The History of Anaesthesia Society Proceedings

Volume 52
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The History of Anaesthesia Society Proceedings

Volume 52

Contents of Volume 52

Papers and Abstracts from the Madingley Hall Meeting

Friday 14th June 2019

Session 1. Symposium on more Subspecialties in Anaesthesia.
Chairman: Dr John Pring

Session 2. Anaesthetists in World Wars, including concentration camps.
Chairman: Brig Ivan Houghton

HISTORY OF ANAESTHESIA SOCIETY

Summer Scientific Meeting at Madingley Hall, Cambridge 13th – 15th June 2019

Organiser (Programme): Dr Alistair McKenzie
Organiser (Administration): Dr Ann Ferguson

FUTURE MEETING 2020

The Prince Rupert Hotel, Butcher Row, Shrewsbury, Shropshire SY1 1UQ

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

26th – 27th June 2020

Organiser (Programme): Dr Adrian Kuipers
Organiser (Administration): Dr Ann Ferguson

The History of Anaesthesia Society Proceedings
Honorary Editor

Brigadier Ivan Houghton
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HISTORY OF ANAESTHESIA SOCIETY

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EDITORIAL

My first anaesthetic was late one night three quarters of a century ago for an emergency partial tonsillectomy for incipient respiratory obstruction. Apparently the anaesthetist (and surgeon) had a tough time and the results are still visible on examination of my throat. As far as I am aware no endotracheal tube was used to secure my airway as it would have been today. Practices change over the years and what is current practice today and even tomorrow will soon be history and needs to be recorded if we are to understand previous practice in context.

The History of Anaesthesia Society is now into its fourth decade and continues to flourish although more members would always be welcome and particularly from amongst those who are younger and will be able to keep the Society going into the future. How can we encourage new members? Anaesthetists in training have busy lives and it may seem difficult to justify giving up a couple of days to attend a conference. However, as in all professions, life is competitive and being able to distinguish oneself as better than the rest at interview is important. You might even meet somebody who will make history. The History of Anaesthesia Society offers the chance to augment a curriculum vitae by giving a presentation in a friendly and supportive environment. It will probably lead to a publication and to make it even more attractive the Society heavily subsidises junior speakers.

National advertising has been found to be ineffective for recruitment and so we have to rely on our own society membership to spread the word and encourage new members. Shrewsbury in Shropshire will be an opportunity to mix business and pleasure with a stimulating conference in an historic town with many old buildings in a lovely part of England.

Notes for Authors

The History of Anaesthesia Society does not issue 'Instructions to Authors'. Authors should prepare their manuscripts to conform with the authors' instructions for either the *'British Journal of Anaesthesia'* or *'Anaesthesia'* . The Editor will make any editorial changes to maintain the style of the Proceedings. Two major differences are that the Proceedings quotes the first six authors and does not abbreviate the titles of referenced journals. The page setup is for A5 and Garamond 12 point font with unjustified right margins. Arial 10 point bold is used for titles. Authors are requested not to embed their titles and references but to word-process them as normal text.

The final version of the Proceedings is delivered to the printers in desktop publishing format ready for printing.

Call for nominations for the David Zuck Memorial Prize 2020

Nominations are invited for the David Zuck Memorial Prize for the best paper or chapter in a book *published* in 2019. This certificate will be awarded by the History of Anaesthesia Society.

The nominated texts must be:

a) on the history of anaesthesia, resuscitation, intensive care or pain management
b) published in the English language in 2019.

The nominator (if not self-nominated) must provide confirmation that the author has accepted that his/her publication is being nominated. A **maximum of two nominations** will be accepted from any one nominator.

Nominations should be sent by email to the Chair of the David Zuck Prize Committee, Brigadier Ivan Houghton: ivan.houghton@btinternet.com

The paper or chapter must be sent as an attachment: word-processed document or PDF. The closing date is 30th April 2020. The winner will be announced at the History of Anaesthesia Society's scientific meeting in Shrewsbury on 26th June 2020.

Acknowledgements

Once again I am pleased to acknowledge the help of Dr John Pring in reviewing the manuscripts and for arranging the printing of the Proceedings.

Deaths of Members 2018-201

Dr G.W. Burton	Bristol
Dr J. G. Fairer	St Jean d'Angely, France
Prof. T Healey	Hastings
Dr L. Kaufman	London
Dr A. Leslie	Altrincham

Madingley Hall Meeting: Speakers' photographs

Dr David Wilkinson

Dr Peter Featherstone

Dr Mike Lindop

Prof. Tony Wildsmith

Prof. Gareth Jones

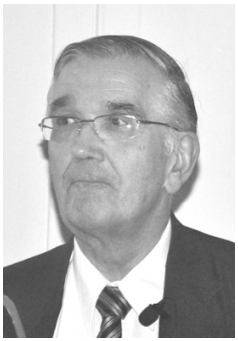
Dr Diana Khursandi

Dr Duncan Mitchell

Dr Elizabeth Bradshaw

Dr Marten van Wijhe

Dr Alistair McKenzie



Prof. Alan Dronsfield

Dr Ahmed Gilani

Dr Reet Nijjar

Dr Alexander Photiou

Dr Christine Ball

Dr Robert Palmer

Dr Henry Connor

Dr Hiroshi Makino

Prof. Andrew Wallace-Hadrill.

LIST OF DELEGATES

History of Anaesthesia Meeting, Madingley Hall, June 2019

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Moyna Barton
Colin Birt
John Blizzard
Elizabeth Bradshaw
Fabrizio Casale
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Kentaro Dote
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David Wilkinson
Patricia Willis
Chris Woollam
Edward Young

The Development of Anaesthesia for Day Case Surgery (Abstract)

Dr David J. Wilkinson

Past President, History of Anaesthesia Society. (lorikeet08@gmail.com)

Day case surgery, where patients stay, usually, for a morning or afternoon in a hospital after a surgical intervention, has been practiced since anaesthesia began. William Clarke, Crawford Long and Horace Wells all provided day stay care in the early 1840s, techniques that today would be classed as office-based procedures.

The founder of day stay care in the United Kingdom (UK) is James H. Nicholl of Glasgow. In 1909 he published a paper in the British Medical Journal on 'The Surgery of Infancy' where he described his own experience of operating on over 7,000 cases, all on an out-patient basis, between 1899 and 1908, at The Dispensary in West Graham Street, Glasgow. There was a large variety of cases including hernias, cleft lip and palates and pyloric stenosis. He arranged for patients to be assessed post-operatively in their homes by nursing staff and even rented a house near The Dispensary where patients' families could stay if their homes were far away (a patient hotel!). He does not mention any specific anaesthetic drugs or techniques and would probably have been using ether, chloroform and nitrous oxide.

In the United States of America (USA), in 1947 Ralph Waters described the opening of a 'Down-Town Anesthesia Clinic' in Sioux City, Iowa where there was a small operating suite and an adjacent recovery ward all of which was available for use by any medical practitioners in the area.

It is difficult to see any immediate impact on mainstream practice occasioned by these papers. Day stay surgical lists were common in UK hospitals where new housemen were allocated to perform circumcisions and other 'minor procedures' in the Accident and Emergency Department while anaesthesia was delivered usually by another trainee. Nitrous oxide was the normal drug of choice sometimes augmented with other inhalational agents. In the dental practices throughout the country, extractions, single, multiple and often full clearances, under nitrous oxide administered by GPs was

the normal practice. The use of ethyl chloride and vinesthene became increasingly common.

In 1959 Canada started a new trend when Drs Webb and Graves reported their experiences in providing anaesthesia for a wide variety of surgical cases. This had been brought about by the shortage of inpatient beds in Vancouver. The USA saw the potential and in 1962 started a formal ambulatory surgical programme at the University of California, Los Angeles (UCLA) and in 1966 George Washington University opened an ambulatory surgical facility.

The major impact came when Ford and Reed opened their freestanding 'Surgicenter' in Phoenix, Arizona and ambulatory care took off across the country. In the UK day care was slower in onset. Surgeons started to perform occasional day cases from the 1970s, set first on an inpatient operating list and with little special preparation, anaesthesia was now induced with methohexitone or propanidid and soon Althesin became available. Maintenance was with halothane and there was little or no use of local anaesthesia to augment analgesia which in turn was often provided by fentanyl. Many UK centres did not like to intubate day cases and there was little enthusiasm for epidural or spinal blocks. By 1975 the topic of 'day case anaesthesia' started to appear at UK meetings and in publications. Leading the way was Dr Tom Ogg from Aberdeen and then Cambridge.

In 1985, the Royal College of Surgeons published their 'Guidelines for Day Case Surgery' and in the USA that same year the Society of Ambulatory Anesthesia was founded with Bernie Wetchler as President. In the UK there was little enthusiasm for this type of work but enthusiasts like Tom Ogg, Jean Millar from Oxford and the surgeon Paul Jarrett from Kingston toured the UK lecturing and promoting the topic. In 1983 Addenbrooke's opened their first Day Stay Unit and in 1986, after visits to Bernie Wetchler in the USA and then further visits to Boston. Barts opened its purpose-built unit

which followed the structure of the American circular format despite being housed in a listed building.

By 1989 the British Association of Day Case Surgery had been created by Ogg and Jarrett, and they were soon holding annual meetings and publishing a journal. In my view the innovations which made day surgical anaesthesia acceptable for the majority of anaesthetists in the UK were the introduction of propofol in 1986 and the laryngeal mask airway in 1987. Day stay surgery took off with an ever increasing enthusiasm as managers began to realise that this would allow the savings of huge sums of money if in-patient beds were closed. Many surgeons found this potential loss of their empires extremely challenging.

Addenbrooke's opened its new National Demonstration Day Surgery Unit in 1992 which was a showcase unit for the UK attracting visitors from around the world and training a huge cohort of surgeons, anaesthetists and nursing staff. More and more reports and papers were published on the subject and each new short-acting anaesthetic agent was immediately advocated as the 'best' for day stay care. More centres around the world started to use spinal techniques and almost every type of surgery has been attempted as a day case.

Anaesthesia for day stay care still has difficulties in ensuring good analgesia without nausea and vomiting for all patients.

History of anaesthesia for vascular surgery

Part 1: Surgery on the abdominal aorta (Abstract)

Dr Peter J Featherstone

Consultant in Intensive Care Medicine and Anaesthesia, Cambridge University Hospitals NHS Foundation Trust.

> 'The surgery of abdominal aneurysm is a highly specialized operative procedure…a skilled anaesthetist…is at least as important as the surgeon's competence to perform the operation.'
>
> Professor Roy Calne, September 1968[1]

Likened by Lord Russell Brock to the ascent of Mount Everest,[2] surgery on the abdominal aorta was long deemed impossible. This changed in June 1817, when Astley Cooper exposed the aorta of a man with a ruptured external iliac artery aneurysm and tied a silk ligature just above the aortic bifurcation. The patient apparently complained of little pain during the procedure, and was even described as 'cheerful' the following day, but died 40 hours post-operatively. Subsequent attempts at ligation of the abdominal aorta proved similarly unsuccessful, and it would be more than a century before a case was attended by prolonged survival. This was performed on 9th April 1923, by Rudolf Matas, Professor of Surgery at Tulane University, New Orleans.[3] Anaesthesia comprised nitrous oxide and oxygen, and was delivered by Dr Ernest Allgeyer.[3] The patient survived for one year, five months and nine days. Nevertheless, by 1940 it was reported that

> 'only a small number of surgeons have felt that direct surgical attack upon aneurysms of the abdominal aorta was justifiable, and… the results obtained by surgical intervention have been discouraging.'[4]

While some subsequently experimented with less invasive techniques, such as intraluminal wiring and electrothermic coagulation, or

external wrapping with cellophane (the method utilised by Rudolph Nissen to manage Albert Einstein's abdominal aortic aneurysm), in 1951, Charles Dubost resected an abdominal aneurysm and restored arterial continuity with a 14 cm aortic homograft harvested from a woman who had died three weeks previously. One year later, Arthur Voorhees Jr. and colleagues reported the use of Vinyon "N" Cloth to bridge arterial defects, and by the mid 1950s, the modern era of open surgical repair using prosthetic aortic grafts had dawned. In the decades that followed, vascular surgeons and anaesthetists began to encounter patients with increasingly severe comorbidities, and in 1991, Juan Parodi was among the first to describe a novel technique that allowed

> 'exclusion of the abdominal aortic aneurysm (AAA) from the circulation under local or limited epidural anesthesia, without the morbidity of a high regional block, or general inhalational anesthetic'[6] - endovascular aneurysm repair (EVAR).

