only to discover that she was a well known customer for her frequent "turns", usually in shops.

Resuscitation

In my bag I carried the usual drugs: atropine, adrenaline, chlorfenamine (Piriton), ephedrine, Diazemuls (later midazolam) as well as I.V. cannulas, Ambu Bag etc. which, fortunately never had to be used. The small cylinder of oxygen was occasionally used for those who felt faint.

Problems

Because we were always dealing with patients in the ambulant outpatient setting, where one would often perform two or more caudals per session (moving on to the next patient in the adjoining room, while the nurse recovered and got them dressed), we gained confidence in our ability to deal with the occasional side effects of the procedure: flushing, dizziness, headache. It was thus a small step to perform the same procedure away from the hospital in the domiciliary setting. On one occasion an elderly lady had a hallucinatory/ psychotic reaction on my completing the caudal in her home, but she responded to a small dose of midazolam. Difficulty in locating the sacral hiatus did occur and the procedure was abandoned. I performed domiciliary caudals on many different people, including medical colleagues or their family, usually on my knees, not as a form of supplication for an uneventful injection, but because resting on the floor was considered the best form of treatment for acute discs. I have performed on all types of beds, the most challenging on being a water bed, once on a physiotherapist's couch when their patient was in agony whenever the traction was stopped. On one occasion I attended a luncheon party to celebrate the second (or third) marriage of one of our nurses only be called back that evening by the distressed bride as her newly wedded husband was incapacitated by a slipped disc. The caudal, performed in the bridal chamber, resolved the problem immediately, much to the satisfaction of all concerned, especially the bride.

Review

In 1987 we sent out a Questionnaire to 200 patients who had received a domiciliary caudal nine to twelve months earlier. 147 aged 18-76 years replied, 17% had been on bed rest for one week, 70% for four weeks. Following the caudal 77% had immediate pain relief. Following the caudal 55% felt much better whist 3% felt worse. At the time of answering 39% were cured, 32% had needed physiotherapy and 11% had had surgery. 97% were pleased to have received the injection at home, 84% would accept another caudal if necessary. Not bad figures!

In 1985 *Anaesthesia* published our paper on the previous 300 consecutive domiciliary visits which we had performed of which 231 had been requested for lumbago/sciatica and 174 received had caudals in their homes. [3]

In January 1986 our paper was reviewed in the *BMJ* by C.J.Glynn, who certainly fits the role of the question raised in the title; he misread our paper pontificating on his views. [4]

Discussion

Our Domiciliary Pain Service attempted to provide immediate relief to patients stuck at home with a variety of painful conditions. We performed a variety of injections including intercostal phenol blocks for fractured ribs on a cyanotic emphysematous patient on oxygen, when a resulting pneumothorax would have been problematic.

This Presentation is not a scientific paper discussing the pros and cons of what procedure or drug constitutes a beneficial effect on lumbar discogenic pain, but rather an historic record of what we considered best choice for the patients we were asked to help at the time. Those were the times and I think we did "jolly well".

The solutions now are less invasive: Counselling, Pain Management, TENS, although they seem no more effective than my injections. It is good to see the occasional patient from the past who gratefully recalls a successful domiciliary or other intervention I performed then, but I wonder whether they are just being polite or their memory is selective.

So in the end were we Angels or Fools or perhaps just Lucky? I leave it our past Patients and our Colleagues to decide.

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CAESAREAN SECTION IN THE BRITISH ISLES BEFORE AND AFTER ANAESTHESIA 1737-1865

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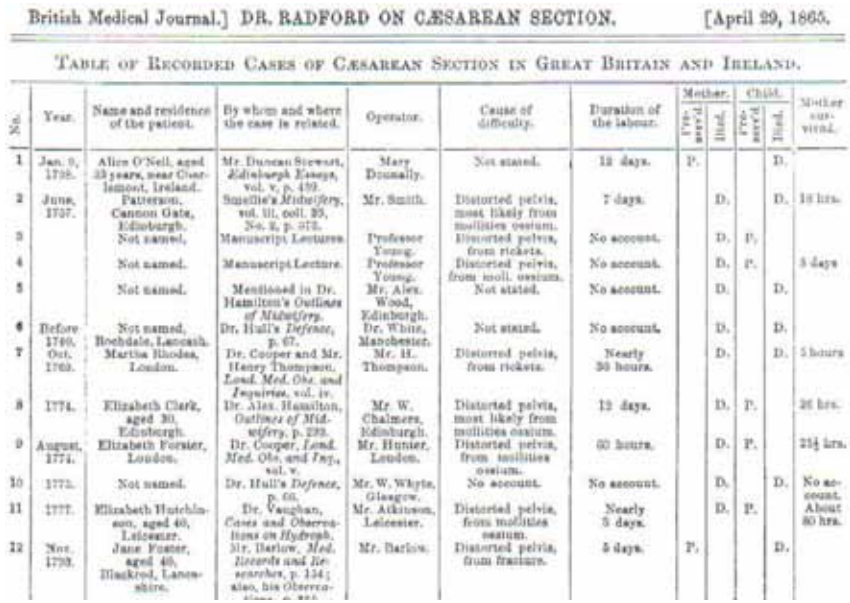
Search for reports of Caesarean sections before 1867

The book *Blackburn Characters of a Past Generation* [1] records that Dr. James Barlow (1767-1839) performed Caesarean sections in 1793, 1817 and 1821 and described them in *Essays on Surgery and Midwifery*.[2] Barlow graduated from St. Bartholomew's Hospital and was only 26 years old in 1793 when he became the first medical practitioner in the British Isles to perform a successful Caesarean section. [3] 'Successful' at that time meant that the mother survived the operative and postoperative periods – the maternal mortality rate was so high that the operation was never performed on a live mother with the primary purpose of saving the baby. Barlow mentioned in his first 1793 case report that no mother had survived in nine or ten previous cases in the British Isles. [4] It occurred to me that, from those and subsequent case reports before 1867, the impact of anaesthesia on the frequency and success rate of Caesarean sections could be documented without the confounding factor of Lister's antisepsis. [5] A Google search produced a remarkable article by Thomas Radford of St. Mary's Hospital, Manchester that tabulated all 77 case reports of Caesarean sections performed in the British Isles between 1737 and 1865 (Figure 1).[6] Sixty-five of these reports were retrieved online through University of Calgary Health Sciences library, either directly or from other libraries through inter-library loan. The remaining 12 reports were personal communications or manuscript lectures and were not traced.

Summary of the reports

The common factor in all but one case (performed by a midwife and incompletely documented) [7] in Radford's table was obstruction of the birth canal that made delivery impossible by any other means – turning, long forceps, or craniotomy of the foetus and embryulcia [piecemeal extraction]. Few of the mothers had antenatal care. When the mother went into labour at term, the midwife came to the home. When labour failed to progress after many hours or even days, the midwife called the doctor who, after examining the mother, called a consulting surgeon or obstetrician to the home. The leading cause of obstruction was mollities ossium or malacosteon adultorum , now known as osteomalacia of pregnancy. (Table 1) Softening of the bone from decalcification



British Medical Journal.] DR. RADFORD ON CÆSAREAN SECTION. [April 29, 1865.

TABLE OF RECORDED CASES OF CÆSAREAN SECTION IN GREAT BRITAIN AND IRELAND.

No.	Year.	Name and residence of the patient.	By whom and where the case is related.	Operator.	Cause of difficulty.	Duration of the labour.	Mother. Preserved.	Mother. Died.	Child. Preserved.	Child. Died.	Mother subsequently.
1	Jan. 9, 1738.	Alice O'Neil, aged 33 years, near Clonlismont, Ireland.	Mr. Duncan Stewart, *Edinburgh Essays*, vol. v, p. 439.	Mary Donnally.	Not stated.	12 days.	P.			D.	
2	June, 1737.	Patterson, Cannon Gate, Edinburgh.	Smellie's *Midwifery*, vol. iii, coll. 25, No. 2, p. 373.	Mr. Smith.	Distorted pelvis, most likely from mollities ossium.	7 days.		D.		D.	18 hrs.
3		Not named,	Manuscript Lectures	Professor Young.	Distorted pelvis, from rickets.	No account.		D.	P.		
4		Not named.	Manuscript Lecture.	Professor Young.	Distorted pelvis, from moll. ossium.	No account.		D.	P.		5 days
5		Not named.	Mentioned in Dr. Hamilton's *Outlines of Midwifery*.	Mr. Alex. Wood, Edinburgh.	Not stated.	No account.		D.		D.	
6	Before 1760.	Not named, Rochdale, Lancash.	Dr. Hull's *Defence*, p. 67.	Dr. White, Manchester.	Not stated.	No account.		D.		D.	
7	Oct. 1760.	Martha Rhodes, London.	Dr. Cooper and Mr. Henry Thompson, *Lond. Med. Obs. and Inquiries*, vol. iv.	Mr. H. Thompson.	Distorted pelvis, from rickets.	Nearly 36 hours.		D.		D.	5 hours
8	1774.	Elizabeth Clark, aged 30, Edinburgh.	Dr. Alex. Hamilton, *Outlines of Midwifery*, p. 293.	Mr. W. Chalmers, Edinburgh.	Distorted pelvis, most likely from mollities ossium.	12 days.		D.	P.		26 hrs.
9	August, 1774.	Elizabeth Forster, London.	Dr. Cooper, *Lond. Med. Obs. and Inq.*, vol. v.	Mr. Hunter, London.	Distorted pelvis, from mollities ossium.	60 hours.		D.	P.		21½ hrs.
10	1775.	Not named.	Dr. Hull's *Defence*, p. 66.	Mr. W. White, Glasgow.	No account.	No account.		D.		D.	No account.
11	1777.	Elizabeth Hutchinson, aged 40, Leicester.	Dr. Vaughan, *Cases and Observations on Hydrops*.	Mr. Atkinson, Leicester.	Distorted pelvis, from mollities ossium.	Nearly 5 days.		D.	P.		About 80 hrs.
12	Nov. 1793.	Jane Foster, aged 40, Blackrod, Lancashire.	Mr. Barlow, *Med. Records and Researches*, p. 154; also, his Observa-	Mr. Barlow.	Distorted pelvis, from fracture.	5 days.	P.			D.	

Fig. 1 Part of Radford's table of Caesarean sections in Great Britain and Ireland. [6] Summarised details of the first 12 of 77 Caesarean section case reports.

Table 1 Underlying pathological conditions

	1738-1846 (n = 49)	1847-1865 (n = 28)
Mollities ossium (osteomalacia)	30 (60%)	14 (50%)
Rickets, distorted pelvis	9 (18%)	8 (28%)
Old fractured pelvis	2 (4%)	0 (0%)
Tumour (uterus, bone)	4 (8%)	6 (22%)
Not recorded	4 (8%)	0 (0%)

produced gross deformity of the pelvis with forward protuberance of the lower lumbar vertebrae and sacrum. (Figure 2) [8,9] It was associated with multiparity, pregnancies in quick succession, prolonged suckling, poor diet and poor living conditions.[6] Pains began in the lower back, pelvis and hips in late pregnancy and persisted until breast feeding was discontinued, only to recur with greater severity in each succeeding pregnancy. The worst-affected mothers needed crutches or were bedridden in late pregnancy and lost up to 12 inches in height.[10,11] Barlow classified degrees of pelvic bony deformity, obtained by digital pelvic examination, and summarized guidelines for delivery in women with increasing degrees of bony abnormality (Table 2). [2]

Table 2 Barlow's synoptical table [2]

	The distance from the upper edge of the Symphysis, to the superior part of the Os Sacrum, or conjugate diameter of the Pelvis	
Well formed pelvis	From 4 to 5 inches	Delivery by nature alone
I–First degree of deformed pelvis	From 4 to 3 or 2¾ inches	Delivery by the efforts of nature, or assisted with the forceps or lever
II–Second degree of deformed pelvis	From 2¾ to 2½ inches	Premature delivery
III–Third degree	From 2½ to 1½ inches	Embryulcia or Delivery with the Crotchet
IV–Fourth degree	From 1½ inch, to the lowest possible degree of distortion	Caesarean Operation

Determination of the exact extent of the bony distortion usually required more than one pelvic examination, sometimes by several medical men when the forward thrust of the softened sacrum was initially thought to be the foetal head.[12,13] When all agreed that Caesarean section was the only way to save the mother's life, this faint hope was explained to the husband, family, and patient with the alternative being prolonged agony with certain death of both mother and child. Most family members and mothers agreed at once. If they were uncertain or refused, the doctors left the house and returned immediately when recalled.

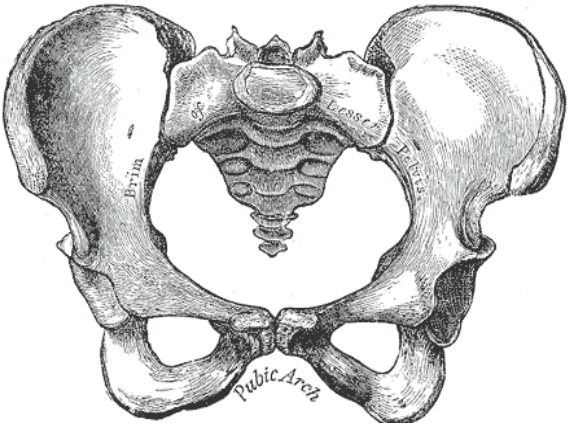


Fig. 2 (a) Normal female pelvis [10]

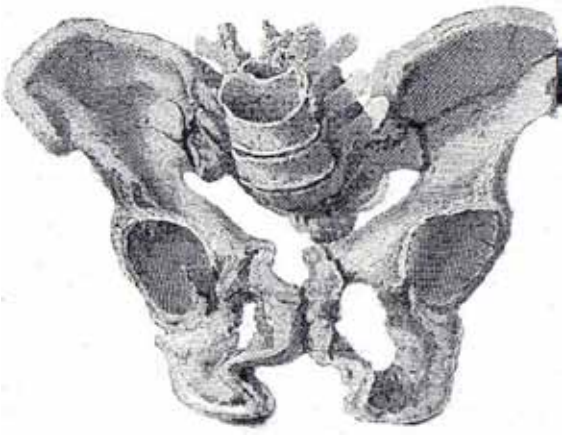


Fig. 2 (b) Osteomalacia showing distorted pelvis and forward thrust of L3-5 vertebrae and sacrum [11]

Regional distribution of Caesarean sections was irregular.[6] In the years 1737 to 1846, Manchester and nearby Lancashire towns had 20 cases, followed by Edinburgh with six, and London with three (Table 3). The remainder were scattered throughout England, Ireland, Scotland and Wales, many of them in small towns and villages. From 1847 to 1865 there were more cases in London, fewer in Lancashire and none in Edinburgh. In the entire period 64 of 77 Caesarean sections were performed in the mother's home and only 13 in hospitals in London (8) Edinburgh (3), Dundee (1), and Bristol (1). Fifty-nine surgeons or obstetricians each performed one Caesarean section; only seven – in the Manchester area, London and Edinburgh – performed more than one.

Median duration of labour was 48 h (3 h -12 days) in the preanaesthetic era and 36 h (5 h-6 days) from 1847-1865. The mother's sustenance during labour was mainly tea or beef tea, brandy and water, and opium or laudanum for analgesia. She took these by mouth if she was not vomiting; otherwise they were given by rectal infusion. Preoperative assessment was limited to history, physical appearance and deformities, breathing, pulse rate and volume, and bladder and bowel function. Auscultation of the foetal heart was occasionally mentioned; more often the mother's awareness of foetal movements was used to determine whether the baby was alive or dead.

Preparation of the room, usually in the home, where surgery was performed changed little over the years. The mother lay on her back in bed or on a table with her head raised on pillows. The surgical technique was a six-inch paramedian incision from umbilicus to pubis through the abdominal wall and peritoneum, and a vertical incision in the uterus. Time to delivery of the baby, placenta and membranes was 2-6 minutes. The uterus and peritoneum were left unsutured. Assistants held protruding bowel in place until the abdominal wall was closed with interrupted sutures. Adhesive plaster on the wound and an abdominal binder completed the procedure. Several obstetricians in the mid-19th century advocated heating of the room before surgery was performed. Only one followed Semmelweis's[14] practice of asepsis, "I ascertained that no one present had lately been dissecting or was likely to likely to be a source of infection; the instruments, needles and silk were new and in perfect order; lastly, we all cleansed our hands most thoroughly." Both mother and baby survived.[15]

Pain and anaesthesia

Skin incision and suturing of the abdominal wall in the preanaesthetic era caused brief, sharp pain. Incision-delivery time was less than most intervals between contractions. After the baby was delivered, labour pains ceased and most mothers were relatively comfortable. The transient pain of surgery did not

Table 3 Regional distribution of Caesarean sections before and after anaesthesia

Region	**1737-1846** n = 49	**Region**	**1847-1865** n=28
London Domiciliary (3)	3	London Bart's (3), Guy's (2), UCH, St. Thomas's, Lying-in Hosp. Domiciliary (3)	11
Lancashire Manchester (5), Blackburn (4), Staleybridge (3), Rochdale (2), Ashton-under-Lyne, Darwen, Denton, Moston, Salford, Wigan	20	Lancashire Manchester (2), Preston (2), Ashton-under Lyne, Stayleybridge	6
Rest of England Birmingham, Leicester, Reading, Rockingham, Sunderland, Welford	6	Rest of England Bristol, Cambridge, Dewsbury, Nottingham, Shaftesbury	5
Scotland Edinburgh (6), Glasgow, Kirriemuir, Leith, Invergordon, Perth, Shettleston, Stobsmuir	13	Scotland Aberdeen, Cupar, Dundee	3
Ireland Belfast, Dublin, Waterford	3	Ireland Lisburn	1
Wales	0	Wales Newport, Mon.	1
Not recorded	4	Not recorded	1
Total	49	Total	28

Number of cases >1 in each location are shown in brackets.

appear to affect the decision of either mother or surgeon. The alternative for the mothers was unremitting, agonizing pain of obstructed labour until death supervened.