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Anaesthesia for Liver Transplantation

Dr Mike Lindop

Consultant Anaesthetist (retired), Cambridge University Hospitals NHS Foundation Trust.

The first liver transplant in Europe was performed in Cambridge in 1968 by Professor (later Sir) Roy Calne. Calne had returned from US where he studied kidney transplantation and graft rejection. He was convinced that transplantation was feasible for more organs than the kidney. The challenge of such a major operation in moribund patients was quickly recognised.

The first patient was anaesthetised by one of the neuroanaesthetists, Ronnie Millar. The neuroanaesthetists had most of the decent monitoring equipment at Addenbrookes at the time! But the programme relied in its early years largely on the support of John Farman – both for the intraoperative and postoperative care.

In the early years only a few transplants were done – the concept of beating heart donors was not established and was hotly disputed by many, including two vociferous Cambridge consultants. There was limited operating theatre access, and a widespread feeling that valuable resources were being squandered on an unworthy group of patients.

The operative procedure involved removing the liver with its challenging anatomy. The inferior vena cava was clamped which dramatically reduced venous return. The new graft, full of potassium-rich preservation solution, was taken from the ice box. Five anastomoses (hepatic artery, inferior vena cava (2), portal vein and bile duct) were made. Then finally the graft was re-perfused straight into the recipient's circulation– already subject to hypovolaemia and hypothermia. A dramatic and challenging moment for the anaesthetist!!

There was much to learn about techniques for risk assessment, monitoring, warming, rapid blood transfusion, management of coagulopathy, and control of rejection. John Farman founded LICAGE (Liver Intensive Care and Anaesthesia Group of Europe) in 1987 which continues to hold meetings throughout Europe to share knowledge as other countries developed their own transplant programmes. This year, John Klinck, one of our consultants and an important contributor to LICAGE, received a medal at the International Liver Transplant Society meeting in Toronto to recognise his work in preoperative assessment and in the creation of education programmes.

In the early years patients were referred from Roger Williams at King's College Hospital and less than one transplant a month could be done. Hepatology was an infant specialty then. As hepatology developed with major therapeutic options available such as transplantation, the demand for the procedure steadily increased. By 2013, 128,000 liver transplants had been done in Europe alone. Last year 125 liver transplants were done in Addenbrookes.

The last fifty years have seen a massive change. Addenbrooke's has been joined by programmes in London, Birmingham, Leeds, Edinburgh and Newcastle. Intraoperative management is guided by new aids such as transoesophageal echocardiography and thromboelastography. The five year survival rate is now 70%, an improvement on the 20% of earlier years. Improvement in the control of rejection remains a major research goal. Some patients develop tolerance which allows anti-rejection treatment to be withdrawn completely. Alcoholic liver disease is no longer the major indication – overtaken by newer indications such as fatty liver disease in the grossly obese.

Aylett's Wartime Anaesthetists

Professor Tony Wildsmith

Professor Emeritus, University of Dundee jaww@doctors.org.uk

Stanley Osborn Aylett was born in Islington, went to Highgate School and won an open scholarship to read medicine at King's College Hospital. He had a glittering career there, graduating with first class honours, captaining the United Hospitals Rugby XV, and qualifying in 1935, also with honours. On the outbreak of World War II, he was a registrar at King's with the FRCS and, against local advice, volunteered to join the RAMC, served right through the war, and received the MBE(Mil) and the French Croix d'Honneur for his services. Afterwards returning to King's, he became a senior registrar at the Marsden, and then a consultant at the Gordon and other London hospitals. He was known for his operative skill *("the fastest fingers in the business")*, and developed a special interest in inflammatory bowel disease, pioneering more conservative surgery with preservation of the rectum against then established opinion.[1]

Aylett wrote an account of his wartime experiences: 'Surgeon at War 1939-45', subtitled 'The Second World War seen from operating tables behind the front line'. The book (first edition 1979) is based on Aylett's personal diaries and contains many contemporary photographs. The second edition, published in 2015 and edited by his daughter Holly,[2] was expanded by the addition of many of his letters home. It is a fascinating account of his experiences: personal, social, military and clinical. Some of it is gruesome, but that dispels any romanticism about war, and Aylett highlights advances contributing to patient survival: the well-known - blood transfusion and the introduction of penicillin; and the less well known - evolution of the Field Surgical Unit (FSU).

In 1939 an FSU was simply a pairing of surgeon and anaesthetist, both Majors. Such teams were sent, at short notice, to supplement the staff of busy mobile hospitals (the Casualty Clearing Stations), but

insertion of strangers to a setting where teamwork is so vital seems of dubious benefit. By 1944 the Unit had been expanded to include a Lance Corporal, six orderlies, and all the equipment and transport needed to provide a completely mobile operating theatre with 12 beds. After D-Day, each Battle Corps was followed by two 120-bed Casualty Clearing Stations which leap-frogged one another during the advance. They were designed so that they could be expanded by the addition of one or two FSUs.[3]

Aylett also emphasizes the importance of the anaesthetist in the acute management of battle casualties, recognizing the need for good rapport with the surgeon, skill and experience in dealing with serious injuries, careful control of depth of anaesthesia, and skill in resuscitation. The ward area was immediately adjacent to the operating theatre, and the anaesthetist was expected to oversee it during the operative procedures.

Aylett was one of those people who always seemed to be in the War's hotspots: starting with the British Expeditionary Force he was involved in the debacle of the retreat to, and evacuation from, Dunkirk; helped set up an 'in case of invasion' hospital in Dover; went, via the Cape of Good Hope, to serve in Greece, but (luckily for him) arrived in Suez after Greece fell; he remained in North Africa and was lucky again, being in the last group to escape from Tobruk before it fell; finally, he returned to the UK, at Madingley, to join an FSU due to go to Normandy on D-Day+1. The Unit stayed with the advance through France and the Low Countries to the end of the war against Germany. They had the terrible experience of 'cleaning up' a concentration camp, and finished working on the repatriation of the injured from both sides. He worked with anaesthetists in all of these situations, but the two mentioned by name are those whom he worked with closely in FSUs during the opening and closing stages of the war.

The first was Frank Blackburn, a Durham graduate who had settled in general practice in Richmond where he was also Deputy Coroner and in the TA. He was with Aylett until Dunkirk, after which he worked with the EMS in central London, becoming a consultant there on the establishment of the NHS in 1948. He seems to have had a fairly peaceful war after Dunkirk because he managed to qualify as a barrister in 1942 and pass the DA in 1945, although it is arguable which was less peaceful: the front line with Aylett or London during the blitz. He was elected to the Fellowship in 1953 (not quite one of the Foundation Fellows) and was awarded the TD in 1954. Further information, and a photograph, would be very welcome.

The second anaesthetist is introduced by Aylett as "Major W (Bill) Alsop", but my research came up against a major (pardon the pun) problem: there is no such person in the 1944 Medical Register. Aylett notes that Alsop had worked in Oxford, but several of its luminaries did not know of him. Fortunately, contact with Dr Len Carrie provided the solution: *"Oh, yes, A J Alsop, always known as 'Bill'. I got his job when he retired"!* Thereafter everything fell into place. Trained at Cambridge & Bart's, he became a GP in Oxford and assistant anaesthetist at the Radcliffe Infirmary so was a member of the original Nuffield Department[4] (this story providing another example of the short 'folk memory' of our profession). He served right through the war, returned to Oxford afterwards and, being elected a FFARCS in 1952, was one of the Faculty's Foundation Fellows.

Aylett and Alsop (Figure 1) met when they were sent to Madingley in 1944 to prepare number 14 FSU to go to war. Aylett thought Alsop ideal for the challenge, so was more than upset when, only three weeks before the invasion, he was posted to a back-up unit, and replaced by an inexperienced Captain. Aylett's entreaties to the Army's anaesthetic establishment fell on deaf ears and, once in France, his anxieties grew. What he considered to be an unnecessary death on induction of anaesthesia led him to ask to be relieved of his

post. The senior surgeon was more sympathetic and Alsop was returned to 14 FSU.

Figure 1. Major Stanley Aylett and Major A. J. (Bill) Alsop, somewhere in Northern Europe, 1945.

They worked well together, and in 1945 published an account of their management of abdominal war wounds.[5] Alsop's anaesthetic technique was remarkable. No pre-operative drugs were given because all the casualties had received an unknown number of

unknown doses of morphine. Patients were resuscitated to a blood pressure of 100/60 and anaesthetized, with signs of shock present and blood transfusion running. Intravenous Pentothal (in 2.5 % solution, dilute for the time) was titrated to produce abdominal relaxation. The only other agent used was oxygen administered by facemask from a circle system with carbon dioxide absorption to allow lung ventilation if needed. The initial Pentothal dose was 100-250 mg, with increments of no more than 200 mg given at no less than two minute intervals. The largest initial dose needed to produce the desired end point, abdominal relaxation, was 1 g, and if it was less than 250 mg it suggested that the patient's shock was severe. The largest cumulative dose administered in any patient was 2.5 g. Complications were described as infrequent.

The paper reviewed the 54 patients with abdominal injuries seen in a series of 200 consecutive casualties managed by the authors. Outcome was clearly related to time since injury: less than 10 hours, mortality 20%; between 10 and 20 hours, mortality 49%; greater than 20 hours, mortality 71%. Severity of injury was the other major factor relating to patient survival.

Aylett's book gives a remarkable account of the workings of acute medical teams near the front line during the Second World War. It is written from the standpoint of a middle ranking army surgeon, but much of it applies to all grades involved. His appreciation of the importance of a high standard of skilled anaesthetic practice reflects the growing status of the specialty during that period. Alsop's technique of using low doses of Pentothal as a single agent to produce anaesthesia with abdominal relaxation in shocked patients indicates his skill. He was not alone in his use of Pentothal for war casualties because the next edition of the British Medical Journal contains a description by Solomons of its low dose infusion in an army neurosurgical unit.[6]

Modern analysis of the 'Pentothal story' was started by Frank Bennetts,[7] and has been brought up to date, and in greater detail, by John Crowhurst.[8] The 'myth' that in 1941 the drug killed more American serviceman than the Japanese at Pearl Harbor is just that, a 'myth', but three factors almost certainly combined to produce excess mortality:

1. At the time the American services still relied on nurses and junior doctors for the administration of anaesthetics;
2. It was an era of 'one drug by one route' anaesthesia, with the desired conditions often being achieved by administration of a single large dose;
3. Pentothal was used in concentrations of 5 or 10 % rather than the 2.5 % which later became standard.

The cardiorespiratory consequences of injecting an 'induction' dose of pentothal in a high concentration to a shocked patient are self-evident.

The presumed source of Alsop's technique is to be found in Bennett's paper, a case report (in *Anesthesiology*) from the Mayo Clinic, very much the 'home' of Pentothal.[9] It describes exactly the technique used by Alsop, a 2.5 % solution given in small increments. The report also notes that the total dose required for the emergency surgery of an extensive gunshot wound when the patient was shocked was only sufficient for the first 10 minutes of a subsequent elective procedure.

Acknowledgements

I thank Ivan Houghton for his comments, John Crowhurst for his advice, and Stanley Aylett's daughter, Holly, for her assistance, particularly for providing the photograph. It is intended that her father's papers will be deposited in the King's College Archive.

References

The career information on Drs Alsop and Blackburn was obtained from records of the Royal College of Anaesthetists, or relevant editions of The Medical Directory held at Ninewells Hospital & Medical School Library, Dundee.

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Medical students and "The Anaesthetist" in Belsen 1945

J. Gareth Jones

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"You may think you know all about Belsen but until you've actually spent a night there you don't". Belsen inmate 1945.

Preamble

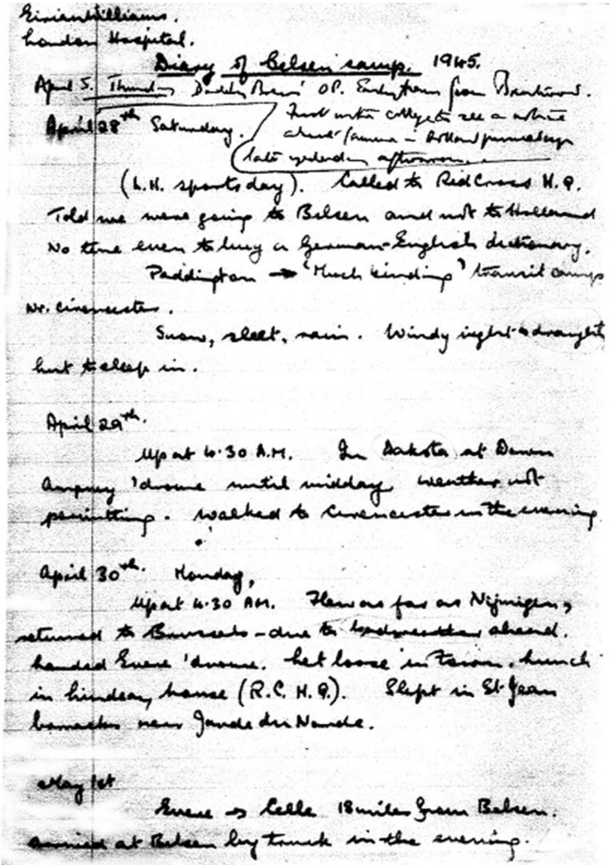
Eirian Williams.
London Hospital.
Diary of Belsen camp. 1945.
April 5. Thursday
April 28th Saturday.
(L.H. sports day). Called to Red Cross H.Q.
Told we were going to Belsen and not to Holland
No time even to buy a German-English dictionary.
Paddington → 'Much Winding' transit camp
Nr. Cirencester.
Snow, sleet, rain. Windy light & draughty
hut to sleep in.
April 29th.
Up at 6·30 A.M. In Dakota at Down
Ampney 'drome until midday weather not
permitting. walked to Cirencester in the evening.
April 30th. Monday.
Up at 6·30 AM. Flew as far as Nijmegen,
returned to Brussels - due to bad weather ahead.
Landed Evere 'drome. Let loose in town. Lunch
in Lindsay house (R.C. H.Q.). Slept in St Jean
barracks near Gare du Nord.
May 1st
Evere → Celle 18 miles from Belsen.
arrived at Belsen by truck in the evening.

Figure 1. First page Eirian Williams' Belsen Diary.

In the 1970s I became a consultant locum for Dr Eirian Williams, a single handed physician at the Withybush ex RAF Hut Hospital, Haverfordwest. His secretary told me that he had gone to South America to lecture on Brucellosis. She continued

"*…but that's nothing, he was flown to Belsen concentration camp during the war when he was a 19-year old medical student and he still keeps his Belsen diary in his office*".

Years later, and 20 years after his death, I was preparing a talk for the History of Medicine Society of Wales[1] and Eirian's wife generously gave me a copy of this diary.

Eirian Williams, London Hospital

Diary of Belsen Camp 1945

April 5 Thursday. Dudley Brewis OP. Early train from Brentwood. First into college to see a notice about famine in Holland pinned up late yesterday afternoon.

April 28th Saturday (LH sports day). Called to Red Cross HQ. Told we were going to Belsen and not to Holland. No time even to buy a German-English dictionary.

Paddington to "Much Binding" transit camp Nr Cirencester.

Snow, sleet. Rain. Windy night & draughty hut to sleep in.

April 29th Up at 4.30 am. In Dakota at dawn Ampney 'drome until midday weather not permitting. Walked to Cirencester in the evening.

April 30th Monday.

Up at 4.30am. Flew as far as Nijmegen. Returned to

Brussels – due to bad weather ahead

Landed Evere 'drome. Let loose in town. Lunch at Lindsey House (R.C.H.Q). Slept in St Jean Barracks near Garde du Norde.

May 1st. Evere-Celle 18 miles from Belsen. Arrived at Belsen by truck in the evening

Ninety-six fellow medical students accompanied him to Belsen, a dozen recorded their experiences for the Imperial War Museum. It's quite remarkable to hear their impressions 75 years after the event. One was made by Dr Peter John Horsey, a consultant anaesthetist at Southampton (IWM 13925 sound archive).

Medical students are sent to Germany

At 2 pm on 28th April 1945, with the war in Europe drawing to a close, 96 students from eight London medical schools assembled, in newly-issued army uniforms, tin hat, gas mask and haversack, outside the Red Cross HQ in Belgravia.[2 3 4] A few weeks previously the Red Cross had asked for volunteers to help in Holland. They heard nothing more until they were summoned to the Belgravia HQ when they were told they were going immediately to Belsen Concentration camp. After a short briefing they were entrained for Down Ampney aerodrome, Cirencester, from whence parachutists had departed for Normandy, Arnhem and most recently the Rhine crossing. After two stormy nights in huts at the 'drome, giving one student time to visit the NAAFI to get "laces, razor blades and an orange",[2] six Dakotas eventually took off in atrocious weather for Celle just south of Belsen on the North German Plain. That day only one aircraft arrived at Celle, one reached Brussels, two got to Croydon and two returned to Cirencester. But by 2nd May all 96 students were assembled at the former Bergen-Belsen Wehrmacht Panzer barracks, which normally housed 13,000 troops and was to be their home for the next month.

RAMC arrive at Belsen

Two weeks before, on 12th April 1945, the British, having crossed the Rhine, were advancing rapidly across the North German plain. Typhus had been out of control at Belsen concentration camp since mid-February when the camp's delousing unit failed. Knowing that the British would soon overrun the camp, inadvertently releasing thousands of typhus cases into the community, the Wehrmacht asked for a local truce. Brigadier Glyn Hughes, DDMS, 2nd Army, entered

Belsen on 15th April. The Nazis had destroyed all the records. Hughes estimated a total of 60,000 inmates in a vast camp in two locations; a primitive hutted Camp 1, and a mile away, the extensive and lavish Panzer barracks, Camp 11, where the British stayed for the next 70 years. In Camp 1 were 45,000 inmates, 16,000 were moribund and, piled between the trees were 6-10,000 emaciated corpses. Camp II had 15,000 inmates who had arrived a week previously from the evacuated Mittlebau Dora V2 underground rocket factory. Desperate for medical staff, Hughes summoned 32 Casualty Clearing Station (32 CCS) with Lt Col JAD Johnston appointed Senior Medical Officer (SMO) of Belsen. This unit together with Lt Col Mervin Gonin's 11 Light Field ambulance and a hygiene unit provided a total of eight doctors who entered the camp on 17th April. Camp 1 was a collection of 100 wooden huts surrounded by 15-ft high barbed-wire fences and 40-ft high guard towers housing Hungarian soldiers with machine guns. A substantial part, also hutted, was landscaped to provide hospital facilities for prisoners of war. In mid 1944 Camp 1 housed 5000 inmates but by April 1945 there were nine times that number. These had originally been Jewish with visas for neutral countries, all being held as high-value hostages to exchange for cash or other benefits for Germany. Ahead of the Soviet advanced from the East the Nazis were rapidly evacuating their concentration camps, Belsen being a major recipient with massive and intolerable overcrowding.[56] Camp 11 was a Wehrmacht Panzer training school built in 1935 with 100 2-3 storey barrack blocks each to accommodate 150 men. The barracks was surrounded by landscaped grounds having a lake overlooked by a spectacular roundhouse including 10 luxurious apartments for senior officers. This included the spectacular senior officers Roundhouse which had a chandeliered ball room with musicians gallery. Within the barracks were 50 stables, 40 tank garages, a cinema, 50m swimming pool, a hunting lodge and a 250-bed military hospital.[57]

Glyn Hughes' assessment

Until the moment Glyn Hughes entered the camp it was the responsibility of the Schutzstaffel (SS). Camp 1 was dusty, grey-brown and oppressively quiet, like a giant chicken farm but with wooden huts designed for 50 people but each now with 500-1000 huddled together mostly on the floor. There was an appalling smell. Many inmates, too ill to move, defaecated where they lay. Emaciated apathetic scarecrows wandered aimlessly outside, others lay sleeping but there were many who looked perfectly normal. Surprising because every inmate had come from another concentration camp. Running water and sanitation were non-existent. The estimated death rate was 500 per day. In contrast, the conditions in Camp 11 were vastly better. This camp housed 15,000 inmates who had recently arrived, free of typhus. They were housed, 600 at a time in two-storey brick buildings designed for a quarter of that number. The death rate here was about 10 per day. Glyn Hughes considered Camp 1 unsuitable for long-term care and that twelve 1200-bed field hospitals would be needed to house the sickest inmates - impossible at this critical stage of the war. Nevertheless he had to find medical staff to care for 13,000 patients. It was decided to send to Belsen the medical students that were standing by in London. Fortunately for Glyn Hughes, and close at hand, was the extensive Wehrmacht Barracks, Roundhouse and the purpose built military hospital, later called the Glyn Hughes Hospital. But the barracks had 15,000 new inmates and the hospital had 1500 wounded German soldiers. His plan was to transfer all able-bodied inmates out of Camp 11 and to convert it into a hospital for the 14,000 sickest people from Camp 1.[7 8] This was a formidable task as he also had to accommodate those who were still able to care for themselves from Camp 1, which would then be destroyed. While this was being done the students had arrived for their new role.

Students role in Camp 1

On 2nd May, the students breakfasted in the Waffen SS Officers mess in the Panzer barracks, Camp 11. They were amazed that the walls inside this two-storey half-timbered building were adorned with fox hunting scenes with English titles. Afterwards they assembled in front of the building for an open-air briefing with notebooks at the ready. Their role was to care for 16,000 moribund inmates out of the 60,000 in the concentration camp. A film taken of this briefing shows what appeared to have been a light-hearted affair under a dense cloud of cigarette and pipe smoke. But the war in Europe had still not come to an end. Days before, despite the truce, Red Cross personnel a few hundred yards away in Camp 11 had been strafed by a Focke-wulf 190. Immediately after the briefing the students piled into trucks and were taken down the road to the Waffen SS office at the entrance of Camp 1 where, each student with two Hungarian soldier helpers, was directed to different tasks. Most were allocated one each to huts with about 450 inmates. Some huts had more than 1000 inmates and two students were allocated to share the work. Others worked in the dispensary, some in the kitchen making up the various diet solutions and others in the post mortem room. Most huts had no beds, and inmates, alive and dead, lay on the floor, naked or in rags soaked in excrement. In some places floor-boards had disappeared and decomposing corpses filled the space beneath. The stench was overpowering. The three immediate problems were to kill the lice transmitting typhus, to assess the moribund and feed and organise hospital care and housing for the ambulant. Twice daily powdering of inmates and staff with DDT compressed-air guns was the cornerstone of typhus prevention. There was no effective immunisation or antibacterial therapy. Feeding inmates was their main job, this had to be done with spoon or tea pot. The feed was not too palatable, being either too sweet or smelling of vomit. East Europeans wanted more bitter fare. Famine oedema was very common and treated, with variable effect, either with mersalyl or

plasma infusions. Local infection was frequent, either abscesses, pressure sores or *cancrum oris*, the latter usually fatal.

Abscesses were incised using razor blades with ethyl chloride spray for topical anaesthesia. Diarrhoea and vomiting were ubiquitous, the students themselves were frequent victims. Morphine was used to treat diarrhoea and the incessant cough, symptomatic of typhus. Within a week of the students arrival the inmates moral improved and there was a fall in daily mortality in camp 1 from about 300 to less than 100. But the total number of inmates was falling in Camp 1 as they were being transferred to Camp 11.