Obstetricians and surgeons commented that surgery was tolerated with courage, patience and fortitude and mother scarcely complained. None reported that a mother screamed or had to be held down during Caesarean section. The only mention of 'screams' in all the case reports was related to one mother's violent labour pains, not to surgery.[16] Some mothers reported that the surgery was less painful than the unrelenting labour pains.[17] [18] One found the needle for abdominal wall closure more painful than the incision ,[19] and another remarked that Caesarean section was a "flea bite", compared with the preceding attempted craniotomy and embryulcia.[20]

Ether anaesthesia was first used during a Caesarean section by Skey at St. Bartholomew's Hospital, London at 7.40 a.m. on 25th January 1847.[21] The 37-year-old primiparous mother was 4 ft. 1 in. tall with extreme contraction of the pelvis from childhood rickets. She was admitted to hospital when her pregnancy was diagnosed at seven months gestation and agreed to have an elective Caesarean section at term. When labour commenced she inhaled ether for about two minutes to test its influence. A few hours later she was taken downstairs on a stretcher and placed on the operating table. Mr. Tracy, "administered the ether slowly for seven or eight minutes, the effect not being complete." Following delivery of a healthy girl, there was moderate blood loss until the uterus contracted. The mother died 36 h postoperatively but the baby survived. The Lancet reported that the inhalation of ether was, "unsuccessful, or but very partially successful,"[21] while the London Medical Gazette commented that, "inhalation of the ether produced insensibility to the pain of the first incision. Its prolonged exhibition was not allowed lest it might possibly interfere with the contraction of the uterus."[22] Various aspects of this case are discussed in detail by Zuck.[23]

Ether was not mentioned again, either before or during Caesarean section. Chloroform was first used on for Caesarean section on 18th May 1849 for a 40-year-old mother with osteomalacia who lived in a "wretched cabin" six miles from Lisburn, County Antrim.[24] Her first four labours were uneventful. Her fifth child was stillborn and was extracted with extreme difficulty through her narrow pelvis. When she began her sixth labour her violent contractions were ineffective and Dr. Campbell was called after two days. Her pelvic deformity was so severe that he and a colleague could not reach the baby's head to attempt craniotomy and embryulcia. Despite warnings of the dangers, she and her

friends readily consented to a Caesarean section. Campbell recorded that, "We poured a little chloroform on a piece of lint, and laid it loosely over the mouth and nose. Complete insensibility to pain being in a few seconds produced", the surgery was completed in five minutes, and the baby was a healthy eight-pound girl. Afterwards, the mother, "in the warmest manner expressed herself to have been without pain and comfortable, though fully conscious that her delivery was being accomplished in so unusual a manner." She died seven days later from sickness, vomiting and abdominal distension. Autopsy showed extensive peritonitis.[24]

Fourteen of 29 mothers received chloroform for Caesarean section. Two of these were put "fully" under the influence, the others simply "under the influence". In one case it was discontinued because of coughing.[25] Two mothers who underwent craniotomy and failed embryulcia then had Caesarean section; the first received chloroform for both procedures, [26] the second only for Caesarean section.[27] One mother with a malignant lower uterine mass inhaled chloroform intermittently in late pregnancy whenever morphia analgesia was inadequate; Caesarean section was performed under chloroform and both mother and baby survived.[28] Another repeatedly demanded chloroform during labour, and only consented to Caesarean section when guaranteed that she would receive chloroform. [29] Radford deliberately withheld chloroform in one case for fear of its causing uterine atony.[30] Five case reports did not mention either ether or chloroform.

Table 4 shows the overall survival of babies and mothers before and after the introduction of anesthesia. Fourteen per cent (11 of 77) of mothers survived from 1737 to 1865. Caesarean section was performed more frequently after anaesthesia became available, although only 18 per cent of cases (5 of 28) were successful from 1847 to 1865 compared with twenty-five per cent (4 of 16) in the 18 years immediately preceding anaesthesia.

No mother died intraoperatively, either before or after the introduction of anaesthesia. Death occurred from 3 h hours to 32 days postoperatively.[6] An autopsy was performed if the surgeon requested it and the family agreed and gross peritonitis was obvious in a few cases. Two surgeons made special note of the soft vertebrae in osteomalacia – they could cut through pelvic bones and vertebrae with a knife; one of them cut nearly through the body of a vertebra that he thought was intervertebral substance.[8 13]

Table 4 Survival of mothers and babies before and after introduction of anaesthesia.

	1738-1846 n = 49	1847-1865 n = 28
Both dead	22	10
Baby only alive	21	13
Mother only alive	2	1
Mother + baby alive	4	4
Success (mother alive)	6/49 (12%)	5/28 (18 %)

Discussion

Most of the mothers were in poor general health, and were dehydrated and exhausted from prolonged labour. Nowadays they would be considered unfit for surgery without resuscitation. Preoperative assessment was limited to history, including bladder and bowel function, observation of breathing, and pulse rate and volume. The clinical thermometer was introduced in 1866,[31] Riva-Rocci's blood pressure cuff in 1896[32] and clinical chemistry in the early 20th century.[33] Mothers died from peritonitis and septicaemia from non-aseptic surgery after repeated pelvic examinations or from hypovolaemic shock from haemorrhage, vomiting, dehydration and prolonged labour.

Surgeons and obstetricians gave clear information and warnings to the mothers, relatives (and sometimes friends as well) before obtaining consent. Whether occasional initial reluctance to consent was due to fear of pain or fear of dying, the brief pain of surgery quickly relieved the unrelenting pain of obstructed labour. This pain was minimal compared to the days of fear and foreboding, followed by the agony of major surgery in the pre-anaesthetic era.[34] The novelist Fanny Burney described her mastectomy in 1812, six months after the surgery, "... this resolution [mastectomy], once taken, was firmly adhered to, in a terror that surpasses all description, and the most torturing pain. Yet when the dreadful steel was plunged into the breast, cutting through veins – arteries – flesh – nerves – I needed no injunctions not to restrain my screams. I began a scream that lasted unintermittingly during the whole time of the incision ..." George Wilson, professor of medicine in Edinburgh, who underwent Syme's amputation in 1843, wrote, "I do not suppose it was more painful than the majority of severe

operations are. The particular pangs are now forgotten, but the black whirlwind of emotion, the horror of great darkness, and the sense of desertion by God and man bordering on close despair ... I can never forget however gladly I would do so."

Anaesthesia was light in most cases and did not provide abdominal muscle relaxation. In the first chloroform case the mother described pain-free awareness during the surgery. In eight of the 14 later chloroform cases surgeons described bowel protrusion after delivery of the baby, as in the pre-anaesthetic era. Early concern that ether and chloroform might cause uterine atony and postpartum haemorrhage [22,30] was not repeated in later reports.

Recent reviews of the history of Caesarean section suggest that anaesthesia "paved the way for a new era in caesarean section" [35] and , "not only offset the distress of the patient but replaced speed with careful technique as a priority in the performance of surgical procedures".[36] Case reports in this series do not support these opinions. The rate of Caesarean sections did increase from 1847 to 1865, but was still less than two cases per year for the entire British Isles. Skey performed three Caesarean sections at St. Bartholomew's Hospital in London and Radford and Clay in Manchester performed two each in Manchester. The remaining 21 mothers were operated on in various towns and villages by 21 different surgeons.

The underlying causes of obstructed labour were the same after the introduction of anaesthesia as before. The life of the mother, rather than that of the baby, remained paramount. Surgical technique remained unchanged: paramedian incision in the abdominal wall and peritoneum ; vertical incision of the uterus; delivery of foetus, placenta and membranes; no uterine or peritoneal sutures; and abdominal wall closure with 6-8 interrupted skin sutures. The heavy responsibility of surgeons who recommended the surgery, and the courage of the mothers who accepted it, were still evident.

Authors of many of the case reports commented that a history of previous obstructed labour, recognition of the problem in early labour, and early surgery would reduce maternal mortality. Radford went further and advocated an antenatal decision for elective Caesarean section at term so that craniotomy and embryulcia would become obsolete.[6] This would eliminate repeated digital pelvic examinations and manipulations, and prevent exhaustion of the mother. The biggest impediment was that many mothers lacked antenatal care and the surgeon was not consulted until they were in labour.

Major advances that reduced maternal mortality appeared between the 1860s and 1880s. Lister introduced his antiseptic principle in surgery in 1867.[5] Closure of the uterine incision had been avoided in the belief that silk sutures would cut out during post-delivery contractions and would require another operation for their removal. Porro in Italy modified the operation in 1876 to avoid haemorrhage and sepsis from the unsutured uterus. After delivering the foetus, he tied a strong wire round the cervix, and performed a subtotal hysterectomy with both bilateral salpingo-oophorectomy.[37] This reduced maternal mortality but sterilized the mother. In 1882 Sänger in Germany closed the uterine wound with silver wire sutures that produced minimal reaction and infection, maternal mortality fell below 10 per cent, and the mothers remained fertile.[38] By the turn of the century Sinclair in Manchester, who followed Radford's vision of antenatal preparation for elective Caesarean sections in mothers with rickets or osteomalacia, reported 10 successful elective cases under ether or chloroform with survival of all mothers and babies.[39]

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THE FIRST CAESAREAN SECTION UNDER GENERALANAESTHESIA

Dr D Zuck, Past President HAS, London

Introduction

This paper owes its origin to an enquiry forwarded to me from the AAGBI in July 2001. It came from Dr. Akaki Bakradze, an obstetrician in Georgia, in the Caucasus, not the United States He was preparing a talk about the history of Caesarean section, and asked for information about the earliest to have been performed under general anaesthesia. I was surprised to find that I could not answer this off the top of my head, so I did what we all do in such circumstances and referred to Duncum [1] ; and I was even more surprised to find that this very important event isn't even mentioned by her, nor is it in any of the histories of obstetrics that I have been able to look at; so what I thought would be very easy to answer turned out to require a considerable amount of research. When I did finally turn it up I put a brief note on the HAS web site for the record. That was ten years ago, and I intended to develop the subject at the time, but other things intervened.

The Problem

Until the end of the nineteenth century, or perhaps even later, childbirth was a hazardous event in the best of circumstances; but for women with severe deformity of the pelvis, usually from the all too prevalent infantile rickets, pregnancy could be a death sentence. At best the woman's life might be saved by an early induced abortion, at worst by the intra-uterine instrumental destruction of the child and its extraction piecemeal. As medical students in the early 1940s we still received descriptions of the use of cranioclasts, cephalotribes, sharp and blunt hooks, and decapitation saws, instruments designed to perforate, crush and remove the foetal skull. But oddly enough, Simpson, who had so strongly pressed the case for pain relief in labour, took a very illiberal approach towards such women, who, he said, should never be married, and had allowed their lust to get them into this life-threatening situation. He would never induce an abortion for such a woman; she should take her chance of Caesarean Section. [2]

The Patient

The patient was Sarah Bartlett, a dress-maker, unmarried, of mild disposition, only four feet one inch in height and much deformed, as a result of childhood

rickets. She lived in lodgings at 31 Upper Rosoman Street, Clerkenwell. [3] In the two published accounts she is said to be 27, or 37, years of age [4] ; independent documentary evidence confirms the latter, surprisingly, because in the *London Medical Gazette* it is stated that on 7th April, ' while under temporary excitement, she had connexion once with a young man lodging in the same house.' [5] She had no idea that she might be pregnant when she consulted a doctor on Saturday 3rd October 1846, Mr. Philip Jolin, of 22 Coppice Row, Clerkenwell, complaining of pain and swelling of the abdomen, although menstruation had ceased six months previously. [6] She had been attending the Finsbury Dispensary with these symptoms for five months, without any benefit. Mr. Jolin explained the need to examine her, and arranged to see her in bed in her lodgings in the presence of her landlady, which he did four days later. Auscultating the abdomen with a stethoscope he distinctly heard a foetal circulation, but in the presence of the landlady he said nothing, only prescribing a tonic and arranging for her to come to his surgery in three days time to report on her progress, which she did. She said that she felt much better, had slept well for the first time in many weeks, and wished to continue with the medicine; but Mr. Jolin now raised the question of pregnancy, which at first she denied. So he explained to her the seriousness of her situation, and the necessity for him to make a vaginal examination to determine whether in view of her external deformity she would be able to effect a natural delivery. This must have come as a great shock because she was intensely anxious about her reputation, and it took several days for her to come to terms with her situation and consent to an internal examination; but this was done on 23rd October, when it was found that the antero-posterior diameter was only one and one third inches, as against the average normal of four. She was immediately told that the only hope for her survival was a Caesarean section, and she readily agreed to put herself into the hands of the doctors.

Mr. Jolin recommended Mr. Skey, Assistant Surgeon at St. Bartholomew's Hospital, and with Miss Bartlett's consent arranged for him to see her at Jolin's surgery, which he did on 3rd November, one month after the initial consultation, and agreed for her to be admitted to St. Bartholomew's two days later. Mr. Jolin met her at the entrance to the hospital on 5th, took her up to Lucas Ward, and saw her settled in. Two days after admission she was examined in the presence of Messrs. Skey and Jolin by three leading obstetricians, Dr. Edward Rigby and Dr. Prothero Smith of Bart's, and Dr.Robert Ferguson, accoucheur to the Queen. The diagnosis and proposed management were confirmed; embryotomy was considered and dismissed because of the extreme narrowness of the pelvis. The plan, in the interest of her own social situation, was to keep her in hospital; and, in the interests of the child, to allow the pregnancy to proceed to term, and operate as soon as she started in labour. But the truth was that she did not want

the child, and would have preferred to lose it. Mr. Jolin visited her from time to time, and observed that she was in good health and spirits; and so she remained in hospital for some ten or eleven weeks, at no expense to herself, until the morning of Monday, January 25th 1847, when she went into labour.

The Progress of Labour

Labour commenced at about twenty minutes to three in the morning, and two hours later Mr. Haig, the house surgeon sent a message to Mr. Skey, telling him that the membranes had ruptured. [7] Mr. Skey arrived at the hospital at twenty past five, and made an internal examination. She was having strong contractions every two minutes, but the os was indistinct, flabby, and soft. Things had changed greatly since she first presented – general anaesthesia had been introduced, but there was anxiety that ether might relax the uterus and interfere with postpartum retraction, so she was given a few breaths to inhale to test its effect, and it seemed that the contractions may have slowed. At six o'clock Mr. Rigby arrived and made an internal examination also. It was decided to wait for one hour.

The Report

There was a report of the operation, slightly inaccurate in one or two respects, in the *London Medical Gazette*. A much fuller one appeared in *The Lancet*, the absence of an author's name indicating that it had been written by one of the journal's reporters [8] ; and the spreading news of the operation had evoked such interest that there was even a short 'trailer' in the issue of the previous week! [9] In fact *The Lancet's* report was so full that it set me wondering why there was so much detail. Then it suddenly dawned on me that the Editor, Thomas Wakley, must have become aware that he had missed the scoop of the century at University College Hospital on 21 December 1846 by not having a reporter in the operating theatre. Consequently no contemporary eye-witness account of Liston's operation or of the anaesthetic exists, and as a result, as we are well aware, there is no definitive record of such basic information as who administered the ether, and who was in the theatre at the time. The reason for not sending a reporter may have been that eight years previously Wakley had been personally instrumental in exposing as frauds two young girls, the Okey sisters, who were being promoted by John Elliottson, physician to UCH, as subjects extremely susceptible to hypnotism, and he must have decided that Liston's trial of ether was going to be a similar fiasco; so no reporter was sent.[10] We know from William Squire's Memoir that Liston had the incident with the Okey sisters very much in mind that weekend, and was so concerned to avoid any risk of a repetition of that failure, and consequently being attacked by Wakley, that he spent most of the preceding day repeatedly testing and checking

the apparatus. [11] After Liston's successful demonstration *The Lancet* carried reports of operations without pain every week from the main London and Provincial hospitals, and with the mounting numbers, and the ensuing correspondence, Wakley must have come to realise the importance, the historic importance, of what he had missed; so he must have been determined that the momentous and historic event that was to take place towards the end of January should receive full coverage. As a result we know the name of every person of note who was present in the theatre, we know who administered the ether, even who monitored the patient's pulse, and we have a detailed step by step account of the operation. Apart from Skey, Tracy, Haig the house surgeon, and Jolin her own doctor, we have the names of nine practitioners who were present. Five were, as they used to be called until the specialty had its own College, obstetric physicians, who, as the title implies, while they applied forceps, did not operate. Three were Skey's colleagues from the staff of St. Bartholomew's, two physicians and one assistant surgeon, and one who would today be called a paediatrician.