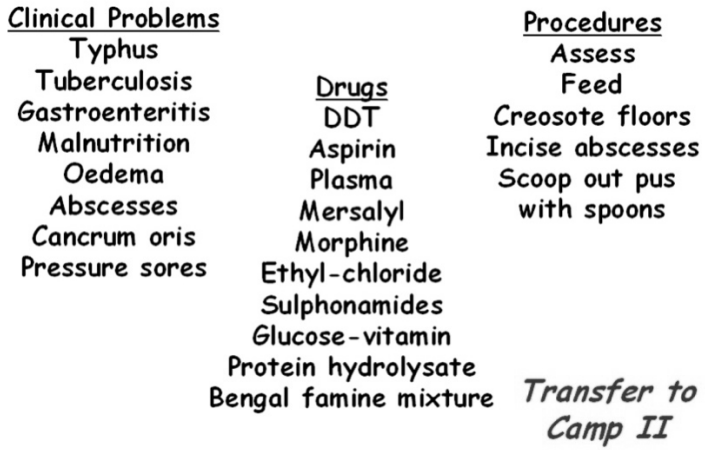

Figure 2. Clinical Problems, Drugs and Procedures presented to the students in Camp 1 prior to transfer to Camp 11.

Tuberculosis and Typhus

The British army were shocked by the piles of emaciated bodies. Photographs of these being bulldozed into grave pits were widely circulated in newspapers and cinemas. This appearance, with stories of shortage of food in the Camp since January and neglect of the inmates for weeks before the British arrived, naturally resulted in the

widespread belief that they had been subject to a deliberate policy of starvation. This being so it was expected that the mortality would fall precipitously as soon as the British began their relief operation. Rather than the mortality falling it was claimed that it increased three fold in the days following liberation and a further 15,000 died after the British took over.[9] However the official Military record of 224 Military Government Detachment, responsible for burying all the bodies at the time, pointed out "*Death rate high but uncheckable, owing to number of unburied bodies*".[10] From these records I found the total new deaths from 17th April to 20th June 1945 were 9448. As Figure 3 (re-plotted from reference 10) shows, the death rate during the first seven days was assumed to be 500 per day. As a per cent of camp inmates this gradually increased over the 30-day period as the inmates were being transferred from Camp 1 to 11.

Camp 1 was razed to the ground on 21st May. The British were blamed for being un-prepared to deal with this catastrophe. The facts were that there was no specific treatment for either tuberculosis (TB) or typhus; tuberculosis was by far the greatest underlying cause of death in Belsen.[11 12 13 14]

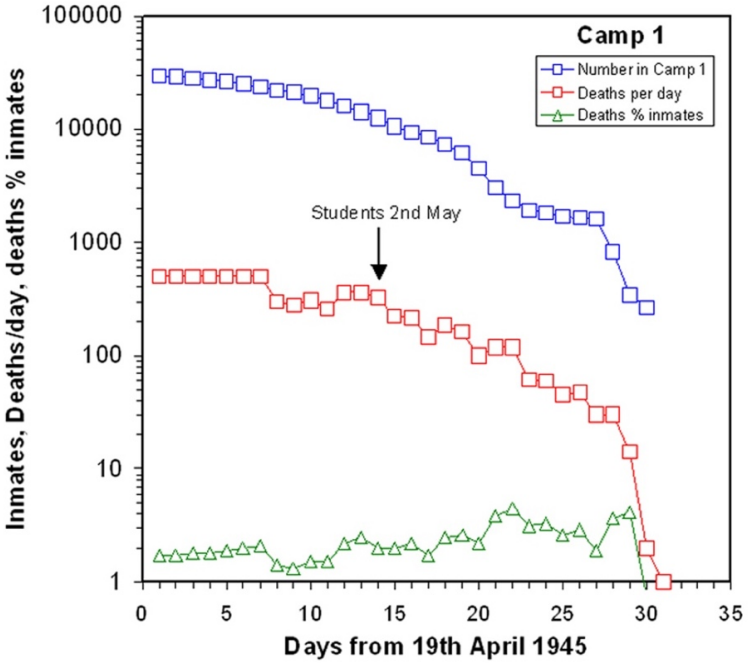

Figure 3. Numbers of inmates in Camp 1. Daily deaths. Deaths % Inmates in Camp 1. Deaths estimated on first seven days. From Reference 10.

For the cachectic 40% who were just surviving with extensive TB, typhus arrived to push them over the edge. DDT was used from the moment the British arrived but it took several weeks before all were fumigated. The typhus incubation period of two weeks with further period of a week for the disease to develop explained the persistent high death rate for the following month. Emaciated inmates put on weight rapidly if they were free of TB. Those with TB did not.

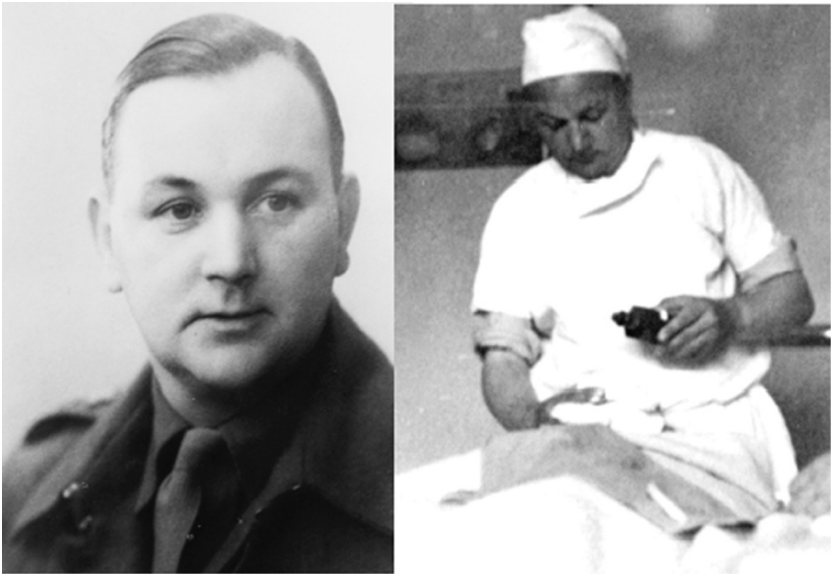

Figure 4. Captain Walter Carlton "Frosty" Winterbottom RAMC "The Anaesthetist".

Frosty Winterbottom; Converting a Barracks to a Hospital

All students kept a diary. Several later published articles about their experience.[2 3 4] In these, together with those of the RAMC who entered the camp on 17th April,[5 6] the most frequently mentioned doctor was "The Anaesthetist", Major Walter Carlton "Frosty" Winterbottom.[7 8] His surgeon at St Mary's Paddington was Sir Arthur Porritt who, in the 1924 Paris Olympics, had represented New Zealand in the 100 metres being beaten to a bronze by Harold Abrahams. Frosty Winterbottom and Arthur Porritt were both in the RAMC, but in different units, and both landed in Normandy on D Day +2. When Frosty arrived at Belsen on 17th April, he and the SMO, Lt Col JAD Johnston, set out to inspect the entire camp and barracks. Not all the survivors were emaciated skeletons; two remarkable Jewish doctors were Drs Ada Bimko from Poland and

Ruth Gutman from Austria (see Figure 5). Bimko's whole family had been gassed when she was sent to Auschwitz in August 1943.

Figure 5. Left to Right. Lt Col James Johnston, Dr Ada Bimko, Dr Ruth Gutman and "Frosty" in women's lager Belsen 17th April 1945.

Amazingly, these two had maintained a degree of orderliness in their huts seen infrequently elsewhere.[7] The British doctors found that all the huts in Camp 1 were unsuitable for the acutely ill, let alone for long-term care for thousands of ambulant people including 500 children. Their problem was to transfer from Camp 1 the 15,000 people needing hospital-equivalent nursing care and to provide for an equal number of ambulant internees. The barrack buildings were laid out in 20 groups of five, each arranged around a square which would accommodate 700 patients. Eleven such squares were requisitioned for the first phase each having an excellent canteen/kitchen and two large dining halls. The Waffen-SS Roundhouse could accommodate

500 patients. The 250-bed Wehrmacht hospital, already with 2,000 injured German soldiers, would be evacuated. But how was the "hospital" to be equipped?

Frosty and rehabilitation

Frosty was appointed to locate and collect the beds, blankets, linen, clothing, bedpans, urinals, sputum pots, and all the essential stores of a hospital. Then to find buildings to store the unused items and arrange re-supply, all in a matter of days. Camp 1 was completely evacuated to Camp 2 by 20 May. To do so a human laundry was created out of two of the large stable blocks. Every inmate transferred from Camp 1 passed through these. All were scrubbed by German nurses and "DDTd". All their clothing and other possessions were destroyed. On 21st May the emptied Camp 1 was burned to the ground. While clothing and bed linen could be requisitioned from the surrounding populace, it required considerable ingenuity to obtain all the other necessary items at that particular time. Nevertheless, in a week he equipped 7,000 beds by "freezing all he could lay hands upon" around Belsen.[7 8] In the following week, he equipped a further 7,000 beds. In addition he found thousands of sets of clothing and footwear for the ambulant prisoners, and a group of plumbers and electricians to repair the extensive damage in the barrack buildings caused by the inmates themselves. He found a sewing machine and set up a seamstresses' room, then found fit internee seamstresses who mass produced the "standard Belsen nightie" for the sick, and made dresses, night-dresses and overalls for the ambulant. He set up a hairdressing salon, got hairdressers, manicurists and laundry workers plying their skills, and established a workshop for repairing radios and bicycles. He converted the now redundant human laundry/stables into a clothing store which he named 'Harrods' because he still had an account there. This came in handy because at that time Harrods store in London had a clientele of 14,000. Frosty arranged for two of their bed factories to send 2,000 beds, 5,000 pairs of shoes, 10,000 sets of

underclothes and 70,000 blankets. Norma Alexander, one of the Queen Alexandra Nurses (Imperial War Museum SR 15441) noted: "When the patients started getting better, the sister in charge would say 'Oh they can go down to Harrods'. I thought 'this is a bit rich' then it dawned on me that 'Harrods' was a hall full of clothes that were taken from the German shops. They would come back with joy on their faces. Frosty's expertise included jazz and the Charleston. So, for RAMC and assistant staff who were doing such heroic work, he organised a nightclub in one of the stable lofts. This was called 'The Coconut Grove' where they could they find music, alcohol, cigarettes, relaxation and a chance to forget the grimness of their task. Each night different Units were issued with 25 double tickets, male and female, for the evening.

Everyone came to Frosty with their supply problems. He was always to be found in his 'flat', a canvas screened corner of one of the Harrods stable lofts shared with many others. His divan bed and cushion were covered with a large red, white and black Nazi flag. His Czechoslovak interpreter was invariably asleep in a nearby chair, but easily awakened to deal with linguistic problems. Like all the internees she had lost all appreciation of time and would fall asleep at any hour.[2] Even at this critical time, he thought it worth trying to normalise the numbed minds of the female internees by ordering 15,000 lipsticks. This caused incredulity in the minds of his colleagues, but delight for the women internees. Without knowing this Lt Col Gonin noted in his diary at the time:

> "A very large quantity of lipstick arrived. This was not at all what we men wanted, we were screaming for hundreds and thousands of other things and I don't know who asked for lipstick. I wish so much that I could discover who did it, it was the action of genius, sheer unadulterated brilliance. I believe nothing did more for these internees than the lipstick. That lipstick started to give them back their humanity."

Fifty years later it was depicted in a Banksy drawing later with Gonin's comments appended.

Departure.

Most students contracted gastroenteritis, six were hospitalised with typhus two may have died after returning to England.[15 16] On 28th May 1945, a month after they had arrived, the students were due to return to London. Prized souvenirs were SS Panzer dot-camouflaged coats and one was provided to each student by Frosty from his extensive stores. Led by Russell Barton (later a controversial psychiatrist and bizarrely accused as a Holocaust denier[15 16]), some of the Westminster students built a raft out of duck boards and beer barrels. As they were punting around the Roundhouse lake a motorcycle dispatch rider arrived to say that their Dakotas were due to take off in 10 minutes.

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A Family and War (Abstract)

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War is an inevitable and ghastly part of human existence. This is one family's story of individual service and sacrifice.