Dramatis Personae

Frederic Carpenter Skey (1798-1872). MRCS 1822; FRCS (Hon) 1843; FRS 1837. Assistant Surgeon to St. Bartholomew's Hospital 1827, Surgeon 1854, and Lecturer on Surgical and Descriptive Anatomy. He held other appointments, and was the author of various publications. President RCS 1863. CB. [12]

Fig. 1 Frederic Skey

Samuel John Tracy (1813-1901). Administered the ether – he performed the duties of dentist to Bart's for ten years before gaining the qualification MRCS in 1849, after which he was appointed Surgeon Dentist in 1850. He was quick to introduce ether anaesthesia to the hospital, and described a hookah-like inhaler of his own design. In 1850 he claimed to have given some 7000 anaesthetics for dental extractions without mishap. He held other dental appointments. He became LRCP Edin. in 1860. [13]

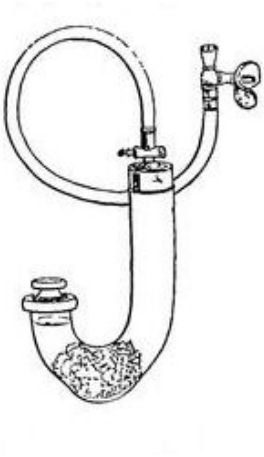


Fig. 2 Tracy's ether inhaler

Philippe (Philip) Jolin (1802-1862). Born in St. Helier, Jersey, was apprenticed to an apothecary in London from 1830 to 1835. Passed the examination and became a Licentiate of the Worshipful Society of Apothecaries on 13 February 1845. Set up as a general practitioner at 22 Coppice Row, Clerkenwell. About 1844 he had a son, Philip, with his housekeeper, Harriet Tomlin. Died in July 1862. He seems to have been a good clinician and a considerate and kind doctor. According to the Jolin family records, unless it is a case of mistaken identity, he also had a wife and six children in St. Helier. [14]

Edward Rigby MD Edin. 1825, FRCP Lond. 1843, very distinguished son of a distinguished father. Senior Obstetric Physician to the General Lying-In Hospital; Physician to the Hospital for Women, Red Lion Square; Examiner in Midwifery and the Diseases of Children at the University of London, Lecturer in these subjects at St. Bartholomew's Hospital, formerly at St. Thomas's. Many publications, including translation of Naegele on The Mechanism of Parturition, and new edition of William Hunter's Anatomical Description of the Human Gravid Uterus. Undoubtedly the leading obstetrician in the country.

Robert Ferguson MD. Physician-Accoucheur to Her Majesty the Queen; one of the censors of the Royal College of Physicians; Physician for the Diseases of Women and Children, and late Professor of Midwifery, at King's College Hospital. [15]

Sir James Eyre MRCS 1814, MRCP 1831, MD Edin. 1834; Physician to the Women and Children at St. George's and St. James's Dispensary. [16]

Protheroe Smith MD Aberdeen, MRCP, Obstetric Physician, Assistant teacher of Midwifery at St. Bartholomew's Hospital; several other hospital and dispensary appointments.

Clement Hue, FRCP, Senior Physician to St. Bartholomew's Hospital; a trustee of the Foundling Hospital.

Eusebius Arthur Lloyd MRCS 1817, FRCS (Hon) 1843; Assistant Surgeon, St. Bartholomew's Hospital.

Thomas Wormald MRCS 1824; Assistant Surgeon to St. Bartholomew's Hospital; late Surgeon to the Foundling Hospital.

Henry Jeaffreson MD Cantab. 1838, FRCP; Assistant Physician to St. Bartholomew's Hospital.

Joseph Moore MD Glasgow 1814, MD Edin 1815, MD Paris 1818. MRCP. Obstetric Physician, several hospital appointments.

John Bemersyde Haig MRCS 1842. House surgeon to St. Bartholomew's Hospital (second year).

The Operation

At twenty minutes to eight Miss Bartlett was carried downstairs on a stretcher, and placed on the operating table. [17] Mr. Tracy administered ether slowly for seven or eight minutes, using the inhaler of his own design. [18] The intention was to anaesthetise her to loss of consciousness, and, to minimise the effect on the uterus, to operate while the ether was wearing off, but she was not completely anaesthetised at the start of the operation. She was catheterised, and Mr. Skey made a nine inch midline incision down to and through the linea alba, starting two inches above the umbilicus. As soon as the abdominal cavity was open the omentum protruded, and was replaced. Mr. Skey then inserted a long director of his own design with a bulbous end, and cut down on it, laying open the

peritoneal cavity. [19] He passed his hand round the sides of the uterus and identified the centre line, which he incised longitudinally until he had opened the cavity, then inserted a deeply grooved director and extended the incision to six inches. He ruptured the membranes with his fingers, and the foetus immediately presented, with the cord in front and the head downwards. He extracted the child, a girl, and handed her to a nurse sitting at the foot of the table; then, 'by a slight internal movement of his fingers,' he removed the placenta and membranes, which came away without any difficulty. This was five and a half minutes from the start of the operation. The problem now was, in modern parlance, that there was no viable exit strategy. Accumulated experience showed that suturing the uterus resulted in a fatal inflammatory reaction along the suture line. Also, there was no routine method of closing the abdomen. Intra-abdominal operations were very few and far between; this may well have been Mr. Skey's first. [20] It was certainly his first Caesarean section; three years later he was described as the only surgeon in the metropolis who had performed the operation on a living patient. [21]

Although the uterus contracted rapidly there was much bleeding. Mr. Skey applied pressure, and poured a jugful of cold water, of unknown origin, over it. Mr. Haig, remarking that he could feel the aorta pulsating, continued to squeeze it. After being observed and compressed for about half an hour, when the obstetric physicians considered that it had contracted to its natural immediate post-partum size, it was returned to the abdominal cavity, the incision unsutured, still oozing small quantities of blood. During this time Miss Bartlett was given some secale cornutum, an ergot preparation, but vomited it up. [22]

After consulting with his assembled colleagues Mr. Skey inserted a single suture across the middle of the wound, after which it appears, although the description is obscure, that an interrupted bandage was applied, *through which* he sewed up the wound with eleven sutures. Over this he applied broad strips of sticking plaster, finishing up with a large pad of cotton wool and an eight-tailed flannel binder. [23]

Miss Bartlett was then carefully lifted onto her bed, wrapped in a warm blanket, and carried back to her room. She vomited, and was somewhat exhausted, but not extremely so. Mr. Skey prescribed half a grain (30 mg) of morphine, a large dose for such a small woman even by mouth. During the operation her pulse was monitored by Dr. Jeaffreson and Mr. Jolin. It was good throughout, her face was tranquil, and had its natural pallor. She did not cry out, only expressed a wish to be back in bed. In the opinion of the reporter Mr. Skey had performed the formidable operation with the utmost self-possession, dexterity, and skill; it had taken one hour.

The Anaesthetic

Although the contrary was asserted in some accounts of the case, including that in the *London Medical Gazette*, *The Lancet's* reporter noted that the inhalation of ether vapour had been only very partially successful. Apparently the reporter did not understand what Tracy was trying to do, which was to maintain a level plane of analgesia without loss of consciousness with a vaporizer that was not up to the requirement that it supply a steady flow of ether vapour in air at a constant concentration. But even if Tracy's aim had been for full surgical anaesthesia he would have found this difficult to achieve, because his inhaler embodied all the features that John Snow condemned – the vaporizing chamber was of glass, a poor conductor of heat, free passage of air was obstructed by an ether-soaked sponge, and the breathing tube was far too narrow. [24]

Postoperative Progress

At one o'clock she was given some brandy and egg, then slept for an hour or two. Lochial discharge mixed with some arterial blood became apparent. She complained of a great deal of continuous severe pain, relieved by suprapubic pressure. At six she was given some beef tea, and at ten another half grain of morphine, after which she slept. The following morning she was pale, perspiring, anxious, with a weak and very rapid pulse, and great thirst, drinking freely of toast-and-water. In the afternoon she became restless and nauseated, with very great abdominal pain, relieved when Mr. Skey loosened the dressings. She drank iced water copiously. The question of blood-letting was considered, and rejected by both Mr. Skey and Dr. Rigby; being puerperal she was now handed over to the care of the latter. She was ordered six grains of calomel, one grain (60 mg) of morphine, and an enema.

By early afternoon she was restless and very thirsty, her breathing was quicker, her pulse rapid and at times intermitting. She was ordered a beef-tea injection with brandy. She was suffering intense abdominal pain, so severe as to cause her to throw herself about and try to get out of bed. She gradually sank, and died at eight o'clock in the evening, thirty six hours after the operation.

Autopsy

The abdominal incision was quite ununited. Not one of the eleven sutures had gone through the peritoneum. The cut edges of the uterus were in direct contact with the abdominal muscles, the cavity being quite open. There was some peritonitis, but not great nor severe. After removing the pelvic viscera the true conjugate diameter was found to be barely more than one inch.

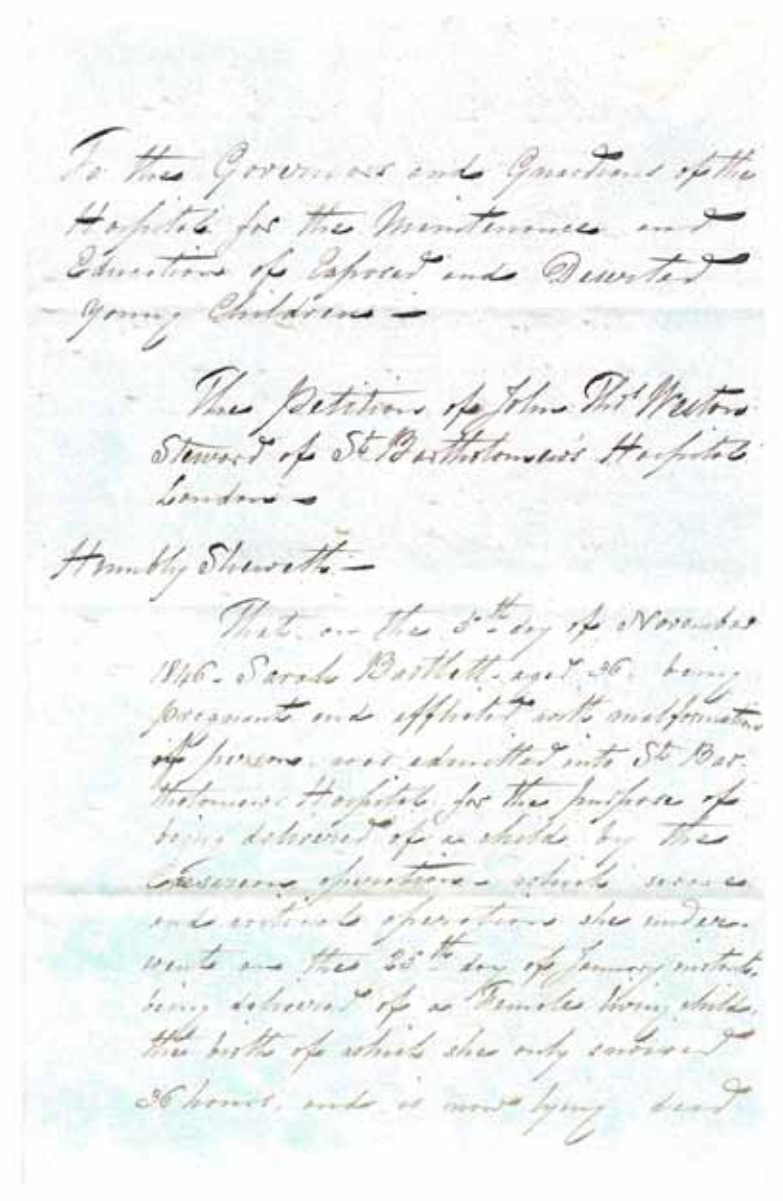
The Child

She was a fine healthy girl of average size. She was put in a warm bath and started to cry. In Mr. Jolin's opinion Miss Bartlett's pulse started to flag and she started to sink as soon as she heard the cries. When the child was put to her breast she became flushed, and the child's cries seemed to distress her. Being unmarried, and so very concerned about her reputation, for she must have been well-known in her local community, the situation she found herself in must have been devastating. After she died her sister told Mr. Jolin that she was desperate to conceal the birth of the child and had convinced herself that it was dead, letting it be known that she was going in to hospital to have a tumour removed. She had asked her sister to be at the hospital at the time of the operation, and to promise, if the child were born alive, to take it to her home and suckle it, having a young child of her own, and to tell her husband that it was a child she had agreed to nurse. This the sister refused to do, being anxious not to jeopardise her own domestic situation should her husband discover the deception. This refusal, and her dire situation should both she and the child survive, weighed heavily on Sarah's mind. Mr. Jolin was convinced that this was the main cause of the fatal termination, that she had no will to live. After her death the child was handed over to the Foundling Hospital.

The Foundling Petition

To gain admission to the Foundling Hospital a Petition had to be submitted, almost always by the mother. [25] The Trustees gave priority to respectable women who had found themselves in the unfortunate situation of Miss Bartlett, with the aim of relieving them of the burden of the child, and allowing them to return as soon as possible to their previous self-supporting occupation. The Trustees were determined that the hospital should not become the dumping ground for the children of prostitutes; in spite of the name by which it was generally known, foundlings were not admitted. The records of the Foundling Hospital are in the London Metropolitan Archives, which is also in Clerkenwell, and I was lucky enough, when I had almost given up, to find the Petition for the admission of Sarah Bartlett's child.

This sad document, a story of seduction and abandonment after a promise of marriage, was submitted by the Steward of St. Bartholomew's, John Thomas Weston on 29th January; and the Trustees unanimously accepted the child for admission on 30th. There the trail goes cold. I could not find a child in the Admissions or Baptismal Registers whose details even approximated to Baby Bartlett's, so it has not been possible to see whether she survived to progress to the Apprenticeship Register. [26]



To the Governors and Guardians of the Hospitals for the Maintenance and Education of Exposed and Deserted young Children —

The Petition of John Pitt Weston Steward of St Bartholomew's Hospital London —

Humbly Sheweth —

That on the 5th day of November 1846 Sarah Bartlett aged 36 being pregnant and afflicted with malformation of persons was admitted into St Bartholomew Hospital for the purpose of being delivered of a child by the cesarean operation — which was performed accordingly on the 23rd day of January instant being delivered of a Female living child the birth of which she only survived 36 hours, and is now lying dead

Fig. 3 The Petition.

Fig. 4 The Cover.

Ethical Considerations

Although Skey had assembled a galaxy of supporting specialists, not everyone was in agreement with the management of the case. In a letter to *The Lancet*, 'Scrutator' asserted that labour should have been induced immediately, at six months, when the diagnosis was made; there was room at the sides of the pelvis to allow the head of a six-month foetus to be perforated and extracted with ease and safety. [27] In a report to the Royal Medical and Chirurgical Society about the second Caesarean section performed by Mr. Skey, in 1850, Dr. Charles West, Physician-Accoucheur to Saint Bartholomew's Hospital, [28] wrote, 'Agreeing, as

I do, most cordially, with the rule laid down in British Midwifery, [29] which gives the mother's life a claim paramount to every other consideration, it cannot but be with a feeling of deep regret that I am compelled to add another to the long list of failures of this operation.' Although West's patient, married, had been under the care of her general practitioner from the fifth month of pregnancy, she did not present any external appearance of skeletal abnormality, and it was only after she had gone into labour that she was found to have an extremely deformed pelvis, with a conjugate diameter of about one inch. So in this case the surgeon's hand was forced, but this did not apply to Sarah Bartlett. The management proposed by 'Scrutator' would have been in accord with the rule cited by West; but it seems that 'Scrutator' had not read the report in the *London Medical Gazette*, where it is clearly stated that embryotomy had been considered and dismissed.

Conclusion

That Miss Bartlett, a patient in the charitable hospital system of mid-19th century Britain, received care, consideration, and medical attention which far exceeded what she would have received in the National Health Service today, can be explained by the summing up of *The Lancet's* reporter, who concluded, 'Altogether, the present case, though it terminated fatally, is one of the most interesting that has ever occurred in obstetric history.'

Acknowledgements

I am grateful to Dr Henry Connor, Prof. Roger Maltby, Hazel Bailey of the Foundling Museum, the staff of the London Metropolitan Archives, Sophie Cawthorne of Bart's Archives Dept., Elaine Garrett, Librarian, Royal College of Obstetricians and Gynaecologists, Professor Pam Lieske of Kent State University USA, Professor Peter Vinten-Johansen, Dr Carol Homden, Chief Executive of Coram, and to the anonymous *Lancet* reporter, whose humanity led him to pursue Sarah Bartlett's story beyond its usual clinical bounds .

Addendum

(Cover) 1847 Petition of The Steward of St. Bartholomew's Hospital
ordered to be admitted unanimously William Curtis V.P. 30/1./47

To the Governors and Guardians of the Hospital for the Maintenance and Education of the Exposed and Deserted young Children – This Petition of John Thos. Weston, Steward of St. Bartholomew's Hospital, London, Humbly Showeth –

That on the 5th day of November 1846 – Sarah Bartlett – aged 36, being pregnant and afflicted with malformation of person, was admitted into St. Bartholomew's Hospital for the purpose of being delivered of a child by the Caesarean operation – which serious and critical operation she underwent on the 25th day of January instant. being delivered of a Female living child, the birth of which she only survived 36 hours, and is now lying dead within the walls of the said hospital.

That subsequent to the admission of the said Sarah Bartlett into the said Hospital your Petitioner enquired of her the particulars of her life and of her situation – when she stated to your Petitioner that she had followed the occupation of Dress-making (lastly at No 31 Upper Rosamond Street Clerkenwell) and maintained herself creditably for many years until some time in the years 1846. when she was seduced under promise of marriage by one Henry Paget a working jeweller, of whose residence (at the time of making this statement) she had no Knowledge, and that the said Henry Paget having seduced her, afterwards deserted her –

That your Petitioner has every reason to believe this statement of the deceased to be true, the same having been reported by the said Sarah Bartlett to the Superintendant Nurse of the Ward in which she was placed in the said Hospital, and confirmed for the most part by a Mrs Burnett a sister of the deceased. –

That the said Sarah Bartlett's relations are poor and appear unable to maintain the said child –

That Saint Bartholomew's Hospital is extra Parochial –

Your petitioner therefore humbly prays that under the peculiar circumstances of the case as detailed the said child may be admitted into the Foundling Hospital, and your petitioner as in duty bound will ever pray –

J.T. Weston
St. Bartholomew's Hospital
29th January1847

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2. Zuck, D. Simpson as a teacher - a student's notebook. *British Journal of Anaesthesia* 1976; **48**: 1103-1111.

3. Rosoman Street was named after Thomas Rosoman, who owned and developed Sadler's Wells in the 1730s. It is mis-spelled as 'Rosamond' on some maps. A very short segment of what was originally a very long street remains, and in the northward continuation there are still three Victorian houses which give an idea of what Sarah Bartlett's lodgings may have been like. At the time of writing, a one-bedroom flat in one of them was on sale for £600,000!

4. St. Bartholomew's Hospital: Caesarean Operation performed by Mr. Skey. *London Medical Gazette 1847***; 39**: 212-213: Hospital Reports: The late case of Caesarean operation performed by Mr. Skey. *Lancet* 1847; **i**: 139-140.

5. Uncertainty about the length of human gestation was highlighted by a footnote pointing out that 'It is worthy of remark that the full period from intercourse (to the onset of labour) was here 293 days.'

6. Coppice Row was immediately south of Mount Pleasant, and was incorporated into Farringdon Road when it was cut through and developed during 1845-46. Crossing the road from Rosoman Street would have been a muddy experience until the work was completed.

7. I have not been able to discover the mechanism for calling senior staff in for emergencies before the days of the telephone, an eventuality that was in any case probably very uncommon. Possibly medical students were used as messengers.

8. St. Bartholomew's Hospital: Caesarean Operation performed by Mr. Skey. *London Medical Gazette* 1847**; 39**: 212-213: Hospital Reports: The late case of Caesarean operation performed by Mr. Skey. *The Lancet* 1847; **i**: 139-140.

9. Operations without pain – St. Bartholomew's Hospital. *The Lancet* 1847; **i**: 132.

10. Experiments performed on Elizabeth and Jane Okey at the house of Mr Wakley, Bedford Square. *The Lancet* 1838; **ii**: 805-814. See also – Woolley, B. *The Bride of Science*, Basingstoke, Macmillan 1999, Pan Books 2000, 224-230.

11. Squire, W. On the introduction of ether inhalation as an anaesthetic in London. *The Lancet* 1888; **2**: 1220-1221: and, The first operation under ether in Great Britain. *British Medical Journal* 1896; **2**: 1142-1143.

12. Plarr's *Lives of the Fellows of the Royal College of Surgeons*, 300-302.

13. Thornton, J.L. Samuel John Tracy (1813-1901). *Anaesthesia* 1952;**7**: 72-76.

14. The family tree for Philippe Jolin and Harriet Tomlin (Jolin Chart 0406) will be found at http://web.ukonline.co.uk/j/jolin406.htm

15. The Royal College of Physicians has recently acquired Ferguson's diaries. I am grateful to Dr. Henry Connor for examining them; unfortunately they do not cover the period of this operation.

16. I am grateful to Henry Connor (personal communication) for additional and very entertaining information about the life and career of Sir James Eyre. Operating theatres were lit by skylight, and elective operations were performed around noon to early afternoon. Sunrise in London on 25th January 1847 was at 0749 hrs. Gas lighting was not introduced to Bart's until 1849, and then only one point per ward over the sister's table. I have not been able to determine how the operating team could see what they were doing.

17. Tracy, S.J. Apparatus for the respiration of ether vapour. *London Medical Gazette* 1847; **39**: 167. In a later letter (*LMG* 1847; **39**: 258) Tracy mentioned that he had used his inhaler during the Cesarean operation.

18. We need to remember that apart from the absence of asepsis, most of the everyday surgical instruments, such as tissue forceps, had not yet been invented. In 1847 Spencer Wells was a surgeon in the Royal Navy, in Malta.

19. Skey's textbook, *The principles and practice of operative surgery* 1850, London, Churchill, (2nd edition Longman 1858,) does not contain a chapter, or any information, about abdominal surgery.

20. West, C. Account of a case in which the Caesarean operation was performed; with remarks on the peculiar sources of danger attendant on the operation. *Transactions of the Medico-Chirurgical Society* 1851; 34: 61-88.

21. The use of an ergot preparation by midwives to speed up labour was mentioned in a publication as early as 1582. However it was first brought to medical attention in 1808 by John Stearns in the United States, but it fell into disrepute for a while when his warning against its use in obstructed labour was ignored. There is an account of secale cornutum and its mode of preparation and use in Christison's *Dispensatory,* 1848, 409-415. For a full history of ergot and the unravelling of its alkaloids, see Sneader, S. *Drug discovery: the evolution of modern medicines.* Chichester, Wiley, 1985, 105-109.

22. Not until 1882, after Lister's work on the sterilization of suture materials, was the uterus sutured after a Cesarean delivery, by the German surgeon Max Sänger (1853-1903), whose pioneering series established the procedure.

Examination of successive editions of textbooks of operative surgery shows that the practice of closing abdominal incisions in layers was gradually adopted in Great Britain between 1880 and 1910.

23. Westminster Medical Society. *London Medical Gazette* 1847; **39**: 156.

24. There is an excellent account of the history and procedures of the Foundling Hospital in Cruickshank, D. *The Secret History of Georgian London*, London, Random House Books, 2010, 246-276.

25. The newborn were immediately baptised, given a new name and a number, and sent out to a wet nurse. They were brought back to the Hospital at the age of three, taught 'the three Rs', and prepared for apprenticeship. The transcript of the Petition is reproduced by permission of the Thomas Coram Foundation for Children (Coram) / London Metropolitan Archives.

26. *The Lancet* 1847; i: 395. Remarks on the late case of Caesarean operation performed at St. Bartholomew's Hospital.

27. West, C. Account of a case in which the Caesarean section was performed; with remarks on the peculiar sources of danger attendant on the operation. *Transactions of the Medico-Chirurgical Society* 1851; 34: 61-88, especially .

28. I have not been able to find any mention of a British Midwifery protocol in histories of obstetrics, nor in contemporaneous textbooks.

29. An exhaustive search for contemporary textbooks, and of the *British Record of Obstetric Medicine and Surgery* for 1848-1849, has failed to find a protocol entitled British Obstetrics. I am grateful to Elaine Garret, Reader Services Librarian, R.C.O.G. for her help.

THE FAMILY HISTORY AND GENEALOGY OF JAMES YOUNG SIMPSON

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"Every Scottish man has a pedigree. It is a national prerogative as inalienable as his pride and his poverty." from J.G.Lockhart in "The Life of Sir Walter Scott." It was really written by Sir Walter Scott in Chapter 1 of John Gibson Lockhart's "Life of Sir Walter Scott".
This year and at this meeting, we celebrate the bicentenary of the birth of James Young Simpson (JYS) on 7th June 1811. It is therefore useful and appropriate to know about the background of his family.

According to the information in the Pedigree of the Linlithgowshire Simpsons prepared by Robert Russell Simpson WS, (Son of brother Alexander Simpson and nephew of JYS) the family had for several generations been settled at Winchburgh and its neighbourhood in the County of Linlithgowshire where they were tenants of small farms. Winchburgh is a small village in the parish of Kirkliston. It stands by the side of the Union canal on the road eleven miles west of Edinburgh and six miles east of Linlithgow

ALEXANDER SIMPSON 1725 - 1816

Alexander Simpson, the grandfather of James Young Simpson was born on 24th March 1725, the son of Alexander Simpson, a tenant at Gartroven, and Mary Nimmo. He became a farmer in Winchburgh and was also a farrier (i.e. a smith who shoes horses), a trade that was much in demand in the farming communities, and he had a reputation for having great skill with animals.

At the age of 24 on 17th May 1749 he married Isabella Grindlay from Midhope, Abercorn in Linlithgowshire. This marriage is important because JYS then married his first cousin once removed.

Alexander and Isabella had five sons and twin daughters. Alexander, John, Thomas, Isobel and Margaret, and then David, the father of James Young Simpson, were born when the family were in Winchburgh.

In 1764 they moved to and settled in Slackend, Torphichen, four and a half miles north of Bathgate, and here Alexander Simpson was a tenant farmer and farrier, and another son, George was born that year.

Slackend , is described in the Ordnance Survey Name Book as a place a quarter of a mile South East of Torphichen consisting of a few small thatched cottages one story high with gardens attached. These have now been pulled down and in 1997 new modern dwellings were being built in the area.

Isabella Grindlay died in 1786 and Alexander died in 1816, having never moved away from Slackend, and his eldest son Alexander succeeded him there. James Young Simpson was five years old when his grandfather died and is unlikely to have been influenced by this very old man, but could have inherited some of his manual skills.

THE CHILDREN OF ALEXANDER SIMPSON AND ISABELLA GRINDLAY

1. Alexander. Born 5 August 1750. Succeeded his father at Slackend. Died in 1821. Married a Jane Wallace and had children
2. John. Born 19 October 1752. A distiller. Died unmarried on 19 July1823. Buried at Torphichen.
3. Isabella, a twin. Born 5 February 1755. Died in infancy.
4. Margaret, a twin. Born 5 February 1755. Married a William Kay, a distiller in Torphichen, who is buried in the Torphichen Churchyard.
5. Thomas. Born 2 March 1757. Having been successful in business bought the farms at Gormyre, north of Torphichen. Died unmarried 14 December 1853. Buried at Torphichen.
6. **DAVID.** Born 12 June 1760. The father of James Young Simpson. His life is detailed below. Died at Bathgate in 1830.
7. George. Born 29 May 1764. Tacksman in Ballencrieff coal and lime works. Unmarried. Died 15 June 1832. Buried at Torphichen.

DAVID SIMPSON 1760 - 1830

David Simpson as one of the younger sons of Alexander did not follow his father into farming but initially served an apprenticeship as a baker. Then with his younger brother George he went to London to seek his fortune and see the world, working as a journeyman baker.

However, in 1783 their father wrote them a letter, appealing to them to return home, as he feared that they would be taken for military or naval service by the press gangs during the Peninsular Wars.

David settled in Bathgate, then a small town 18 miles from Edinburgh and 24 miles from Glasgow. The population was about 2500 and the main trades were

weaving for cotton manufacturers in Glasgow and coal mining . At first he was a distiller at Glenmavis on the eastern outskirts of Bathgate, initially in partnership with his elder brother Thomas. This venture failed because of new excise laws relating to alcohol, the refusal of the laird of Balbardie (Mr Marjoribanks) to enlarge the premises, and the effect of the Peninsular wars on the price of grain. A period as a brewer of beer failed as did an attempt to manufacture sugar of lead' (lead acetate, a substance with a sweet taste). His movements at this time can be traced in four abridgements of sasines, where he was involved in the purchase and sale of property in Bridge Street and High Street Bathgate, and in 1796 and 1800 he is described as a distiller and in 1802 as a brewer.

Meanwhile in January 1792 at the age of 32, while at Glenmavis he married the 21 year old Mary Jarvey, daughter of his neighbour John Jarvey , the tenant farmer of Balbardie Mains , and his wife Mary Cleland, who, it was claimed, could trace her family back to William Wallace. Although the date of this marriage is referred to in the Simpson pedigree and biographies, a record of it could not be found, because in the Linlithgow OPR the pages are missing between 1783 and 1813.

From 1792 to 1808, David and Mary Simpson had seven sons, one of whom died in infancy and one at the age of seven, and one daughter. In 1810, David Simpson returned to his original trade and commenced business as a baker in premises in Main Street, Bathgate. No sasine indicating that he had bought the property could be found, which suggests that it was rented. The houses in Main Street have been pulled down and all that remains is a clearance site.

At first the bakery business was slow to make progress, and at the time of the birth of their seventh and youngest son, JAMES, in June 1811, David Simpson was in debt, and his wife Mary took over the financial management of the bakery and the household. From that date the business prospered so that they were able to move into larger premises on the other side of Main Street.

Mary Jarvey worked hard for her family, but when her elder sons had left home and daughter Mary had gone to Grangemouth to keep house for her brother Thomas, and young JAMES had started school, her health failed. She seemed to be depressed and spent much of the day praying. She died in 1820 and Mary returned to look after the house and David Simpson until he died in 1830. Mary then emigrated to Australia with her husband John Pearson, a brewer.

At each road entrance to Bathgate there is a sign to commemorate that the town is the birthplace of James Young Simpson. It is sad that there was no other

memorial to him in the town such as a plaque in Main Street. NOW THERE IS A MUSEUM. However, one of the principal streets in Bathgate, which was there in David Simpson's time, is named Jarvey Street , after George Jarvey, a brewer, born in 1726, brother of John Jarvey. There is a pillar in Bathgate Jarvey Street Cemetery, which commemorates George Jarvey as one who by his industry greatly improved Bathgate.
John Jarvey and wife Mary Cleland, his father Thomas Jarvey, and his grandfather.
Thomas Jarvie is all buried in the same plot in Bathgate Kirkton cemetery.

CHILDREN OF DAVID SIMPSON AND MARY JARVEY

1. Thomas. Born 28 December 1792. In business in Grangemouth. Died 29 July 1864
2. John. Born 22 December 1794. In business in Bathgate. Died 13 February 1841
3. ALEXANDER Born 7 August 1797. Married Janet Russell. Bank agent in Bathgate. His son Sir Alexander Russell Simpson succeeded James Young Simpson as Professor of Midwifery at Edinburgh University in 1870.
4. Mary . Born 3 August 1800. Married John Pearson, a brewer, and emigrated to Victoria, Australia.
5. George. Born 5 December 1802. Died in infancy.
6. David. Born 17 August 1804. A baker in Edinburgh then emigrated with his family to Hamilton Australia where he died in 1865.
7. George. Born 7 June 1808. Died 23 January 1814.
8. **JAMES**. Born 7 June 1811. Died 6 May 1870.

BIRTH AND EARLY LIFE IN BATHGATE

James Young Simpson was born on the 7th June 1811 in the house in Main Street, Bathgate where his father had the bakery. The local medical practitioner, Dr Dawson kept detailed records of visits to his patients. Two volumes of these records were available to Duns, who noted this entry: -
No 275. Simpson, David, baker, Bathgate. Wife, Mary Jarvie. Age 40. Lab. nat. easy. rapid. 8th child. Son. Natus 8 o'clock. Uti veniebam natus (Born before arrival). Paid 10s 6d. (Half a guinea).

Rapid labour after multiple pregnancies and therefore the delivery of a child before the arrival of the medical attendant or midwife is a common occurrence.
The following entry appears in the Linlithgow OPR 662/2 for 1811.
June 7th David Simpson and his spouse Mary Jarvey had a child born.
Baptised 30th June - James Simpson.

The addition of Young, to his first names appeared later. Again there are different spellings of his mothers surname in the doctor's note and the OPR.

James was the seventh son born to this family. There has been a long held tradition in Scotland that a seventh son was special and would bring 'good luck' to a family, and with James this proved to be so, for from that date the bakery business prospered, but this could have been due to the administrative skills of Mary Jarvey.

James thrived and flourished and at the age of four went to the local school, where he had excellent teachers, was usually the dux of his class, and was already showing evidence of aptitude for learning, and a most retentive memory. He had a happy home life and was dearly loved by his older sister and brothers, and was a particular favourite of Alexander (Sandy). He played his part in the family business by delivering the morning bread rolls.

As previously noted, his mother died when he was nine years old, and his sister Mary took over the household management. According to Eve Simpson, Mary Jarvey had managed the business so well that the family were now quite well off.