My grandfather CF Strange (CFS) was born in the UK, and emigrated to New Zealand as a child. As an adult he decided to become a missionary with the Church Missionary Society. First in India, until he decided that he would be of more use as a doctor. He trained at the London Hospital (now the Royal London Hospital, RLH), and was sent to China in 1910. During his time at the London Hospital, he met and married my Grandmother Olive Harrison. He worked at the hospital in Hangzhou founded in 1859, known as Dr Duncan Main's Hospital, now the Second Affiliated Hospital, Zhejiang University Medical School, an enormous institution in the city. When the First World War broke out he joined the RAMC and served as a major, in Arras, as a specialist surgeon, and in Noyelles Sur Mer, a divisional surgeon at the First Chinese Labour Corps Hospital. He was awarded the Médaille d'Honneur des Épidémies. His wife was a nurse, and after CFS's death in 1927, she returned to Hangzhou to become the matron of Dr Duncan Main's Hospital.

Their son, my father Derick Strange (Frederick Griffiths St Clair Strange), became an orthopaedic surgeon, and his medical training was also at the London Hospital. During World War II he was the only doctor and surgeon at the Dunston Hill Ministry of Pensions hospital for Wounded Servicemen near Newcastle upon Tyne. He was awarded the Robert Jones Medal for his work on nerve injuries. Later, in 1947 he became a consultant orthopaedic surgeon in East Kent, until his retirement in 1973. He established Canterbury as a major accident & trauma centre, the Royal Sea Bathing Hospital

Margate (ex TB hospital) as regional orthopaedic hospital, and founded the Canterbury Postgraduate Centre. He was an Honorary Fellow (and previously Vice President) of the British Orthopaedic Association, and in the First Travelling Fellows Group 1948 (USA & Canada) – the ABC Fellows.

Derick's sister Daphne Geraldine Strange trained at St Bartholomew's Hospital as a nurse and midwife. She volunteered to join the Colonial Nursing Service when war broke out, and was teaching midwives in Kuala Lumpur, in Malaya as it was then, when the Japanese forces came down the Malay peninsula. Evacuated to Singapore, in February 1942 she boarded one of the last ships to leave the port, the Vyner Brooke, a ship originally built for and named after the Rajah of Sarawak. Two days later the ship was torpedoed and sunk near Banka Island, now Indonesia. Many, including her, perished. Some made it to land, and were then either killed by the Japanese or taken prisoner. Some Australia nurses survived the camp. Their story is eloquently told in the book "White Coolies" – the basis for the film Paradise Road, and the TV series Tenko.

Uncles Ivan (Navy), Peter (Royal Sussex Regiment) and Ian (RAF, who lost his leg when his Hurricane Bomber was shot down) and John (Royal Navy, Royal Indian Navy) also served in WWII. Peter died in 1942 in a motor vehicle accident.

Aunts Marcia and Esme became physiotherapists, and treated wounded serviceman in various hospitals. Pitta drove an ambulance in London.

Cousin Keith joined his father's regiment, the Royal Sussex Regiment, and served in Korea. Nephew Jonathan joined the Gurkhas after Sandhurst, and served in Hong Kong, and in Northern Ireland during the Troubles.

Development of Anaesthesia in the Northern Isles of Scotland

***Dr Duncan Mitchell and **Dr Elizabeth Bradshaw**

*Department of Anaesthesia, The Royal London Hospital. ** Emeritus Consultant, Ealing Hospital.

Being from Shetland and my retired colleague, Dr Bradshaw, having stood in as a Locum Anaesthetist on a number of occasions in Orkney – we decided to research the development of anaesthesia in the Northern Isles of Scotland.

The Orkney and Shetland Isles make up 170 of the United Kingdom's 6,000 islands. They are world renowned for their history, with Bronze Age, Iron Age, Pict and Viking settlements dating back as far as 2500 BC. An abundance of diverse wildlife, agriculture, seafood and music also help to make these islands unique.

It is worth a mention that Shetland played its own part in the history of medicine, by way of one of its inhabitants, Mr John Williamson, known locally as "Johnny Notions" who developed his own smallpox vaccine. He created his own serum by boiling slugs and slaters (woodlice) with seaweed, herbs and soot. He mixed smallpox with this serum, added butter and hung it above the peat fire for a year. He then buried it for two years with camphor before using it on people. This inoculation was performed by raising the skin with a knife, so that no blood flowed, and a small amount of his serum placed under this flap with a cabbage leaf used as a plaster dressing. Johnny Notions' serum proved to be very effective and he is credited with saving the last 16 inhabitants on the small island of Foula. Edward Jenner's inoculation made it to Shetland in 1804 – A year after John Williamson died.

In the late nineteenth century there was no mention of any anaesthesia being performed in the northern isles that we could find until about 1890. Until then any patient requiring surgery was sent

south to Edinburgh where Sir James Young Simpson pioneered the use of chloroform.

The first evidence we could find of an Orkney patient having anaesthesia in Edinburgh (and perhaps the first chloroform death) were in letters from a Mrs Nisbet of 21 York Place, Edinburgh to her Orcadian friend Nenny (Janet) Clouston dated 3rd July 1874.[1] It recounts that on the previous Tuesday, Charlotte Clouston had 14 teeth extracted under chloroform anaesthesia. During that night she was sick and throughout Wednesday this continued with "shaking and twitching". Finally a Dr Begbie was called who diagnosed *'too much chloroform'*. He ordered that her stomach was given an entire rest for 36 hours - irritation of the stomach being her chief complaint. She had injections of port wine and beef tea every three hours, but she died the following day. The letter did not specify the route of administration of these supplements (of note – the letter was tear stained).

A Shetland man from the small island of Fetlar, Dr William Watson Cheyne, was the House Officer to Joseph Lister at The Royal Infirmary of Edinburgh.[2] He followed Lister to London where, to make ends meet, Lister appointed him for a retaining fee of £200 to give anaesthetics for him. Later he was to make his name in the world of bacteriology, following on from Lister's asepsis work (for which he was knighted), and to retire subsequently to Shetland on his home island of Fetlar.

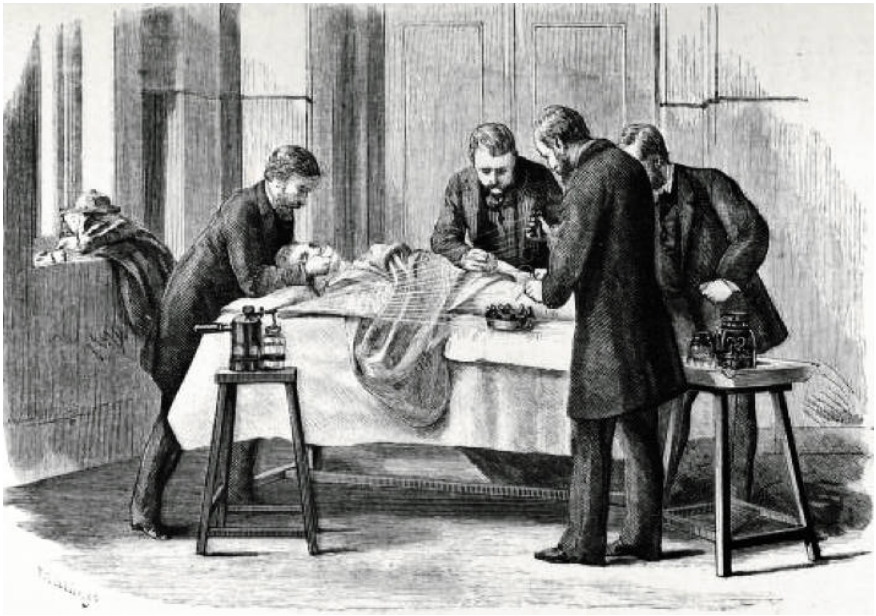

Figure 1. William Watson Cheyne performing anaesthesia for Joseph Lister. Lister's carbolic spray can be seen in the foreground.
Image from: http://www.victorianweb.org/science/health/cheyne.html.
accessed 30 July 2019.

The first evidence of a Shetland patient receiving anaesthesia was in 1878. Margaret Matthewson was a 30-year old lady from the island of Yell – the neighbouring island to Cheyne's home of Fetlar. Margaret had developed tuberculosis of the shoulder which was a problem for her as she, along with many Shetland women, knitted haps (a type of knitted hat) to make ends meet. She was seen by the Rev. Barclay, a Church of Scotland minister, whose father was a doctor on the neighbouring island of Unst – The most northerly island in the United Kingdom. The Reverend Barclay operated on Margaret and gave her some ointment. This did not solve the problem so, in the meantime, she went to a Methodist minister for help. He gave her

cocaine to keep her going. Margaret met Dr Watson Cheyne during a vaccination programme in Shetland, and he suggested she should travel to Edinburgh for treatment. She travelled steerage to Leith via Kirkwall and Aberdeen then proceeded to the Royal Infirmary of Edinburgh where the Gateman suggested she be seen by Lister. She met Dr Watson Cheyne who diagnosed a tuberculous abscess and admitted her to the hospital. In her diary she described her period in the Royal Infirmary of Edinburgh as 'The Sketch'. Cheyne, being from her neighbouring island, spoke the same Shetland dialect so between them they would often talk to each other with no one able to understand them. She called this 'their larks'.

Prior to her surgery she was taken to a dark room, was undressed, and was lectured on in front of medical students. Watson Cheyne helped her as she was very frightened. Two weeks following this, having been in hospital for four weeks, she was operated on by Lister. She recalls that Dr Watson Cheyne '*laid a towel, saturated with chloroform over my face*'. It took one hour and 10 minutes for her to recover, whereupon she tried to remove her bandages in case the arm had been amputated. Watson Cheyne visited her post operatively and persuaded her to take morphine and suck ice. She vomited for the next five days.

Dr Watson Cheyne continued to look after her, changing her dressings on the ward right up until he left for London with Lister. Margaret Matthewson described Lister's carbolic spray with burner and wick. She was eventually discharged eight months from admission where she returned home to Yell. She continued to knit her haps but sadly died two years later, aged 32, of tuberculosis.

The first documented evidence we found of anaesthesia in the Northern Isles was in the biography of Dr Harry Pearson Taylor, a Parish Doctor, who practiced in Shetland from 1890 to 1935[3]. As well as being a GP he performed minor surgery, and gave the anaesthetics.

A difficult case, he recalled, was being called to a neighbouring island to perform amputation of a young boy's forearm that had been

crushed by a threshing machine. The minister on the island had summoned him, and he was taken by rowing boat in severe gales and driving snow. Their usual landing area was inaccessible because of the storm so, to save their lives, they drove the boat up against the cliffs and managed to access dry land. The doctor, with his bag of instruments, had to scramble up the side of the cliff to safety. They eventually made it to the house where they were met by the minister. After having some tea and preparing the kitchen table as an operating table, they went on to perform the operation. The minister was in charge of administering the chloroform and Dr Pearson-Taylor was able to perform the operation without hitch. He went on to say that the lad made a full recovery, the wound healed by first intention, and, by the end of the month, he had learnt to write with his left hand.

He later recalled a case of a Dutch fisherman whose boat was sheltering in the Sound from a storm. Dr Pearson Taylor was rowed to the vessel and on reaching it went down to see the patient. He was met by *'intense heat and a variety of solid smells which, coupled with the very active movements of the vessel, proved to be too much for me, so I soon became sick as a dog'!* Nobody spoke English, nor he Dutch. He found the fisherman to have open distal tibial fractures bilaterally. 'I gave him a good dose of chloroform, set the bones into alignment, and splinted them as best I could'. There being no hospital on Shetland, the Dutch vessel set off for Holland (with favourable winds), and he never heard anything more about it.

The Gilbert Bain Hospital opened in 1902 – sometimes with a surgeon, sometimes not. One notable surgeon from the 1940s was Mr Lamont, father of Norman Lamont, who was to become Chancellor of the Exchequer under John Major and later The Right Honourable Lord Lamont of Lerwick. From around this time the hospital would consistently have a consultant surgeon. The anaesthetic however, was administered by the local general practitioners with these GPs also being required to perform patient transfers from Shetland to

mainland Scotland by using the inter-island aircraft as an air ambulance or, in severe weather precluding fixed wing transport, the Sumburgh Coastguard rescue helicopter[4].