UNIVERSITY AND MEDICAL STUDIES

In 1825 when he was fourteen, James had learnt all that he could from his teachers in Bathgate. Bathgate Academy had not yet been founded, and the only means of further education for a bright boy was to send him to university to continue his education. It was also a common practice for the older siblings in a Scottish family to support a bright younger brother, and so James went to Edinburgh University. This period of his life is already well documented in various biographies.

ELECTION AS PROFESSOR OF MIDWIFERY AND MARRIAGE

In 1839 Professor Hamilton resigned from the Chair of Midwifery, which was the first of its kind in Great Britain, having been established in 1726. Its administration had always been under the auspices of the Town Council of the City of Edinburgh , who were thus responsible for the appointment of a new professor. Simpson, although he was only twenty eight, had already been in specialist practice as an obstetrician for five years, and so on 15th November he sent in his application for the post to the Lord Provost, together with eighty testimonials which he had received from colleagues. He had copies of the application printed and sent to anyone who could influence the Town Council,

for canvassing was allowed. His youth was a disadvantage, and so it is claimed was his provincial background. It was also suggested to him that it might be inappropriate for the Professor of Midwifery to be unmarried. Simpson wasted no time and wrote to Walter Grindlay in Liverpool requesting to marry his daughter Jessie. Walter Grindlay, who was a nephew of Isabella Grindlay, the wife of Alexander Simpson of Slackend, and was married to Margaret Scott had moved from Bo'ness to Liverpool where he was a ship owner. Jessie was therefore a first cousin, once removed.

James Young Simpson and Jessie or Janet Grindlay, as she is described on the marriage certificate and in the 1812 Bo'ness OPR record of her birth, were married according to the Rights and Ceremonies of the Established Church on the 26th December 1939, at the St John the Baptist Church in the Parish of Walton on the Hill, a suburb of Liverpool. At this point it should be noted that in both his application for the professorship and in his marriage certificate, Simpson is now called James Young Simpson. He may have adopted this additional name when he set up in private practice, as there was a James Simson in the City who was a surgeon. He probably chose the name Young as he was often called 'Young Simpson'. The young couple rushed back by coach to Edinburgh and set to work to catalogue the contents of his museum in which there were 682 items. This was to further impress the Town Council. There were four other candidates for the Professorship, the chief rival being Dr Evory Kennedy from Dublin. The result of the election was announced on 4th February 1840, James Young Simpson having been elected the Chair by a majority of one vote. James and Jessie were then able to go on their honeymoon. On their return they lived at 1 Dean Terrace.

A MOVE TO 22 ALBANY STREET.

Following his election as Professor, his practice and reputation increased, so that they needed a larger house in which patients could be seen. He accepted the sub tenancy of 22 Albany Street from a William Ingerson in March 1840. Albany Street is in the Northern part of the New Town on the opposite side of Dublin Street to Abercromby Place. Here their first child Maggie' was born, followed by two sons, David James in March 1842 and Walter Grindlay in September 1843. In May 1844 they were devastated by the death from diphtheria of their beloved ' Maggie'. She was buried in Warriston Cemetery, where Simpson had now bought a family plot. The Cemetery had been newly opened in 1843, designed by the architect David Cousin and modelled on the Père Lachaise Cemetery in Paris.

1854. MOVES TO 52 QUEEN STREET

By 1845, Simpson found that 22 Albany Street was too small for his increasing practice. They had two sons and Jessie was pregnant with another baby, Mary Catherine, born on 24th April 1845, so he bought a larger house at 52 Queen Street for £2,150. The sasine was completed on 20 June 1845.

Queen Street is in the New Town, parallel to George Street to the south and Heriot Row and Abercromby Place to the north, and is the longest sequence of eighteenth century architecture in Edinburgh.

The Simpsons lived at 52 Queen Street for the rest of their lives. The large house, a busy home and consulting rooms for the now famous obstetrician and gynaecologist were the scene of triumphs and tragedies over the years. They had six more children and lost four at Queen Street. The details of the lives and deaths of the children are set out later.

In 1853, so that the family could have somewhere to escape from the frenetic activity of Queen Street, Simpson bought a house in Trinity called 'Viewbank' in Laverockbank Road overlooking the Firth of Forth. The details of the sale are set out in an abridgement of a Sasine dated 18 October 1853.

His hectic lifestyle did not contribute to good health, and for the last years of his life he had rheumatism, sciatica, and developed increasingly severe attacks of angina leading to heart failure.

DEATH OF J Y SIMPSON

He died at home on 6th May 1870. The cause of death was dilatation and fatty degeneration of the heart.

Jessie refused the offer of burial in Westminster Abbey, and he was buried at Warriston with his children. His funeral was attended by all the Edinburgh dignitaries, and there were at least 10,000 people lining the streets of Edinburgh.

A committee was formed to decide on memorials to him, and resulting from their decisions, a plaque was placed in Westminster Abbey, a bronze statue by William Brodie was erected in Princes Street Gardens, and the Maternity Hospital was named the Simpson Memorial Maternity Pavilion, but when the Royal Infirmary moved to Little France, the name was changed to the Simpson Centre for Reproductive Health.

DEATH OF JESSIE SIMPSON

Jessie was unable to live without him and died on 17 June 1870 at Lady Blantyre's cottage in Killin where she had been taken to avoid the post funeral pressures. The cause of death was given as sudden cardiac syncope. She is also buried at Warriston.

THE CHILDREN OF JAMES YOUNG SIMPSON AND JANET (JESSIE) SIMPSON

The Simpsons had nine children, five of whom died before the death of their parents in 1870 and the other four survived into adult life. In all the records of births seen, Jessie Grindlay always appears as Janet.

1. Margaret Grindlay Simpson, (Maggie) was born on 16th October 1840 at 22 Albany Street. A much-cherished child, her parents were broken hearted when she died at home on 26 May 1844. She was the first of the family to be buried in the Simpson family plot at Warriston Cemetery. In a letter to his sister-in-law, Janet Russell, Sandy's wife, he said that Maggie, after an attack of measles had suffered a very bad sore throat and was unable to swallow or breathe. This could have been due to diphtheria or acute epiglottitis.

2. David James Simpson was born at 22 Albany Street on 26 January 1842. He was educated at Edinburgh Academy 1851 - 1857 and when he was fifteen he spent a year at the Gymnasium in Elberfeldt in Germany. On his return he studied Medicine at Edinburgh University and graduated M.D. in 1863, his thesis being entitled 'Syphilisation'. The thesis could now be written and presented in English. At the same time he passed the examinations for the diploma of Licentiate of the Royal Colleges of Surgeons and Physicians of Edinburgh .43 -66- After graduation he spent a year as a resident physician at Edinburgh Royal Infirmary, and also in 1863, like his father before him he was elected one of the Senior Vice Presidents of the Royal Medical Society. He then furthered his studies, particularly in obstetrics and gynaecology in Berlin and Vienna. On his return he became one of his father's assistants at 52 Queen Street, and set to work to put the sometimes chaotic Simpson Practice on a more business like footing 14. Sadly, just after the announcement at the beginning of January 1866 that James Young Simpson was to be made a Baronet, David was taken seriously ill, and died at home on 14th January. He is buried in the family plot at Warriston.

His father, in a letter to his second son Walter, describes that David had severe vomiting and jaundice, followed by abdominal ileus and then purpura. This would seem to have been a fulminating infection, probably acute hepatitis.

His death certificate gives the same clinical description as the cause of death, with the addition of albuminuria and kidney failure. Dr Andrew Wood signed the certificate. James Young Simpson was the informant and his characteristic signature can be seen clearly.

The suggestion by one biographer that he had appendicitis is probably spurious, because there is no history of abdominal pain.
His distraught father, knowing that his son was dying, wanted to refuse the baronetcy, but was persuaded by David before he died that he should accept the honour.

3. Walter Grindlay Simpson (Wattie) was born at 22 Albany Street on 1st September 1843. (1843 OPR. 6851 / 58. Edinburgh). He was educated at Edinburgh Academy 1853 – 1860 and Caius College, Cambridge. He then studied for the Bar and was admitted to the Faculty of Advocates in Scotland in 1873. On the death of his father in 1870, he succeeded him as the 2nd Baronet. While studying law in Edinburgh he became a close friend of Robert Louis Stevenson (RLS), who was a fellow law student. RLS described Walter as being shy, retiring and a slow thinker. They spent several holidays together, and Walter having taught RLS to canoe, was his companion on the canoe trip from Antwerp to the Mediterranean described in the book by RLS, ‘An Inland Voyage'. Walter's description of this voyage can be seen in the Simpson Mss at the Royal College of Surgeons. He contracted an irregular marriage with Ann Fitzgerald Mackay in 1874, but they were formally married on 13 January 1881 at Banchory Devenick, Kincardineshire, according to the forms of the Established Church of Scotland. They had two sons and two daughters, but according to RLS, the marriage was a disaster.

He practised at the bar intermittently and had various Edinburgh addresses.
He also had a country house at Balabraes of Ayton in Berwickshire and lived the life of a country gentleman. In 1871 he edited Volume 3 of his father's essays and papers on "Hospitalism' and in 1892 he had a book published, ' The Art of Golf'.

He died on 29th May 1898 at Balabraes of Ayton and is buried in the Simpson family plot at Warriston.. The cause of death is given as chronic interstitial nephritis for four years and cardiac dilatation.

The title of Baronet passed to his eldest son James Walter Mackay Simpson who was born in l882. He died unmarried in 1924 and the title became extinct because Walter's second son, Lt Odo Louis Mackay Simpson was killed in action in Belgium on 13 July 1918 at the age of thirty-three.

4. Mary Catherine Simpson was born on 24th April 1845 at 52 Queen Street.
Little is said about this child in the biographies or letters, except that she died in infancy on 16th February 1847 at the age of two. Amongst the RCSE Simpson Mss there is a list written in pencil with dates of death of all the Simpson children. On this piece of paper, Mary is stated to have died of scarlatina (scarlet fever).

5. James Simpson (Jamie) was born on 26th December 1846 at 52 Queen Street
His father was in London on 26th December visiting Robert Liston and Mary had died in February. He suffered from a severe disfiguring eczema all his life. He died at home on 14th February 1862 at the age of fifteen. His death certificate was signed by his father and the cause of death given as ' Long standing eczema - albuminuria - heart disease of many years - last illness five days. 'Sudden coma with rheumatic symptoms'.

This description would suggest that as well as eczema, he had rheumatic fever at some time and also had kidney failure.

6. Jessie Simpson was born at 52 Queen Street on 22nd September 1848.
She was now the only daughter, auburn haired and a great favourite. She is described as always being delicate, and was ill and confined to bed for some years before her death at the age of seventeen, on 15th February 1866, one month after the death of her brother David.

The death certificate was signed by Dr Andrew Wood and the cause of death given as General struma for several years. Abscesses and exhaustion for several months.

Struma is a general weakness. If she was confined to bed she probably had bedsores that had become infected. She could have had tuberculosis or was anorexic, so causing the weakness. She was very depressed after David's death as he was the only person that she would allow to dress her sores, and she went downhill very rapidly.

7. William Simpson.was born on 9th August 1850 at 52 Queen Street.
He was educated at Edinburgh Academy 1853 - 1860.
He became an artist and is named as such in the 1871 Census for Queen Street. He also knew Robert Louis Stevenson and was with him and Walter in Antwerp, where he is described as someone who liked to get drunk on absinthe. He was a witness at Walter's wedding in 1881, but does not appear in the Indexes to the 1881 or 1891 Censuses.

He died unmarried on 31 August 1911 at his home, Laverock Braes, Reston, Coldingham, Berwickshire. In the death certificate he is described as a landed proprietor, and his butler reported his death. The cause of death was 'Cerebral haemorrhage'.

8. Alexander Magnus Retzius Simpson was born at 52 Queen Street on 10th August 1852.

He was called after Magnus Retzius, the Swedish obstetrician who was staying with the Simpsons at the time. Unlike his brothers he did not go to Edinburgh Academy, but seems to have been to several schools. Mr Oliphant for four years, Merchiston Castle for one year, Queen Street Institution for two years and the Collegiate school for three years. In 1870 at the age of 18 he entered Edinburgh University as a medical student and graduated M.B, C.M in 1875. 10 His name does not appear at all in the Medical Register or Medical Directory. In the 1881 Census he was living at 5 Randolph Cliff with his sister Evelyn, where he is described as head of household and a retired M.B.

He died on 11th November 1884 at the age of thirty two at 15 Inverleith Row that was then the home of Evelyn.

His cousin Alexander Russell Simpson who was now Professor of Midwifery signed his death certificate. The cause of death was given as: -

' Mitral stenosis for many years - ulcerative endocarditis, probably 21 days - slight meningitis - probably 7 days'.

Therefore he would have had rheumatic fever or scarlet fever, and he had probably been an invalid for some time, which would explain why he had not practised medicine.

9. Evelyn Blantyre Simpson was born on 19th December 1856 at 52 Queen Street and named after her godmother Lady Blantyre.

She was only fourteen when her parents died. At first staying at Queen Street with her cousin Alexander Russell Simpson, she then moved with her brothers to 5 Randolph Cliff, off Queensferry Street, where Robert Louis Stevenson was a frequent visitor.

She became an author, publishing several books, notably the biography of her father, and an account of Robert Louis Stevenson's life in Edinburgh. She had a country house 'Bonardub' built at Coldingham, and an Edinburgh house in Inverleith Row.

She never married and died in Edinburgh on 23 January 1920 from cancer of the liver at the age of 65. She is buried in the family plot at Warriston.

COMMENTS

It was common in large Victorian families for a number of the children to die young, and the Simpsons were particularly unfortunate. The risks of infectious disease increased with the rise of urban populations. Many of the Simpson forebears who lived in the country survived to a great age, and his brother Alexander brought up a large and successful family.

It could be suggested that by marrying a first cousin once removed, that some of the Simpson children had some genetic weakness and that their immune systems could not easily combat infections. The severe eczema suffered by Jamie could also have been a genetic problem.

Apart from the tragic deaths, the Simpson household seems to have been a happy on as borne out by Eve Simpson in the biography of her father and a memoir in the 1911 issue of the Edinburgh Medical Journal.

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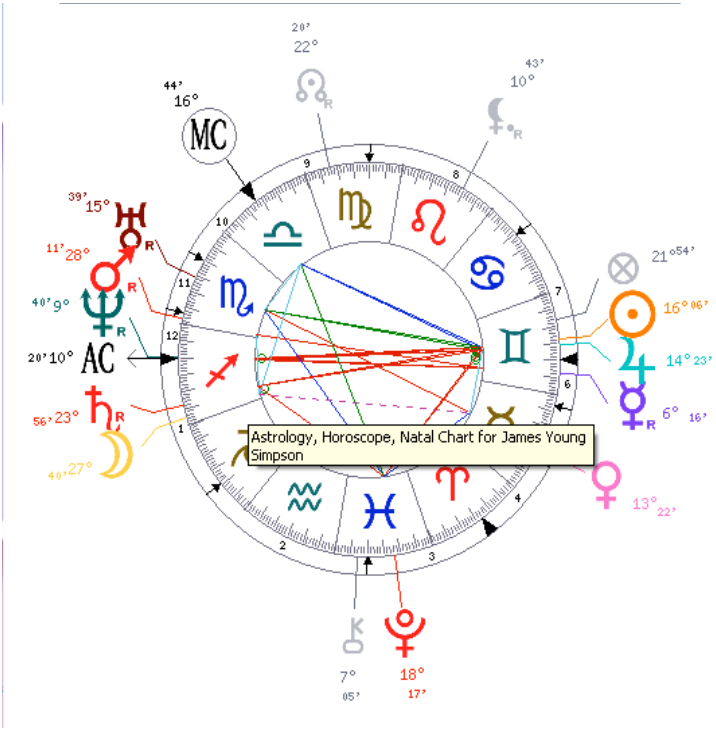
THE ASTROLOGICAL PORTRAIT OF JAMES YOUNG SIMPSON *

Dr Y Pole
Retired Consultant Anaesthetist, Manchester

A display of the ***Horoscope with the Chart of Sir James Young Simpson*** is as follows :-
Born :- June 7, 1811, at 8.00 P.M.
Place :- Bathgate, Scotland, United Kingdom.
Sun :- 16 degrees 6minutes – GEMINI.
Moon :- 27 degrees 40 minutes – Sagittatrius.
AS (Ascendant) :- 10degrees 20 minutes – Sagittarius.
MC (Midheaven) :- 16 degrees 44 minutes – Libra.
Numerology :- Birthpath number 6.



* Abstract only

SCOTTISH AMERICAN LEADERSHIP OF WORLD WAR I BASE HOSPITAL #28 FROM KANSAS CITY *

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Introduction

US Army Base Hospital #28, located at Limoges, France, was a 2,500 bed general hospital and one of more than 100 base hospitals sent to France to support the two million American soldiers serving in the American Expeditionary Force in Europe in World War One. Two Kansas City doctors, John Fairbairn Binnie and Lindsay Stephen Milne, commanded Base Hospital #28. Both were born in Scotland and qualified as specialists in the United Kingdom before moving to Kansas City.[1]

John Fairbairn Binnie (Figure 1) was born in Stirling, Scotland, on April 22, 1863. He was the son of Reverend William Binnie, a minister of the Reformed Presbyterian Church. In 1875, the Binnie family moved from Stirling to Aberdeen, Scotland, where Rev. Binnie took a position as Professor of Church History in the Free Church College. In 1882, John Binnie received an A.M. degree at King's College, Aberdeen. He then enrolled at the Marischal College of Medicine, graduating in 1886 with an M.D., and a Master of Surgery or C.M., an advanced qualification in surgery. He received further surgical training in Goettingen and Berlin, coming to America and Kansas City in 1889. He began surgical practice in Kansas City, Missouri, and was Professor of Surgery at the newly formed (1905) University of Kansas School of Medicine in Kansas City, Kansas, and served as a general surgeon at the General Hospital of Kansas City, Missouri.[1-3]

Binnie was elected to fellowship in the American Surgical Association in 1901, and served as its vice-president in 1907 and 1919. In 1906, he was elected a member of the Society of Clinical Surgery and the Societe Internationale de Chirurgie (Belgium). In addition to these professional societies, Dr. Binnie was a member of the Authors' Club of London, the Kansas City Club, and the

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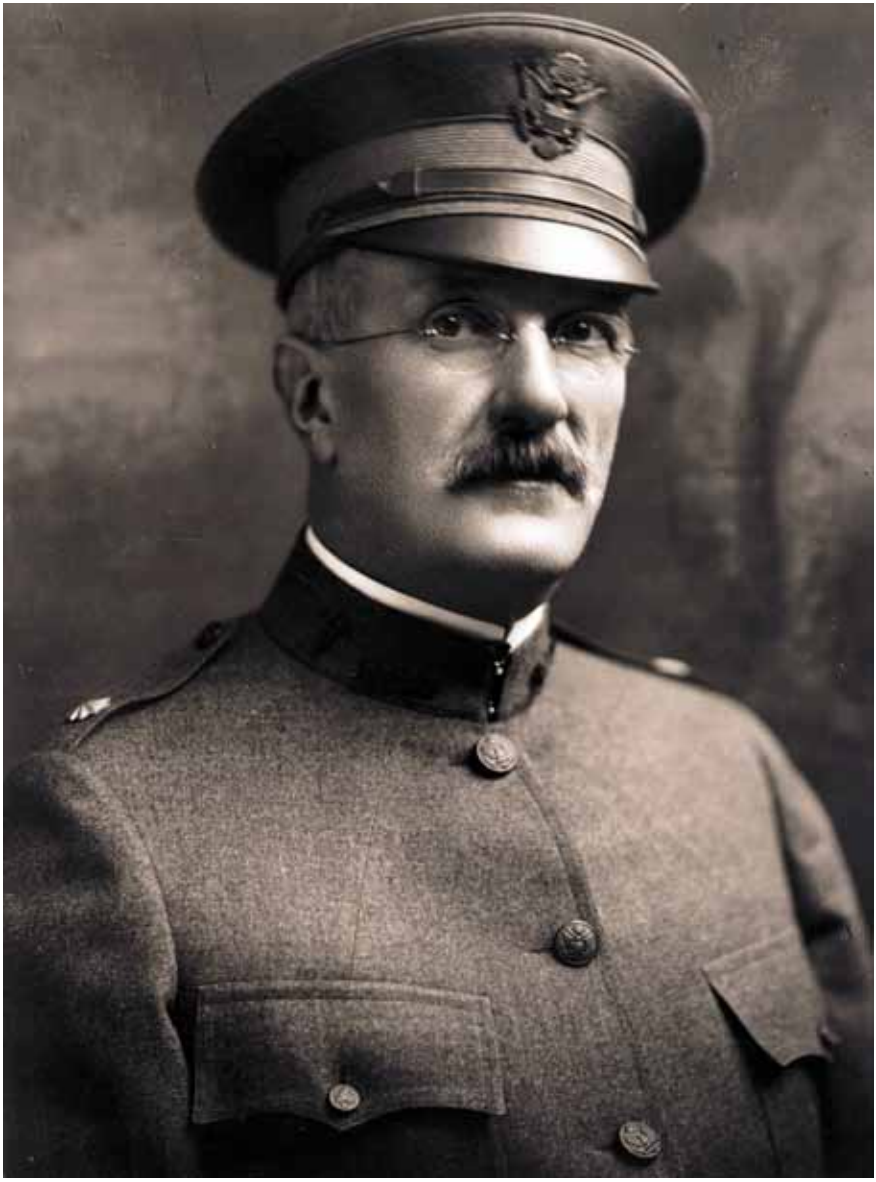

Fig. 1 John Fairbairn Binnie
Courtesy of Western Historical Manuscript Collection, Kansas City 0088 v. 1:1

University Club of Kansas City. Binnie was one of the founders of the Kansas City Country Club and is thought to have brought the first golf club to Kansas City, a Spoon Brassie from Aberdeen.[1-3]

In 1909, at the age of 46, Binnie married Ellen Mosher. During World War I, Dr. Binnie along with Dr Lindsay Milne helped organized Base Hospital # 28 in Kansas City, and went with that unit to France with the rank of major in the United States Army Medical Reserve Corps.[2-3]

Lindsay Stephen Milne (Figure 2) was born in Montrose, Scotland, on May 8, 1883. His parents were George G. Milne, a wheat broker, and Jane L. Milne. Lindsay had four siblings. He graduated from the Montrose Academy in 1899 where he studied mathematics, English, Latin and Greek. He spoke several languages as his parents schooled their children by conversing in French, German, Gaelic or English at the dinner table each evening.[1,4-6]

Milne lied about his age to enter the British Army and fight in the Boer War. However, when his real age was discovered, he was returned home to his parents. He then enrolled at the University of Edinburgh Medical School, where he graduated in 1904.[6] He remained at Edinburgh until 1908, serving as an instructor in Pathology and Medicine, following which he was designated a Fellow of the Royal College of Physicians of Edinburgh. In 1908, he left Edinburgh to do pathology research at the Russell Sage Foundation, and then the Rockefeller Foundation in New York City. Multi-lingual, he also conducted research in Vienna, Panama, Costa Rica, Brazil, South Africa, Paris and Berlin. He was a well known contributor to the medical literature, especially in the fields of hepatology and arthritis. Through this work, in 1912, he came to the attention of the seven year old University of Kansas School of Medicine at which time he became chair of the Department of Internal Medicine. He held that position until he enlisted in the army medical corps two days after the United States entered World War I in 1917. For a brief time after his enlistment, Milne served on the Mexican border, then was shipped overseas to Limoges, France. He was promoted to lieutenant colonel and became the commander of Base Hospital #28. According to one of the technicians of the hospital, “He was the most hard-working and earnest one in our group. He never spared himself and never took a day off. He watched out for the rest of us, but would not spare himself.”[1,5,7]

Fig. 2 Lindsay Stephen Milne
Courtesy Western Historical Manuscript Collection, Kansas City 0088 v. 111:60

Base Hospital #28, Limoges, France

In accordance with the mobilization of medical units from the United States (US) at the time of its entry into World War I, the War Department used base hospitals, staffed from a variety of American cities and universities.[8] Their selection was based on the location of the surgical thought leaders and experts of the time. Prior to US entry into the war, the Lakeside Unit from Cleveland, Ohio, which included Dr. George Crile of Base Hospital #4 was located at Neuilly, France (1914).[9] From Boston, Massachusetts, Base Hospital #5 included Dr. Harvey Cushing.[10] From Kansas City, the surgical leader was Dr. John Binnie.

To understand fully the role that a base hospital such as #28 played in World War I, as well as to understand the presentation of medical and surgical statistics in this paper, it is important to review the role that a base hospital played in the US Army triage system. After a soldier was wounded, he would first proceed to an advanced dressing station, in which first aid was administered. After this point, the triage process would begin. The wounded soldier would advance to a casualty clearing station and next to a field hospital. At these two places, if needed, initial surgery and treatment for shock would be administered. After the field hospital, soldiers would then proceed further behind the front war zone to an evacuation hospital, and finally to a base hospital.[7 10]

As a standard reference for many aspects of US military medical and surgical procedures, a common war manual was consulted. One specifically devoted to surgery was the "Military Surgery of the Zone of the Advance, Medical War Manual #7" published by the US Army.[11] In Kansas City, at the University of Kansas, prior to World War I, Binnie had published a commonly used major clinical textbook "Manual of Operative Surgery", which was in its 7th edition in the early part of the 20th Century.[12] Dr. Binnie, in his day, was a surgeon with the stature of a Crile, Cushing or Mayo. He played an important role in the operation of Base Hospital #28, and because of his surgical knowledge, fame and textbook, was also commonly consulted for his expertise as a surgeon, travelling to numerous other base hospitals surrounding Limoges. The physician in charge of the day-to-day medical operation of Base Hospital #28 was Dr. Lindsay S. Milne.

The data and statistics of BH #28 have been obtained from the extensive patient lists completed by the registrar, Capt. Sherman B. Hibbard.[13] Of 2511 battle casualty admissions, 1978 were non-operative and 533 were operative cases. Total deaths were 23: 17 non-operative and 6 operative. Of the 23 patients who died, all were autopsied, revealing that 7 had gas gangrene and 10 died of other

causes. Six were operative deaths. There were no reported cases of "dead on arrival." There was a total of 2066 surgeries for gunshot wounds, 361 involving the upper extremities, 963 lower extremities, 332 head and neck, 68 abdomen and genitals, 130 back and side, 92 chest wounds, 114 multiple wounds, and 6 cases of gas gangrene. In addition to surgery for gunshot wounds, other surgeries included 178 ear nose throat procedures, 53 eye surgeries and 1774 dental cases.[13]

Anaesthesia was administered by three corpsmen and one anaesthesiologist. Type of anaesthesia selected depended on the condition of the patient and the surgery or anaesthesia required to treat the patient. The World War I soldiers were young (18 to 20 years of age), and were in good physical condition with few medical problems. However, as was a common practice at the time, many were heavy smokers and were exposed to cold, damp conditions in the trenches. Even though they were young, many had some degree of lung disease and chronic bronchitis. Because of this, sometimes they were difficult to anesthetize using ether or chloroform. Often they were also very nervous, especially those who suffered from shell shock, having lived for a long time in the trenches.[14] [15]

Similar to present day practice, patients underwent a physical examination and preoperative workup. Commonly, the diagnosis or abnormality might actually be drawn on the patient's chest to indicate an area of chest consolidation, pneumonia, or heart murmur in order for others to more easily identify and monitor the abnormality. Patient information was often completed on a 5X8 card and included the admission diagnosis and date. There was a one- or two-line entry for each hospital day to note any changes in the patient's disease. For preoperative preliminary medication, morphine (1/6 grain) and scopolamine (1/150 grain) were commonly given intramuscularly (IM) approximately ½ hour before surgery, as a method to augment the effects of general anaesthesia. Scopolamine or atropine was used to minimize oral secretions and provide a quiet recovery and sleep after surgery.[13]

The philosophy of Dr. George Crile of Base Hospital #4, Lakeside Unit, was "anoci-association." This method used the technique of nitrous oxide, oxygen and local (Novacaine) anaesthesia.[16] [17] This method was very helpful for patients who were hypovolemic or in shock. Local anaesthesia regional blocks were thought to be best for short surgeries (½ to 1 hour). Local anaesthesia included the anaesthetic Novocain. Spinal anaesthesia was only occasionally used. The local anaesthetic Stovain was used for operations on the pelvis or legs.[18] [19]

The anaesthetics available for general anaesthesia included chloroform, ether, ethyl chloride and nitrous oxide/oxygen mixtures. These were initially given by

the open drop mask method and by anaesthesia machines.[14 15] In Base Hospital #28, the Connell and Heidbrink anaesthesia machines were used to administer nitrous oxide/oxygen and ether.[20 21]

There were three operating-room (OR) areas at Base Hospital #28, located in the Bettaire Hospital Annex and the adjacent temporary, wooden, barrack style buildings. The picture of the anaesthesia apparatus (Figure 3) includes the anaesthesia work area of Lt. William H. Clark. The small table included a Sorenson suction apparatus, an assortment of ether masks, ethyl chloride and ether cans. The anaesthesia machine on the left was a Connell machine (brass War SP model,1917) commonly used by the allied forces and the French, which enabled the anaesthetist to give N_2O/O_2/ether mixtures. It had a rotary- type flow meter and was an immediate predecessor to the Connell anaesthetometer piston type flow meter. The machine on the right of Figure 3 was a Heidbrink machine, developed by Dr. J. Heidbrink (dentist). It allowed the administration of N_2O and O_2. A rebreathing bag equalized O_2 and N_2O pressures using pressure reducing valves.[20 21] For drop ether, a variety of masks such as Yankauer, Oschner and Esmarch were used. A Sorenson vacuum machine was used to help suction secretions that commonly developed during ether/chloroform anaesthesia.[22]

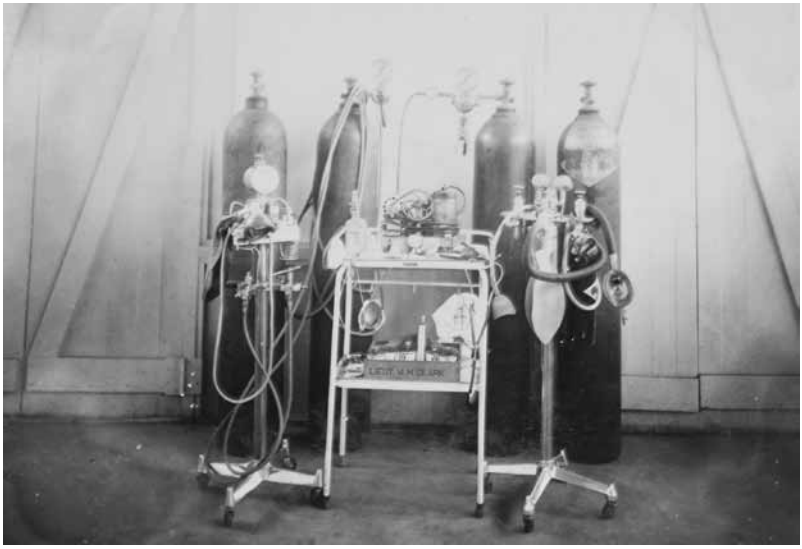

Fig. 3 Anaesthesia gas machines used at Base Hospital #28, Limoges, France from July 1918 to May 1919. A Connell gas-oxygen apparatus, brass SP model is on the left. A Heidbrink machine is on the right. (Courtesy of National WWI Museum, Kansas City)

Of specific interest and noted in the Kansas City Star newspaper (January 7, 1919) was an interview with Cpl. Clyde Morris, who worked as an anaesthetist at Base Hospital #28.[23] The newspaper article described his impressions while giving anaesthesia for operations performed by Lt. Col. Binnie. He mentioned in the article that Binnie, after one of his consultation trips, returned to Base Hospital #28 and operated on 9 patients. Cpl. Morris gave the first anaesthetic. Because of the problem of doing multiple surgeries in a short amount of time, anaesthetists worked in teams. Morris worked with Cpl. Neal Woodruff that day. He mentioned that by the time he started the first anaesthetic, Cpl. Woodruff had the next man ready, anaesthetized and brought to the operating room, at which time Cpl. Morris finished the anaesthetic on the first patient. Then, Cpl. Woodruff started the anaesthetic on the next patient. In this way, no time was lost and the surgeon merely had to change gloves and gown before starting the next case. On that day, Binnie completed 9 operations. Cpl. Morris and Cpl. Woodruff noted how the opportunity to serve as anaesthetists in a base hospital under Drs. Binnie and Milne afforded them a rare opportunity and how much they appreciated working for them. They noted that, while many doctors and students had observed Binnie's work at home in Kansas City, these men were able to observe and give anaesthesia for his patients at Base Hospital #28.[23]

The severity of shock or type of operation dictated whether the shock itself was an indication or contraindication for anaesthesia and surgery. If patients were in shock, spinal anaesthesia would decrease blood pressure when patients had a low volume of blood or fluids and for this reason was not commonly used. Instead Crile's anoci-association balanced anaesthetic technique with morphine, nitrous oxide/oxygen and local block regional anaesthesia was used. [15 17] The theory was that, as less ether or chloroform was required for wounded soldiers in shock, the changes in blood pressure would be less, resulting in less mortality and more favourable surgical results.[15 16] The doctors, nurses and technicians at Base Hospital #28 gave excellent care working with early 20th century technology under difficult conditions. They had surprisingly good results at that time in history, with no reported anaesthetic-related deaths during the nine month period of operation at Base Hospital #28.

Post WW 1:

Binnie

In 1918, Binnie was promoted to the rank of Lieutenant Colonel and served as a consultant surgeon to the Third Army Corps. He received a citation for Exceptionally Meritorious and Conspicuous Service at Base Hospital # 28, Limoges, France. At this time, it was evident to his many friends, notably Dr.