In the late 1990s and early twenty first century a number of reviews were set up to try and establish the healthcare needs of rural Scotland. The Remote and Rural Areas Resource Initiative (RARARI) was the first of these, looking at: contract reviews, better team working, mobile health units, telemedicine, training programmes, career structures, transport solutions, and improved patient involvement. This was followed by the Kerr report – National Framework for Service Change, which concentrated on: out of hours care, maximising services available locally, role of remote rural general hospitals, skilled and competent workforces, and to create an integrated transport system. These, and other subsequent reviews, led to the creation of a dedicated Scotland-wide integrated air ambulance service of two rotary and two fixed wing aircraft; thus negating the need for the isle's doctors to perform infrequent transfers of critically ill patients.

These reviews also resulted in the phasing out of GP-delivered anaesthesia in Scotland's rural general hospitals by the appointment of consultant anaesthetists to work alongside their consultant general surgical colleagues, and visiting surgical specialty consultants.

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History of Anaesthesia in Disaster and Emergency Situations (Abstract)

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The beginning of anaesthesia in disaster, emergency and (post) war situations may be set with the foundation of the International Red Cross (ICRC) in 1863. Humanitarian medical and surgical assistance to the struggling military medical services became accepted. Examples are the "ambulance" sent from the Netherlands to both sides of the Franco-Prussian war in 1870, to Turkey and Russia in 1877 and during the Boer War. In the latter mission, members were arrested and interned in Ceylon for the duration of the war.

The reports from that period describe surgical procedures without mentioning the anaesthetic technique, with the exception of an instance from a British mission to Serbia in 1915 when they witnessed no anaesthetic being given at a military dressing station.

Robert Macintosh's improvisation of an ether vaporizer when he went to treat war wounded during the Spanish civil war in 1937 is well known. His ensuing work resulted in the development of the Oxford vaporiser No. 1,[1] produced by the Morris car factory for the military during World War II.[2] Further models[3] (EMO) were used into the 1980s for draw-over anaesthesia in third world countries. Ether however is not normally allowed on aircraft because of its high degree of flammability unless specially packed, paving the way for ketamine as the drug of choice for humanitarian missions from 1965 onwards. Most reports of its use come from *Médicins sans Frontièrs* (Doctors without Borders), the humanitarian organisation founded in 1971 during the Biafran War. The ICRC's strict neutrality rules prevented it from aiding civilians in the beleaguered province, leading French journalists and physicians to found an organisation with fewer ties to national governments. The ease of administration of ketamine, requiring hardly any specialist knowledge or training, in contrast to

draw-over anaesthesia which does require such training has led to a complete switch of technique in third world humanitarian settings. The downside is that the person administering the anaesthetic is not trained in the close observation of vital signs and the principle of maintaining homeostasis of bodily functions. However under the circumstances, it is the best option, there being no properly-trained personnel available.

The presentation will focus on the historic and anaesthetic details and give an oversight of the literature. It is an excerpt from a paper in "International Anesthesiology Clinics"[4] and a chapter in "Operation Crisis"[5] based on the author's personal experience.

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Erythroidines in the History of Neuromuscular Blockers (Abstract)

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Between 1938 and 1951 erythroidine derivatives were seriously considered as alternatives to curare for the provision of muscle relaxation. This has been overlooked in the published history of anaesthesia.

The first publication on the paralysing effect of an extract of *Erythrina americana* was in 1877, but this was in a Mexican journal, which it seems was not widely read. Sixty years later erythroidine was isolated, and in 1938 it was first used clinically to treat spastic dystonia, preceding the use of Intocostrin for this purpose. By 1943 dihydro-β-erythroidine was prepared in crystalline form, which was equipotent with curarine and of acceptable duration; it was used in clinical anaesthesia in 1946. In the 1940s curare was presented in solutions with potency stated in units, determined by bioassay, which was a disadvantage compared with the straightforward mg of dihydro-β-erythroidine. However, by the early 1950s, improvement in the pharmaceutical presentation of d-tubocurarine and new neuromuscular blockers, displaced the erythroidines.

Note: a version of this paper was presented at the 9th ISHA in Boston on 27 October 2017.

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Chemist Harry Raymond Ing and his discovery of Decamethonium

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In January 1942, Harold Griffith, an anaesthetist at the Homeopathic Hospital, Montreal, administered curare to a patient undergoing appendicectomy and was astonished at the resulting muscular relaxation. Griffith was farsighted enough to see the advantages of curare, particularly in cases of abdominal surgery and he published his account of the operation in *Anesthesiology* in July of the same year.[1] Griffith had been inspired to use curare by positive reports in the late 1930s by a psychiatrist, Professor Abram Bennett, that small doses of curare produced muscle relaxation during chemically-induced convulsive treatment, which otherwise caused marked muscle spasm that could result in spinal fractures (chemically-induced seizures were replaced by electroconvulsive therapy, which came into widespread use during the early 1940s.). Griffith's paper provoked much medical interest, unlike the first account of such use, reported in German in 1912 by Arthur Läwen of Leipzig. A Dr Reive published his experiences with the drug in 500 patients in 1943[2] and by June 1945 Sidney Newcomer of E. R. Squibb and Sons maintained that the firm's product of standardised curare, *Intocostrin*, was then being used on about 10,000 patients per month.[2]

Surprisingly, few chemists were stimulated into action by this discovery. Usually, chemists rush to 'improve' any new natural product of medical interest, and generate a patentable commercial product. For example, the di-acylation of morphine gave the powerful analgesic diamorphine (first marketed by Bayer as *Heroin)*, and consideration of the structural features of cocaine allowed

construction of a synthetic moiety that improved on the substance that Nature provided, resulting in procaine in 1907, which all but supplanted cocaine for the next half century. It has been speculated[3] that the War accounted for the early lack of chemical interest in curare. But was curare (d-tubocurarine) capable of improvement? That it survived in use in theatre alongside the synthetic relaxants for many years, finally disappearing in the early 1990's, attested to its safety, versatility and ease of use. Despite initial reports of unpredictable effects on blood pressure and concerns about new-born infants because it could penetrate the placenta, such complications were virtually unknown. Three other factors probably provoked chemical interest:

- The drug was expensive and difficult to acquire. Moreover, its importation might be susceptible to enemy action in any future conflict. A cheap, easy to synthesise analogue would be immediately attractive,
- Its use provoked histamine release, leading to occasional bronchospasm and salivation,
- Anaesthetists had two approaches to the use of curare. The Americans favoured low doses, with occasional manual ventilation as and when required. The Liverpool school, led by Cecil Gray and John Halton, favoured high doses with artificial ventilation throughout, with a chemical reversal at the end of the operation. An early goal in seeking a replacement for curare was identifying a molecule that would thoroughly relax the abdominal muscles, yet leave those of the diaphragm substantially unaffected.[4]

Today's anaesthetists, of course, will view the last-aspiration as somewhat naïve and impractical.

By 1948 three groups had prepared useful synthetic curare substitutes. One, led by the future Nobel Laureate Daniel Bovet (then in Paris) followed a traditional chemical pathway to achieve the goal of an

"improved" curare substitute. The other two, UK based, came across their molecule more obliquely.

Daniel Bovet had the advantage of knowing Harold King's structure[5] for d-tubocurarine (1935, corrected 1970, Fig. 1) and surmised that any successful synthetic product would also have at least two quaternary nitrogenous groups some appropriate distance apart.

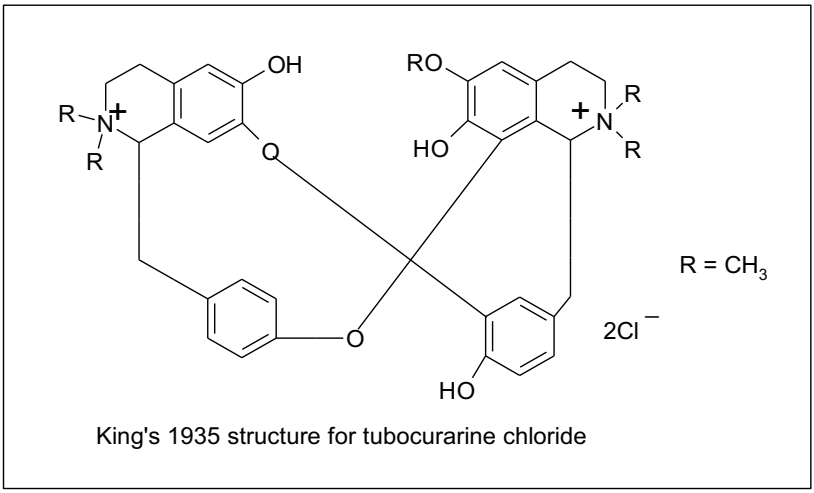

Figure 1. An early structural formula for tubocurarine chloride.

King's molecule was a substituted phenol, albeit a complicated one. Several species were synthesised by Bovet and tested, and one based on the cheaply available trihydric phenol, pyrogallol, was found to replicate curare-induced relaxation and was marketed as gallamine in 1947 (Fig. 2).[6]

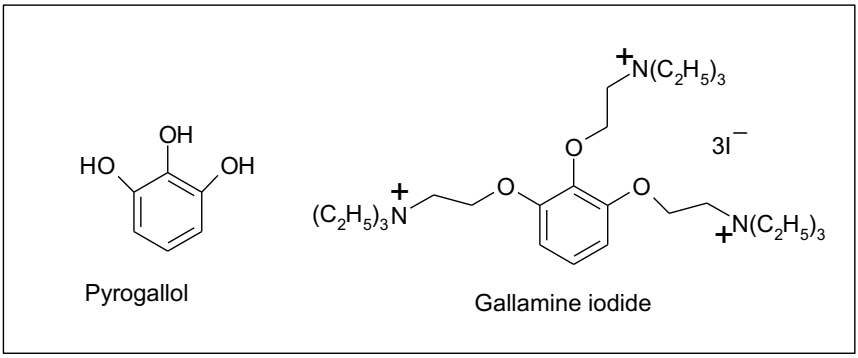

Figure 2. Gallamine iodide and its precursor, pyrogallol.

In the UK, slightly lagging behind the French workers, were two groups, one led by Raymond Ing working in Oxford, and another led by William Paton at the National Institute for Medical Research (NIMR) at Hampstead. This Institute, now part of the Francis Crick Institute near St Pancras Station, was led for many years by Sir Henry Dale, a physiologist whose many interests included the action of histamine. He attracted several younger researchers sharing this interest, including William Paton (also later knighted). He, and co-worker Eleanor Zaimis, were seeking chemicals that would release histamine. In 1939 curare had been identified as one such, and they were seeking additional examples, although it is unclear why: possibly they planned to develop antihistamine compounds. Fortunately, chemist Harold King, who had achieved an excellent reputation for his work on the structure for d-tubocurarine, was on the staff of the NIMR and Paton approached him for test compounds that might facilitate histamine release. King gave him a sample of the bistrimethylammonium iodide based on a C8 central carbon chain. We do not know if this was synthesised specially for Paton, or just happened to be "spare", surplus to King's investigative work on curare, or that he himself had commenced a study similar to Bovet's,

but only with slower progress. This molecule had a dramatic effect on an anaesthetised cat. There was no obvious histamine release, but the cat stopped breathing, its chest muscles paralysed. Paton and Zaimis must have then made the connection with Griffith's work and sought additional "bis-onium" molecules for testing on their cats. That based on C10 was astonishingly effective in causing paralysis.[7] The results for the bis-onium series were tabulated about a year after the initial report of the discovery (Table 1).[8]

"Bis-onium" Compound based on	Dose
C5	>40
C6	>40
C7	1.9
C8	0.16
C9	0.036
C10	0.030
C11	0.060
C12	0.1
C18	1.5
d-Tubocurarine chloride, for comparison	0.3

Table 1. Doses (mg/kg of cat) of bis-onium salts containing 5-18 carbons in the chain needed to produce paralysis, with datum for tubocurarine for comparison.

By a remarkable coincidence, Raymond Ing had come up with the same conclusion[9] and it was agreed that both teams should publish in

the same issue of *Nature*, so that neither could claim precedence. The C10 bis-onium was christened *decamethonium* and marketed from 1949.