Harvey Cushing, that Binnie was suffering from overwork. It was suggested that he be ordered home for a rest. While awaiting sailing orders, he suffered a cerebral haemorrhage at Angers, France, and was sent to New York on a hospital ship. After arrival in the US, he was transferred to a government hospital at Fox Hills (Staten Island, New York). When he was well enough, he returned to Kansas City.

In March, 1919, Binnie was able to resume his practice in Kansas City, but in July 1921, he suffered a second stroke, which caused total paralysis of his right arm, leg and trunk. This resulted in his inability to speak, read or write. Discouraged and depressed, he was admitted to Letterman Army Hospital in San Diego. Relatively content in San Diego, he took an interest in hospital activities and enjoyed being chauffeured around the area by automobile. He remained in Southern California until his death on November 28, 1936 and was buried in Fort Rosecrans National Cemetery, San Diego.[1 3]

Milne

Upon returning to Kansas City after the war's end, Milne entered private practice and specialized in Internal Medicine. He married Marian Young on December 15, 1925, and they had twin daughters and a son. He became a beloved family friend to all his patients, wealthy and poor. Considered to be an all around "family doctor" he was especially fond of the children he encountered through his practice.

Milne's practice grew quite large over the years, and many of his friends and patients became concerned about his health. An avid hunter and fisherman, he was often encouraged by patients to pursue these activities, as they wished to give him some time off from work for rest and relaxation. According to his obituary, "He would go happily along thinking it was doing his patient some good." He was admired by his professional colleagues. He was considered to be "unassuming and diffident," and by one fellow physician as, "one of the kindest and most gracious persons as well as being an outstanding medical man."

His professional accomplishments included Fellow in the American College of Physicians; Diplomate of the Board of Internal Medicine, member of the American Medical Association, the Society of Pathologists and Bacteriologists of Great Britain and Ireland, the American Pathologic Society, the New York Pathologic Society, the Harvey Society, Fellow of the New York Academy of Medicine, the Biological Society of New York, the Kansas City Academy of Medicine, Kansas City Southwest Clinical Society and the Jackson County Medical Society. His Kansas City hospital affiliations included: University of

Kansas, Christian Hospital, Research Hospital, General Hospital, St. Luke's Hospital and Menorah Hospital. Dr. Milne died on September 17, 1944 at his home in Fairway, Kansas.[1 6]

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GUEST LECTURE – SUMMARY
SIMPSON: THE NATURE OF HIS GENIUS

Dr Morrice McCrae
College Historian, Royal College of Physicians of Edinburgh

Early life

Simpson's grandfather was a tenant farmer in the second half of the eighteenth century when improvements in agriculture were increasing the productivity of farms in Linlithgow by up to 500%. He became prosperous enough to set up each of his sons in business. Simpson's father, David, became a distiller, earning a good income until, in the last years of the Napoleonic Wars, high malt taxes and scarcity of grain made distilling unprofitable. In 1811, he set up a second business as the owner of a bakery. Thanks largely to the efficiency of his wife, Mary, both businesses survived and flourished.

Mary also had social ambitions. She claimed to be descended from Robert the Bruce and when it became clear that her youngest son, James, was unusually bright and possessed a prodigious memory, she decided that he should become a great man able to restore for her children the place in society that she felt that she had lost. As a family friend later wrote, from his earliest years Simpson was 'commissioned to be famous.'

Student life

At the age of fourteen Simpson became a student at Edinburgh University. At first he studied the subjects required for the MA degree but he soon discovered that the university was most famous for its medical school. In his second year he therefore enrolled also as a medical student. But at that time Scotland's universities and all other important institution still operated within a system of government ('Old Corruption') designed to secure for the Westminster government the loyalty of the people of Scotland throughout the years of civil unrest that followed the French Revolution. Open support for the government brought lucrative public appointments, pensions, commissions in the army or other favours. But those suspected of being out of sympathy with the government were excluded from positions of influence including appointments within the universities.

Simpson had reason to believe that his loyalty was suspect. His family had never declared any interest in politics but at university he had become an associate of open opponents of the government. He became so convinced that he

would not be allowed to graduate that he abandoned his studies. It was with difficulty that he was persuaded to return to university; in 1832 he graduated MD without incident.

Shaping his career

Simpson's dissertation for his degree brought him to the attention of the Professor of Pathology who appointed him as his assistant. Simpson decided that his further path to fame now demanded that he should become one of the five professors of medicine at Edinburgh. When it became clear that the first vacancy was likely to be the chair of midwifery he abandoned pathology and set up practice as an obstetrician. The Chair of Midwifery became available in September 1839 and, as he expected, there was, strong opposition to his appointment. However after spending the modern equivalent of £37,500 of his family's money on canvassing the members of the appointing committee he won the chair by a majority of one vote.

Polymath

Simpson did not intend to limit his attention to midwifery. He made contribution to the great medical issues of his time; the prevention of cholera epidemics, homoeopathy, mesmerism and hospital infection (surgical fever and puerperal fever). He also wrote on evolution (18 years before Darwin), hermaphroditism and on archaeology.

Publications

Simpson published extensively, pioneering the use of statistics and introducing a new style of medical writing. He contributed to the leading medical journals but to ensure that his views reached his medical audience quickly he founded his own journal, *The Monthly Journal of Medical Science*. To ensure that he also reached the lay pubic, he reissued his works as pamphlets, printed and published in Edinburgh, London (and often in Philadelphia) and sold in the streets for sixpence.

Clinician

Simpson owed his great success as a clinician to his inventive skills as a diagnostician and to his consequent confidence as an adventurous obstetrician. He also acquired a following of grateful patients as one of the early pioneers of gynaecology.

Anaesthesia in obstetrics

Simpson's interest in general anaesthesia had its origins in his belief that women should not be made to suffer the pain of childbirth. When, in December 1846, he heard that Robert Liston had successfully amputated a leg while the patient was anaesthetised by ether, Simpson invited himself to spend Christmas in London with Liston. On his return to Edinburgh, Simpson became the first to use ether in the management of a difficult birth. Encouraged by this success he advocated the use of anaesthesia in normal childbirth. Aware that many believed that the Bible decreed (Genesis, 3:16) that the pains of childbirth had to be endured, he published a pamphlet, *Answer to the Religious Objections.* However the pamphlet proved unnecessary; Simpson's work was approved by both the Moderator of the Church of Scotland and the Archbishop of Canterbury.

It soon became apparent that ether was unsuitable for Simpson's purpose. Its administration required unwieldy equipment that made it unsuitable for normal deliveries in the patients' homes. David Waldie, an Edinburgh graduate working in Liverpool drew Simpson's attention to chloroform. This satisfied all Simpson's requirements and from November 1847 chloroform superseded ether.

Anaesthesia in general surgery.

Many general surgeons, especially military surgeons, were reluctant to use general anaesthesia believing that it added a further risk to an already risky procedure. Others believed that the pain of the operation was an excellent stimulus to recovery. By setting out the pros and cons of general anaesthesia in pamphlets addressed to the lay public, Simpson encouraged patients to insist that the pain of their operations must be relieved. The opposition of the surgeons soon crumbled.

Genius

Simpson contributed greatly to advance in several fields of medical science. But the author suggests that James Young Simpson's genius lay in publishing pamphlets that empowered the lay public to play their part in shaping the course of developments in medical practice. Simpson's genius lay not only in carrying forward the practice of medicine along its usual course but in exploring new courses.

BOOK REVIEWS

James Young Simpson: Lad o Pairts. Nuttall A, Mander R (eds.). Erskine: Scottish History Press, 2011. Paperback, 198 pp, illustrated, indexed, £19.95.

This is a book of ten essays published to coincide with the bicentenary commemoration of Simpson's birth; each attender at the HAS 2011 summer meeting in Edinburgh received a complimentary copy. In her introduction Alison Nuttall explains that because of the breadth of Simpson's interests the intention was to move away from the conventional biographical format and, by including contributions by authorities in a range of subjects, to build up a picture of his life in the context of his times. The topics covered include a brief factual account of his life; his qualities as a teacher; his involvement in the campaign against long-running attempts to introduce homoeopathy to Edinburgh Royal Infirmary, showing him as a supporter of 'legitimate' scientifically based medical practice; the development of his methodology of physical examination; a comparison of his and Semmelweis's understanding of the etiology of puerperal fever; his approach to the feeding of the newborn; a feminist interpretation of his attitude to the opposite sex; the place of religion in his life; and his contributions to archaeology; and the mistaken assumption seems to have been that an informed survey of these aspects of Simpson's character, interests, and contributions, would be beyond the competence of a single biographer.

Unfortunately the contributions for which Simpson is most renowned, the introduction of chloroform, and the championing of pain relief in labour, have been excluded; it must have been assumed that nothing remained to be said. Hence Simpson receives no credit for his early use of the statistical survey to rebut criticism of general anaesthesia; and the accusation that he invented the religious opposition to pain relief in labour because no evidence could be found of it emanating from the clergy, is not addressed. In fact, as examination of the book that was the subject of Douglas Bacon's Blessed Chloroform Lecture shows, there was much opposition on religious grounds, but from the *medical* profession, not the clergy; and it was tackled not by Simpson alone, but also by Prothero Smith of Bart's. Unfortunate too was the unawareness of those authors to whose studies it would have been relevant, of the existence of a student's notebook recording Simpson's 18487-1849 lecture course, a crucial year for the exposition of his views on both anaesthesia and puerperal sepsis, now in the library of the AAGBI, but written up in the *British Journal of Anaesthesia* as long ago as 1976.

The introduction provides a useful survey and critique of earlier biographical studies of Simpson, excluding the most recent one, by Morrice McCrae, and connects the individual essays to particular aspects of them. Each essay follows

the same format: its purpose is set out, and its individual parts analysed, before getting down to the subject. Apart from the biographical introduction, the essays likely to be of interest to most medical readers are those on Simpson and Semmelweis, and Simpson and the Development of Physical Diagnosis.

The author of the former, who has read and translated from the original Hungarian, sets out to explain the difference between the proponents, and why Semmelweis firmly denied that Puerperal Fever was a contagious disease. Simpson, in his 1848-9 lecture course, referred to the work at the Vienna Hospital, (if he mentioned Semmelweis by name the student did not note it) and continued, 'The disease seems to be given to the women by the innoculation (sic) of the abraded vagina, by the fingers of the practitioner or nurse... One or all kinds of erysipelas or gangrenous inflammations if we handle them or let our fingers come in contact with the substances effused and then attend a woman we are very likely to give her puerperal fever...' This seems clear enough, but briefly, as was later explained in an article by one of Semmelweis's compatriots and the editor of his collected works, (György, T. *BMJ* 1906;ii:715-6) it was, in the days before bacteriology, a question of definition *of the nature of the disease itself*, contagious *versus* infectious, not of the mode of transmission. Hence a contagious disease was one that was transmitted *identically* by contact, scarlet fever to scarlet fever, for example; but, as Simpson indicated, puerperal fever could follow from contact with other conditions, such as erysipelas, hence to Semmelweis it was an infectious, but not a contagious, disease. In other words it was not a *specific* disease, as bacteriological developments soon showed. It is confusing that the mode of transmission became tangled up with definition, but Simpson was more interested in prevention than semantics.

'The development of physical diagnosis is one of the defining characteristics of nineteenth-century medicine.' The author discusses Simpson's contributions in the field of obstetrics and gynaecology, and emphasises the great care he took to accommodate feminine modesty. Consent for an intimate examination had to be negotiated, 'proselytised for' is his expression – the case of Sarah Bartlett, the first to undergo Cesarean section under general anaesthesia, is a documented example. An exploration of any contextual connection between the development of feminine modesty and female undergarments, both apparently lacking until at least the eighteenth century, might have been revealing. Simpson's contributions included development of the use of the stethoscope in the diagnosis of pregnancy, and of the vaginal speculum, the uterine sound, and the exploring needle to distinguish cysts from tumours, not without opposition from some members of the medical profession; and he pointed out the value of general anaesthesia for relaxing the abdomen, and for avoiding the embarrassment of exposure while conscious. The author has much fun with the medical (not to be

confused with the Foucaultian, heaven forbid) gaze, and Simpson's role in extending it until the practitioner achieved 'unrestricted access to the female reproductive tract' from introitus to fundus, and his development of the doctrine of the 'educated finger.'

The book contains some excellent illustrations and comprehensive references.

David Zuck

While You Sleep – A personal journey in anaesthesia. Humble RM. Ely: Melrose Books, 2011. Paperback, 189 pp. with illustrations, no index. Price £11.99.

This book is an enjoyable read – I couldn't put it down. It is divided into two parts: "travelling forward" and "looking back".

In **Part 1** Roy Humble traces his Scottish school days in the 1940s, his medical degree course in the early 1950s and national service as a medical officer in Tripoli 1955-56. This is interspersed with amusing anecdotes and interesting asides, a theme which continues throughout the book. After a sojourn in general practice in Nakuru, Kenya 1956-57 he underwent obstetric experience at the Rotunda, followed by experience in anaesthesia in Paisley from 1958. There he was "thrown in at the deep end", but found that this method of training worked, and he valued the 'high touch' element of anaesthetic practice in those days.

I was particularly interested in his account of six months' general practice with anaesthetic services in Bulawayo (Zimbabwe) in 1960. A correction is required to the note that his boss, Dr ON Ransford, died in 1989 – I remember telephoning this man shortly before his death in 1993. Roy Humble then proceeded back to Nakuru (1961) for more general and anaesthetic practice, encountering interesting cases of gout, malaria and afibribrinogenaemia (later called DIC). In 1963 he returned to UK to work in the London area and passed the examinations for Fellowship in Anaesthesia. (For lay persons he points out that anaesthetists have to pass exams to specialise, just like other doctors!) He worked under Eve, Doughty and Bourne, experiencing the perils of 'no recovery rooms'. In 1965 he was appointed Consultant Anaesthetist at Dumfries Infirmary, where he picked up Tom Baillie's enthusiasm for the history of anaesthesia. At this point he provides a great description of pitfalls and hazards in anaesthesia. In 1969 (reasons unclear) he emigrated to Edmonton, Canada with his wife and children, having to pass the Canadian Certification in Anaesthesia. In the ensuing years he experienced remarkable contrast and change.

Part 2 begins with the story of Richard Gill and the introduction of curare into anaesthetic practice. Then the evolution of modern anaesthesia is briefly covered, mentioning mesmerism with an aside on successful use of hypnosis by a Malaysian psychiatrist in 1965. The author points out that the 'personal touch' in anaesthesia has largely been replaced by machines. He lucidly states the major lesson. *To the generation which follows, old-fashioned methods appear outdated, archaic or dangerous. But our efforts will be no different. Human*

knowledge may increase, but human thinking stays the same. The same mistakes will be made – with right and wrong conclusions reached.

Roy Humble reminds us of the value of the 'personal touch' in anaesthesia, which he feels is being eroded by increasing use of day-stay surgery. For the lay reader he sets out the difficulties and hazards in administering anaesthesia. Through the book he is not shy to confront shortcomings of both anaesthetists and surgeons. Finally he expounds on the relationship between anaesthetist and surgeon, and how "the image of our speciality has suffered from our very failure to seek the limelight". He encourages patients to be better informed and anaesthetists to blow their own trumpets more.

Who should read this book? I believe it will be enjoyed by past, present and future practising anaesthetists, because it states what is so often unsaid – the information which only the informed can read between the lines. The book provides valuable information for patients and, for this reason as well as the above, should be read by the general public, who may thereby recognise the true status of specialists in anaesthesia – now (as the author notes) the largest single group of hospital-based specialist physicians in the UK.

Alistair McKenzie

Heads for Medicine. Horton J. Bicester: Bound Biographies, 2011. Paperback, 262 pp. with illustrations, no index. Price £9.99.

'Heads for Medicine' is the complete story of the life of a truly remarkable lady, Jean Mary Horton, from her birth on the 28th October 1924 to the present day. Much of it has been recalled from memory. It includes a complete genealogical account of five generations of her parental forebears. Her mother's forebears including a highland soldier, blacksmiths, crofters and fishermen were from Caithness in Northern Scotland while the Hortons were originally yeoman farmers in Middle England.

Jean was the second child and only daughter of Robert Lister Horton, who at the time of her birth was a surgeon and general practitioner in Weymouth and Elizabeth Mackay MacDonald, a former nursing sister in Queen Alexandra's Imperial Military Nursing Service. When Jean was about five years old her mother announced that her older brother, Tom, was going to be a lawyer. Jean immediately felt that she must make her own decision about what she would do as she had no desire to become a nurse. Torn between medicine and law she tossed a coin,' Heads for Medicine' or 'Tails for Law'. The coin fell 'Heads up'. Jean was determined that she would become a doctor and never wavered from this decision.

Jean was educated privately, first at Westerhall House School close to home and, then from her ninth year at Queenswood School, an independent boarding school in Hertfordshire where she led a fully active academic life with interests in drama and music. Alas, she innocently caused her last term at Queenswood to end disagreeably. Despite this, she acknowledged that her nine years there had taught her 'to stand on her own feet, make her own decisions, live in a community and take responsibility'. In 1989 she became Chairman of the Old Queenswoodians Association and later in 1990 joined the Board of Governors of Q for a term of three years.

Having passed the London University 1st MB examination while in the sixth form, she was one of 20 women admitted in the autumn of 1943 to the second year of the Faculty of Medical Science at University College London, the alma mater of both her father and grandfather, to commence preclinical studies. Two years later she began her clinical training at the West London Hospital. The 'ups and downs' of her life as a student, are openly discussed, in particular her repeated examination failures. In September 1948, having qualified in medicine with the MRCS LRCP, she began her medical career as a House Surgeon at the West London Hospital, a role which she found boring. Immediately after this before taking up the post of House Physician at Leicester General Hospital she

studied for the final MB BS and passed successfully to graduate as an MB BS of London University. Nine months later, in April 1950, she moved to Addenbrooke's Hospital in Cambridge – as a casualty officer: a post in which she had frequent contact with anaesthetists including Aileen Adams who became and remains a good friend. At the end of this appointment another major decision had to be made. She wanted to remain in Cambridge so welcomed the suggestion to apply for the vacancy for a resident anaesthetist and so a great, varied and fulfilling career began when she was appointed without interview or personal communication with any of the consultant anaesthetists. As there was no formal training and little consultant supervision she found the safety of ether invaluable. Her clinical experience at Addenbrooke's contributed to her appointment as resident anaesthetist at the world famous Plastic and Jaw Injuries Unit of the Queen Victoria Hospital in East Grinstead where Sir Archibald McIndoe performed miraculous surgery on airmen severely burned during WW2. She also gained experience with hypotensive anaesthesia, recently introduced by Dr Hale Enderby, and in great demand by all the surgeons whenever appropriate. At the end of this 'extraordinary and valuable year' of clinical work and, undaunted by further failure in the part one examination for the Diploma in Anaesthetics, Jean successfully applied for a post as resident anaesthetist at Great Ormond Street, supported by Sir Archibald McIndoe, Russell Davies and Hale Enderby. The experience gained there was exceptional and, the contacts and friendships made enduring.

After the end of her year at GOS, Jean attended the course run by the Royal College of Surgeons of Edinburgh for its primary exam as a pass in this exam would provide exemption from the Primary FFARCS. Alas, she was again unsuccessful. Despite this Jean became a registrar at the Royal London Hospital where she gained valuable practical experience for a wide range of surgical procedures. She was left on her own to anaesthetise neurosurgical cases and gradually introduced her own anaesthetic techniques, an experience which laid the foundations of her future career as a neurosurgical anaesthetist. After nine months at The London she rotated to the Brentwood Annex where, in addition to the continued care of neurosurgical cases, she became adept at local analgesia for thoracoplasty. Nine months later she returned to The London where she gained experience in cardiothoracic anaesthesia. Unfortunately, during this period her much loved father and great inspiration for many years died.

Undaunted by another failure in the Primary exam, Jean successfully applied, for the post of senior hospital medical officer at the Welsh Regional Plastic Surgery Unit in Chepstow where she spent over two years, her tenure including weekly involvement in thoracic surgery requiring manually controlled one lung anaesthesia, While there, she took three months unpaid leave to attend the

Primary Fellowship Course at the Royal College of Surgeons of England and 'at last' passed the primary. On the advice of Professor Mushin she sat and successfully passed the final Fellowship in Anaesthesia examination within a very short period.

In December 1958 Jean returned to Cambridge as a Senior Registrar. There, she initiated some important changes in anaesthetic practice and training, helped to establish a six bedded Intensive Care Unit and encouraged the development of regular discussion meetings on current anaesthetic topics. Unwilling to take the risk of waiting until the new Addenbrooke's Neurosurgical Unit was opened on the new site and an intense desire to go to Scotland, Jean applied for the post of consultant anaesthetist to the Neurosurgical Unit in Edinburgh, fully aware of the prejudice within the Anaesthetic Department towards the appointment of women, the fact that she came from south of the border and was not an Edinburgh graduate. Jean, however, countered all these prejudices and commenced work in the Department of Surgical Neurology, initially in the operating theatre in Ward 20 at the Infirmary on the 1st April 1960 subsequently moving to the new unit at the Western General Hospital where she remained in post until August 1970.

Throughout this period she worked hard, taking care to avoid criticism. Moreover, she thoroughly enjoyed the extramural activities available in the City, in particular the annual Edinburgh International Festival of Music and Drama and singing in the Bach Choir. Her mother had joined her in the city but, unfortunately she died suddenly at their home in Edinburgh in March 1966. Jean soon contemplated taking a sabbatical year. In February 1968 she accompanied Aileen Adams to a meeting in Nigeria of the Society of Anaesthetists of Nest Africa to explore the possibility of spending a year in Lagos or Ibadan. Following negotiation with the Anaesthetic Department in Lagos, Jean was offered an appointment as Senior Lecturer to commence in October 1968. The Head of the Department of Surgical Neurology in Edinburgh approved one year of unpaid leave provided she could provide a locum. This done, Jean eventually set sail from Liverpool, visiting all the former British West African colonies en route during the 16 day voyage. A very busy year in Lagos, clinically, academically, and socially followed. She particularly enjoyed teaching Medical Students and admitted that her stay there had been a 'life changing experience'.

Shortly after returning to Edinburgh, Jean was invited to return to Cambridge to take responsibility for the neuroanaesthetic service on the new Addenbrooke's Hospital site. She commenced work on the 1st August 1970 and took up residence at 18 Amhurst Court which is still her home. Life in the hospital environment was initially problematical. Communication within the

neurological surgical department was difficult. Pioneer liver transplant surgery was undertaken without proper specialist after-care. There was no Recovery Ward or Intensive Care so patients were returned to the ordinary ward with a 'special' nurse. Eventually, after five years in post Jean was invited to join the Neuroplanning Committee and now had authority to equip the Neurotheatres and annexes with appropriate equipment and to counter the deficiencies in the organization of the neuroanaesthesia services and the available equipment. As singing was a favourite form of relaxation Jean was able to rejoin the Cambridge Philharmonic Choir.

In 1976 Jean was elected to the Council of the Association of Anaesthetists. Despite finding the Council Meetings daunting in 1979 she accepted the invitation to become Honorary Secretary in 1979, a further commitment for four years of enjoyable but very hard work.

As retirement approached Jean was invited by Andrew Thornton, an old friend from her days in Leicester, to join him as a Senior Lecturer to help to establish the Department of Anaesthesia in the new Faculty of Medicine of the Chinese University of Hong Kong. Offered a five year contract, she arrived in Hong Kong in September 1983 to begin work at the new, as yet incomplete, Prince of Wales Hospital in Shatin, the teaching hospital of the Chinese University of Hong Kong. It became a centre of excellence, the home of all medical specialties including open heart surgery. Accommodation was available on site. On arrival she spent time preparing teaching material for students and trainees. When the hospital opened in January 1984 Jean found that, for the first time in her life, she had an office to herself.

Jean was elected to the first council of the Hong Kong College of Anaesthesiologists, founded in September 1989 and in 1993 became a Fellow of the Hong Kong Academy of Medicine.

Jean remained in Hong Kong for six years and, in her last years there, helped Mike Moles to organize the Seventh Asian Australian Congress of Anaesthetists and, subsequently the Sixth World Congress of Disaster Medicine in September 1989.

Her time in Hong Kong was a rewarding and life-enhancing experience and while there she took the opportunity to travel widely,

Previously, in 1978, Jean and Aileen Adams had gone on an exciting adventure, a Himalayan Trek to Kalar Patar at 18,000 feet to 'enjoy the most wonderful views of Everest'.

‘Heads for Medicine’ is a remarkable autobiography tracing the career of a very enthusiastic anaesthetist against the back drop of the developing National Health Service, the specialty of neuroanaesthesia and the social changes and prejudices of society. Written by a founder member, Past- President and Honorary Member of the History of Anaesthesia Society, it is a major contribution to the history of anaesthesia and its role in promoting the progress achieved in surgery in many parts of the world where Jean M Horton personally played a significant role. Fortunately, the tossed coin landed with the correct side uppermost.

Anne Florence

OBITUARIES

Doreen Vermeulen-Cranch

On November 8th 2011 emeritus professor Doreen Vermeulen-Cranch passed away after a long and very active life. The international anaesthetic community, especially the Dutch, suffers the loss of one of its great pioneers.

Directly after the end of the Second World War Doreen Cranch, Welsh born and trained in anaesthesiology by among others Professor R MacIntosh, met professor Willem Noordenbos sr., surgeon at the Wilhelminagasthuis academic hospital in Amsterdam, who had come to London to receive honorary membership of the Royal College of Surgeons. The meeting led to her visiting Amsterdam several times in 1946 and the subsequent request to come and build up a modern anaesthetic department.

In memoriam Professor DME Vermeulen-Cranch, FFARCS
30/12/1915 – 8/11/2011
Professor of Anaesthesiology University of Amsterdam, the Netherlands

In the mean time she married the Dutch merchant marine officer G. Vermeulen, who had survived two torpedoed ships during the war and was later to become director of the Royal Dutch Steamboat Company (KNSM) in Amsterdam.

At that time, contrary to the situation in the United Kingdom, there were no specialist anaesthetists in The Netherlands. Surgeons let their most junior assistant or a nurse apply very basic anaesthetics. Dutch professors of surgery who visited the UK after the war saw the advantages that more advanced professional anaesthesia provided.

The barely thirty year old young doctor (to look older she pinned up her hair) made "the jump to the continent" to enter the strongly conservative, masculine and hierarchal world of Dutch surgery. She was accompanied by her great lead in knowledge and a famous small case with modern equipment.

With her knowledge, but especially her gift for tactical communication, a great deal of modesty mixed with professional determination and feeling for existing relationships she managed to modernize the anaesthetic departments of her own and several other hospitals in Amsterdam and even in Utrecht. Where before open ether masks and unprotected airways led to limited possibilities and sometimes dangerous situations, she introduced endotracheal intubation making intrathoracic surgery possible. She also introduced the routine application of an intravenous drip in all operation patients, intravenous hypnotics, brand new curare and analgesics; the concept of mono-anaesthesia went overboard. The introduction of routine pre-operative evaluation, recovery room facilities and intensive care department, including one for neonates, were also of her doing. Exceptional was her initiative to train nurses as specialised anaesthetic assistants, and the institution of a departmental technical instrument maker. Before long the surgeons, who formerly claimed not to need anaesthetists, were rolling out the red carpet for the charming Welsh newcomer. Later in her career she championed sedation techniques for dental surgery and for the mentally handicapped.

Professor I. Boerema, head of the Surgical Academic Unit in the Wilhelminagasthuis asked her to implement an anaesthesia specialist training program in 1947. Her first pupils Boeré and Mauve were general practitioners in their thirties, later to lead academic departments of their own. She was appointed lecturer in 1951, and in 1958 her installation as professor made her the first in the field of anaesthesia on the European continent. Many future heads of Dutch academic departments were to be trained by her. She stimulated the institution of the Dutch Anaesthetists Society (NVA) in 1948 and of the

World Federation of Societies of Anaesthesiologists during its first congress in The Hague in 1955. Up to her retirement in 1984 she was the educator of countless trainees and trusted advisor to many surgical colleagues dealing with difficult problems. Under her supervision the specialty of anaesthesia in the Netherlands grew and developed into what it has now become. Her valedictory

lecture was titled “Emancipation process”. Herself a fully emancipated woman, who inspired many female professionals, she was responsible for the emancipation of anaesthesia in the Dutch academic world.

Up to the summer of 2011 she retained an active interest in the profession, being guest of honour at the European Society of Anaesthesia congress in Amsterdam in June. She continued to visit the annual meetings of the Dutch Society to attend the opening lecture which is named in her honour. Always she had a relevant remark to make. As travelling abroad became more troublesome she regretfully could not visit professional meetings, especially those of the History of Anaesthesia Society.

In honour of her many achievements she was awarded Commander of the British Empire and Knight of the Order of the Dutch Lion. The anaesthetic societies of both the UK and the Netherlands made her honorary member.

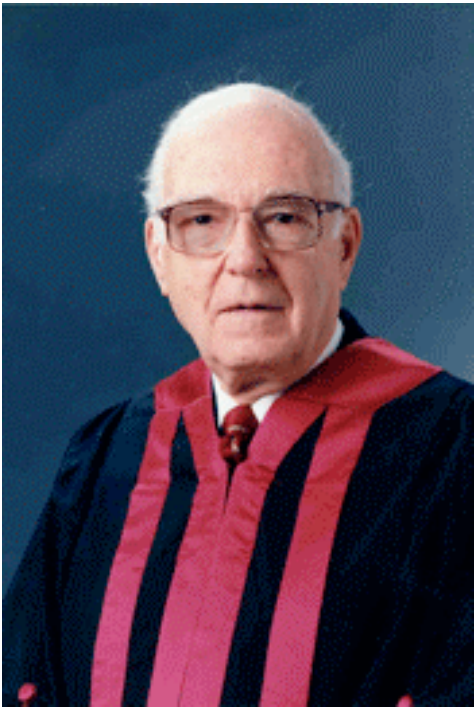
Her famous case, painting and many other attributes remain in honour of her memory in the Historic museum of the Anaesthesia Department of the Amsterdam Academic Medical Centre.
We remember her as an exceptional person and especially a warm personality.

Jan Eshuis, anaesthesiologist Amsterdam

Lucien E Morris

Lucien E Morris, academic anesthesiologist and inventor of the Copper Kettle vaporizer died peacefully at his home in Seattle, Washington on November 15, 2011, two weeks before his 97th birthday. He was one of the last remaining Aqualumni, the doctors who trained with Dr. Ralph Waters at the University of Wisconsin. Certainly his life epitomized Waters' admonition "to teach doctors to go out and teach other doctors" the medical specialty of Anesthesiology.

Dr Morris was born November 30, 1914. His father, a biochemistry professor, died of tuberculosis when Lucien was eleven leaving the family in difficult straits through the Great Depression. Lucien attended Oberlin College, graduating in 1936 in chemistry. He commenced graduate studies in biochemistry, before electing to obtain a medical degree at Western Reserve University in Cleveland. He married Jean Pinder in 1942; this resulted in what Lucien would count as his life's most successful endeavor lasting more than 69 years.



Dr Lucien E Morris (1914-2011)

Lucien's internship was at Grasslands Hospital in New York followed by a residency at St. Mary's Hospital in Madison, Wisconsin that was interrupted by a call to military service. Prior to leaving Madison, having decided to specialize in anesthesia, he met with Dr. Waters who promised him a residency position after the war. Lt. Morris arrived in England in July, 1944 and was made Chief of Anesthesia of the 103rd General Hospital where he personally provided more than 700 anesthetics. He established lifelong British connections when in March, 1945 he attended a review course in Oxford taught by the faculty of the Nuffield Department of Anaesthesia.

Residency in Madison after the war provided a stimulating environment to learn under the mentorship of "the Chief." As a co-investigator in the chloroform centennial study trying to deliver a known amount of vapor, Lucien complained within earshot of Waters, "Anyone ought to be able to make a better vaporizer than this!" A few weeks later a single-sentence post-card arrived from the vacationing Waters, "Has Morris made a new vaporizer yet?" The result of that challenge was the Copper Kettle, a precision device that was the industry standard for 25 years.

Dr Morris began his academic career at the University of Wisconsin and then moved to the University of Iowa (1949-1954), the University of Washington (1954-1960) where he was promoted to professor, the Anesthesia Research Laboratories at Providence Hospital in Seattle (1961-1968), and the University of Toronto (1968-1970). He became the founding chairman of the Department of Anesthesiology at the Medical College of Ohio in Toledo in 1970. Following a sabbatical to the London Hospital Medical College in 1980, he returned to Toledo, retiring in 1985. Dr Morris traveled and taught internationally for WHO in Israel and Iran in 1951, with an around-the-world lecture tour beginning in New Zealand and Australia in 1958 and served as external examiner for the medical school at the University of Lagos, Lagos, Nigeria in 1977. He lectured and actively participated in ASA, World Congress and numerous other meetings and conferences for more than 60 years.

Lucien Morris was elected a Fellow of the Faculty of Anaesthetists of the Royal College of Surgeons in England (FFARCS) in 1978, an Honorary Fellow of the Faculty of Anaesthetists Royal Australian College of Surgeons (FFARACS) in 1989, and received an honorary Doctor of Science degree from the Medical College of Ohio in 1994. He published his first paper in 1947 on thiopental and his last in 2011 on anesthesia history.

Dr Morris has also coached fencing as a University sport, guided canoe trips in Temagami, Ontario, and was an avid downhill skier, from the time he learned at age 41 until his last run at eighty-five. He is survived by his wife Jean, five children, sixteen grandchildren and six great-grandchildren.

Lucien will be remembered for his quick intellect and keen insights, his pleasure and insistence on getting the details right on every project, his love of the specialty of Anesthesiology, his loyalty to his friends, respect for his teachers and willingness to mentor newcomers to the subjects he loved. He will be sorely missed by those he taught and colleagues worldwide.

By Mark E Schroeder, Associate Professor, University of Wisconsin, Madison, WI, USA

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