Whereas Bovet's product had only a short history, building on King's 1935 structure of tubocurarine, and Paton's serendipitous discovery was a chance observation made whilst researching in an entirely different field, that of Ing had a rich history, traceable back to the work of Crum Brown and Thomas Fraser published in 1869.[10] They reported that alkaloids such as the deadly poison strychnine could be rendered much less toxic by methylating the tertiary amine part of the molecule, converting it into a quaternary ammonium salt (a mono-onium). They found, to their surprise, that the product had curare-like muscle relaxant properties and suggested that it might be superior to the formulations of curare used at that time. However, despite their medical degrees, neither pursued this suggestion (at the time of their report, curare was being used occasionally as a treatment for tetanus, rabies, epilepsy and strychnine poisoning, but variations in potency of the curare preparation meant it was often unsuccessful or fatal). Its use as an adjunct to surgery had to wait until the Griffith paper of 1942. However Brown and Fraser's work provoked much subsequent interest and by 1947 there had been 224 papers on the issue of curariform activity and chemical structure.[11] Almost 650 substances were reported, the majority being synthetic ammonium salts with the cation $R(R_1)(R_2)(R_3)N^+$, where R, R_1, R_2 and R_3 are alkyl, aryl or heterocyclic groups of varying complexity. Mostly the molecules were tested on frogs, mice, rabbits and dogs. They seldom advanced to clinical trials, one exception being Ranyard West's use of the mono-onium iodide, $[(CH_3)_3N(CH_2)_7CH_3]^+I^-$ (Fig. 3) as a possible curare substitute, although this was soon abandoned due to the intense nausea it induced.[12]

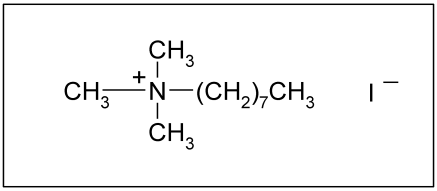

Figure 3. Ranyard West's mono-onium iodide.

Raymond Ing was a chemist very much in the Crum Brown mould, more interested in exploring pharmacological mechanisms than the therapeutic potential of his molecules. In his first paper on "*The Curariform Action of Quaternary Ammonium Salts*" (1931),[13] Brown and Fraser get mentioned in the first line as "*providing one of the earliest examples of uniformity of physiological action among the members of one chemical class*". In setting out to investigate further the mode of action of quaternary ammonium salts, and specifically the structural features which enhanced the relaxation that they induced, he immediately spotted a problem:

> "a great variety of quaternary ammonium salts have been shown to possess the curariform action, but few attempts have been made to compare the behaviour of these salts quantitatively under comparable conditions."

Hundreds of molecules had been tested, qualitatively, to see if they had curariform action in a variety of animal models, using mice, frogs, rabbits, cats and dogs, usually but not always, with their heads attached. Ing's method was to dissect out a frog's sartorius muscle, connect an end to a smoked drum kymograph, bathe it in Ringer's solution and subject it to regular electrical discharges. The contractions were recorded on the drum (Fig 4). When the Ringer's solution was replaced with a test one containing the quaternary ammonium salt, the stimulated contractions would reduce or cease, enabling concentration effects to be studied, or delays in the onset of paralysis to be determined. The ammonium salt could then be rinsed

out of the muscle with Ringer's solution and the stimulated contracture restored, ready for a new set of measurements. The use of the sartorius muscle, only 1-2 mm wide in the frog, was thought to minimise any delays attributable to diffusion of the salt into the tissue. On the other hand, it was delicate and difficult to manipulate. Ing's colleague in the Oxford laboratory, Edith Bülbring, in 1946 developed a more robust preparation for measuring stimulated contractions, the rat phrenic nerve-diaphragm preparation, which later became the tool of choice for assessing the extent of curare-like paralysations.[14]

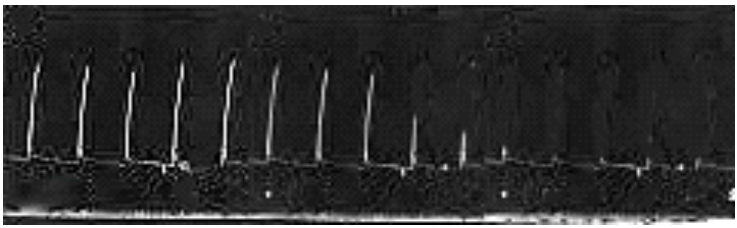

Figure 4. Portion of a kymograph trace, recording muscle twitch on electrical impulse, with relaxant showing effect at about the eighth impulse.

Harold King's bis-quaternary ammonium structure for tubocurarine appeared in 1935. Ing states that he (and his student Richard Barlow) began their work on synthetic analogues in 1946.[15] In the intervening period his publications reflected his interest in synthetic mydriatics and atropine chemistry. This suggests that, alongside most of the rest of the world's chemists, Ing had little interest in building on King's discovery. However, in 1946 Ing and Barlow obtained funding from the Medical Research Council and began to address, in a disciplined fashion, the mode of action of tubocurarine. The explosion of medical interest in this molecule was conceivably a spur, though this aspect of research had always been alien to Ing. Although a few bis-oniums of short central carbon chain length had already been shown to have some slight curariform action, tubocurarine chloride was far

more effective as a muscle relaxant. Ing attributed this to the fact that the two quaternary groups in tubocurarine were the optimum distance apart to bind to a receptor molecule and block neuro-muscular transmission. To test this hypothesis, they synthesised 28 bis-oniums, mostly based on pairs of either $(CH_3)_3N^+$ or $(C_2H_5)_3N^+$ terminal groupings. Ing and Barlow assessed the *relative* relaxant effect of each of their products, together with the older ones (which they synthesised specially) using-the same approach of muscle stimulation, but using Bülbring's rat phrenic nerve diaphragm preparation, presumably for simplicity, availability and robustness. T. C. Chou, also working in the Oxford department, was already using this method for routine assay of tubocurarine preparations. In a series of experiments, they assigned a value of "1" to the most effective relaxant, and recorded the relative effectiveness of the other species in the series. For that based on the series $[(CH_3)_3N\text{-}(CH_2)_n\text{-}N(CH_3)_3]^{2+}$ the most effective had nine CH_2 groups in the chain. For two CH_2 groups the value was 0.30, and for twelve CH_2 groups, 0.6. Fortuitously, Ing then passed these promising chemicals to another research student in the department, Nirmal K. Dutta, to examine using the rabbit-head drop technique (a bioassay which determined the dose sufficient to paralyse the rabbit's neck muscles so that they dropped their heads), first used by Brown and Fraser in 1869), and compare the results against those obtained using pure tubocurarine chloride. These are shown in Table 2.[15]

Bis-onium based on n CH_2 groups	Mean head-drop dose, μg/kg rabbit	Relative potency
n = 8	808	0.3
9	290	0.9
10	78	3.3
11	657	0.4
12	783	0.3
13	857	0.3
Tubocurarine, for comparison	261	1

Table 2. Relative potency of bis-oniums needed to achieve rabbit head drop.

The bis-onium based on ten CH_2 groups was over three times more effective than pure curare, a result that clearly suggested the need for clinical trials.

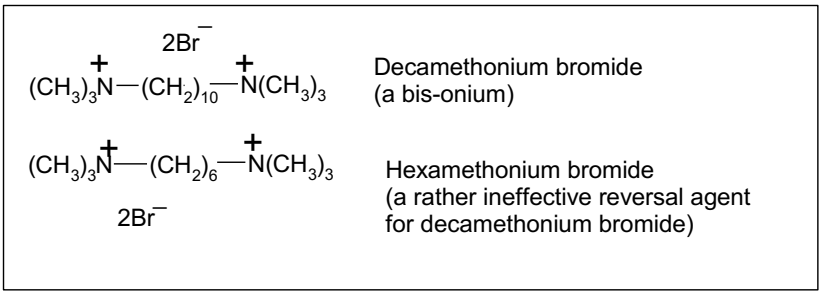

Figure 5. Formulae for decamethonium and hexamethonium, a possible reversal agent.

But at this point, Ing lost interest in proceeding further with his "decamethonium" and indeed with the physiological effects of quaternary ammonium salts generally. There are two possible reasons for this. Firstly, Paton and Zaimis at Hampstead, who had arrived at the same result both simultaneously and independently, were both qualified medical practitioners and thus would have had greater insight into the potential use of a safe, synthetic alternative to curare, together with the contacts to facilitate clinical trials. Secondly, Ing believed in quality rather than quantity when it came to research. Indeed, this quality was clearly recognised by his peers, as evidenced by his election as a Fellow of the Royal Society in 1951. He seldom had more than one D.Phil student under his wing at any one time, and seldom produced more than one paper or review per year. His research interests were broad, and we must assume from his post-1948 publication record that he found sufficient other pharmacological projects to occupy his sharp mind. As to the two independent, *simultaneous*, publications covering the same ground, one might suspect the guiding hand of Harold King. His connection with the Paton work has already been mentioned, but he also had earlier contact with Ing. In 1935 he had supplied him with a preparation of tubocurarine for some work on action potentials in frogs' muscles.[16] It is realistic to assume that he knew about the late 1940s work on the bis-oniums of both Ing and Paton and that for either group to achieve precedence in publication would have been unfair to the other. In the two letters to *Nature*, neither mentions the work of the other group (but in the follow-up longer paper also published in 1948, Ing does acknowledge the Paton group).[15] In Paton's *Nature* letter, it is clear that the clinical potential of the bis-onium is at the forefront of his mind. Indeed, he may have already travelled a little further down this road than he was prepared to reveal *"…before clinical application can be considered, it is desirable to find an antagonist to its effects*".[7]

Decamethonium was introduced to medical practice in 1949, giving anaesthetists a choice of three muscle relaxants: curare, gallamine or

decamethonium. There was an initial enthusiasm for the last,[17] but it had its detractors, including the editorial staff of *The Lancet*. It had a sharp "end point"; that is, unlike curare, it wore off suddenly after 20 minutes or so with a standard adult dose of 5 mg, whereas anaesthetists of the era preferred the gradual resumption of the patient's own respiration that was a characteristic of curare. Its detractors pointed to the absence of suitable, safe antagonists, such as neostigmine, to reverse rapidly its effect on the intercostal muscles. Bis-onium salts with a shorter methylene chain *could* antagonise its effects, but were associated with a problematic drop in blood pressure. Though neostigmine seemed to have little effect on patients treated with a standard dose of decamethonium, there is some evidence that it was helpful to counteract the effect of excessive doses. However, by the early 1950s only a few enthusiasts were persevering with its use, and by 1958 Burroughs and Wellcome & Co decided to cease its production.[18]

Decamethonium has an important place in the history of anaesthesia. Through the work of Raymond Ing, it connects back to the seminal work of Crum Brown and Thomas Fraser. But perhaps more importantly, it showed that chemistry could provide a worthwhile alternative to curare, and that a disciplined search for yet more synthetic relaxants, and indeed pharmaceuticals in general, through relating chemical structure to pharmacological activity, might be the way of the future. And so it proved.

Raymond Ing – a life in science.[19]

(Harold) Raymond Ing (1899-1973), though born in Alford, Lincolnshire spent his boyhood in Oxford, where he attended Oxford High School, which focused on preparing students for Oxford entrance. He was fortunate that his science master arranged additional tuition for Raymond and two other boys by A. F. Walden, a don at New College. Walden nurtured his interest in chemistry, and became his tutor when he entered New College in 1917. After an interruption

due to the War, Raymond graduated in 1921 and then completed a D.Phil in Oxford, under the professor of chemistry, William Henry Perkin. His thesis, on the configuration of dibromodibasic acids, gives no indication of his later interests in pharmacological chemistry. With no positions open to him in Oxford after completing his doctorate, he transferred to Manchester to work with Robert Robinson, one of the most gifted organic chemists of the twentieth century. He undertook some important classical organic chemical research with him (see below) and then took a position as chemist to the Manchester Committee on Cancer to investigate mule-spinners' (scrotal) cancer. Mule spinners worked on the huge numbers of spinning mules (spinning machines) in the textile industry. These were lubricated with shale oils, which sprayed the inevitable excess oil at groin height onto the mule spinners (workers). By extension from the earlier observations by Percival Potts on how coal tar induced scrotal cancer in chimney sweeps[20] the oil was a prime suspect for causing these cancers. Although he became dissatisfied with this work, this experience may have been one of the factors responsible for the change in direction of his career to one in pharmacological chemistry, concentrating on structure-action relationships of drugs. He returned to academia in 1929, being appointed lecturer at University College London, and promoted to Reader in 1937. After a brief stay in the USA he returned to the UK in 1939 to take up a post in chemical pharmacology at Oxford University where he spent the rest of his life undertaking research in quaternary ammonium salts and other projects, including two of particular interest to historians of anaesthesia. Firstly, Ing had an abiding interest in alkaloid chemistry. In 1936 he reported that the alkaloid cytosine could be esterified to yield local anaesthetics which were better than cocaine in a number of respects, although it transpired they had no particular advantages over the ubiquitous procaine.[21] The second arose from government concerns in the late 1930's that a naval blockade could deprive the UK of atropine, long used for anaesthetic premedication, and thus it

made a request to university departments to seek synthetic substitutes. Ing responded to this, concentrating on a number of mono-oniums. One of these was marketed as *Lachesine* (from 1947, by Whiffen & Sons), but for ophthalmic rather than anaesthetic use.[22] However, the world would have got its synthetic relaxants even without Ing's input – the independent work by the future Nobel laureate Daniel Bovet in France and the future Sir William Paton in the UK saw to this.

But one of Ing's discoveries, in the field of classical chemistry, secured his place in the history of chemistry. It was a perplexity that if you nitrated trifluoromethyl benzene, $CF_3.C_6H_5$, the NO_2 group entered the benzene ring at the 3-position (*meta* position), yet if you nitrated methyl benzene, $CH_3.C_6H_5$, the NO_2 group entered at the 2, 4 and 6-positions (*ortho* and *para* positions), with virtually nothing attacking at position 3. There were two theories proposed to explain this and many other similar mysteries, one advanced by Robinson that depended upon the then new concept of electron transfer across an alternating structure of double and single bonds, and another theory, proposed by rival chemist Christopher Ingold (based at University College London), that was based on an earlier theory of "divided" valencies. The dispute was bitter and personal, but thought capable of resolution by examining the products from the nitration of diacetyl benzylamine.

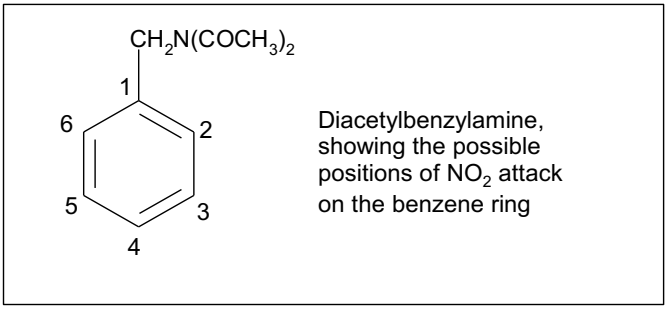

Figure 6. Formula of Diacetylbenzylamine.

If the NO_2 enters the ring at the 3-position, it supports the Ingold theory, and if it enters at the 2 and 4-positions, then it vindicates Robinson's.[23] Ingold (or rather, his student Eric Holmes) carried out the nitration and reported attachment at the three position on the benzene ring. Victory to Ingold, then. But Robinson did not believe the result and had sufficient confidence in his theory to persuade Raymond Ing, then working with him in Manchester, to repeat the experiment and confirm his predictions. Ing showed, indisputably, that the NO_2 entered at Robinson's predicted 2 and 4-positions.[24] Victory to Robinson and embarrassment for Ingold. However, the story does not stop there. Ingold adopted all Robinson's mechanistic ideas, extended them and published both extensively and persuasively. His name became associated with the electronic theory of organic chemistry, eclipsing that of Robinson (who originated it), much to the latter's fury. Robinson was not a forgiving man, and the feud, and much associated bitterness, persisted until his dying day.[25] It is arguable that Ing's experience of such disputes in the mainstream chemistry of the time moved him to seek out a career where he might make his mark without becoming enmeshed in such rancour, and he found this in the area of pharmacological chemistry – much to his, and the anaesthetic world's, advantage.

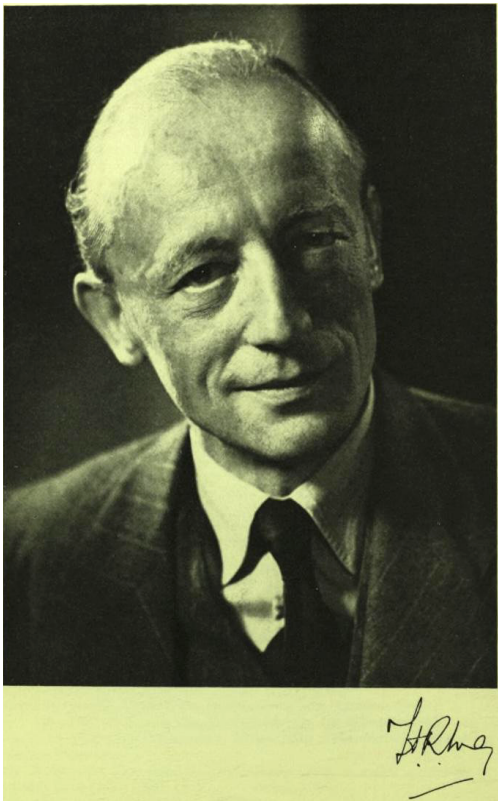

Figure 1. Photograph of Raymond Ng by Raymond and Muspratt.

Acknowledgements

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Colonic Adminstration of Ether Anaesthesia

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Colonic ether anaesthesia refers to the administration and maintenance of anaesthesia via rectal insufflation of ether. Roux in 1847 suggested ether's use through the rectum.[1] Nikolay Pirogoff, a pioneer of Russian medicine and the founder of field surgery utilised during the Crimean War, was one of the first to administer a rectal injection of ether in 1847 and found it had certain advantages compared to the pulmonary route.[2]

The main advantage of this method was during head and neck surgery, where the anaesthetist was seen as a hindrance within the operating field, and hence rectal maintenance of anaesthesia was accepted more enthusiastically by particular surgeons. Despite the early use and enthusiasm of rectal ether, its mention in medical literature seemed to have been forgotten for the subsequent 37 years. The experiences of its usage during the Crimean war may have tempered its popularity due to the constant requirement to use hot water to heat the delivery system, and the rudimentary equipment used to deliver the vapour. Another reason may be due to the popularity of using chloroform as opposed to ether during the period.

Daniel Mollière in 1884 created the first machine for rectally-administered ether.[3] Mollière, a surgeon, practiced in Lyon - one of the centres which preferred the usage of ether over chloroform. He utilised a Richardson's hand-bellows to push ether vapour into the rectum via an India-rubber tubing system attached to an ether containing vessel immersed in hot water and demonstrated the route's success in allowing accessibility during head and neck surgery. Unlike the pulmonary route, it was noted less ether was required for induction and maintenance of anaesthesia. He noted that patients routinely stated they could taste the ether prior to becoming drowsy.

His method was repeated and described by Abner Post in 1884; he described:

> 'The first case was a patient of Dr Homans [the surgeon], a man with cellulitis of the arm.… After the tube was introduced he first complained of the taste of ether in the mouth. It was then noticeable to the bystanders in his breath. His pulse grew rapid, the pupils dilated, he partially stiffened out, put his hand to his mouth, vomited, and anaesthesia was complete at the end of thirteen and a half minutes. The ether was discontinued almost as soon as he was insensible, but the anaesthesia continued for nearly thirty minutes, probably not so complete as to allow surgical interference without shrinking during all that time, but so complete that he lay without motion. During the afternoon he had two or three loose discharges, mostly gas, for which he received a starch and opiate enema, and which soon ceased.'[4]

The description emphasises the common perception of administering ether rectally this method: its slow onset and less excitability in comparison to pulmonary induction. Subsequent descriptions by the German anaesthetist Starcke noted a few drops of chloroform by mouth may be required for long procedures.[5]

Cunningham updated Mollière's apparatus in 1902, and demonstrated a reduction in postoperative nausea and vomiting and confirmation of the equipment's suitability for head and neck carcinomas.[6] Sutton modified Cunningham's apparatus with the introduction of a generator where ether and oxygen is mixed, along with an efferent tube system to scavenge and exhaust gut contents with a safety valve to blow off at pressures above 20 millimetres.[5]

Increasing usage showed the route's concerning side-effect of diarrhoea, rectal bleeding, irritation and gastrointestinal haemorrhage primarily due to ether's direct irritability towards gastrointestinal mucosa. It was at this point that James Gwathmey began

experimenting in the application of rectal anaesthesia. He demonstrated, with the help of the chemist Baskerville, ether's altered pharmacology when mixed with oil caused less mucosal irritability, but allowed the same rate of evaporation when given rectally. With the publication of '*Anesthesia*', Gwathmey described his successes in rectal anaesthesia with a case series of 140 patients.[5]

Colonic anaesthesia fell out of use and serious practice in anaesthesia after the First World War. Chalier and Dunet noted that the method had serious administrative problems, and should only be performed on young persons who had no serious pathology and normal gastrointestinal systems.[8] By the 1930s, the German produced tribromoethanol, branded as Avertin, took over as the main method of rectal anaesthesia because of its simplicity in application, rapid effect, no stage of excitement during induction or recovery, and no rectal mucosal irritability.[9] The effects of war, improvements in delivery of anaesthesia via the pulmonary and intravenous route, and improved pharmacology with ease of usage may explain the decline of this form of anaesthetic administration. However, its administration demonstrates the beginning of a speciality experimenting and attempting to improve patient and surgical care during the early years of anaesthetic practice.

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Obstetric anaesthesia and the Royal family

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Unlike physician members of the Medical Household, whose lineage can be traced over three hundred years, there is little documentation of anaesthetists treating royalty. Furthermore, there is sparse information regarding the obstetric anaesthetic care provided to members of the royal family. Probable contributing factors to this include the nature of the royal patient, the relative age of the specialty, and the often overlooked and poorly understood role that anaesthetists play in patient care.

Given the scanty documentation, the presentation will review the available literature on anaesthetists who have tended to royalty during childbirth from the nineteenth century onwards, and, where possible, their anaesthetic technique and their thoughts on the care provided.

Queen Victoria

The most documented of cases are those of Dr John Snow and Queen Victoria. The queen's dislike of pregnancy was well known, which she described as an '*occupational hazard of being a wife'.*[1] On the 7th April 1853 Snow's presence was requested at Buckingham Palace as the queen was in labour with her eighth child. In attendance were the obstetrician, Charles Locock, and, physician, James Clark. Snow's involvement in the delivery of Prince Leopold was documented in his casebook:

> 'Administered Chloroform to the Queen in her confinement…. At twenty minutes past twelve by a clock in the Queen's apartment I commenced to give a little chloroform with each pain, by pouring about 15 minims by measure on a folded handkerchief…. Her Majesty expressed great relief from the application, the pains being very trifling during the

> uterine contractions, and whilst between the periods of contraction there was complete ease. The effects of the chloroform was not at any time carried to the extent of quite removing consciousness…. the chloroform was inhaled for 53 minutes… The Queen appeared very cheerful and well, expressing herself much gratified with the effects of the chloroform.'[2]

The use of chloroform was regarded a success with an uncomplicated delivery for the queen and the birth of a healthy boy. James Clark later wrote to the obstetrician James Simpson stating that the chloroform

> '… acted admirably. It was not given so strongly as to render the Queen insensible, and an ounce of chloroform was scarcely consumed during the whole time. Her majesty was greatly pleased with the effect'.[3]

The queen herself described chloroform and its effects as *'that blessed chloroform…. soothing, quieting and delightful beyond measure.'*[1]

Queen Victoria rewarded Snow for his services by extending an invitation to a levee:[4] a sought-after social event, with a royal presentation. His position as a leading anaesthetist was cemented and he continued to administer anaesthesia to patients. Unfortunately, his life was cut short when he died of a suspected stroke in 1858.

Duchess of York

George VI was the son of King George V and the younger brother of Edward VIII. He was married to Elizabeth Bowes-Lyon, who was formally known as the Duchess of York. In 1925, the duchess became pregnant with Princess Elizabeth, who through unexpected events would eventually become our current monarch Queen Elizabeth II. In mid-April 1926, the duchess's doctors advised that the forthcoming birth should be induced.[5] Therefore, a week earlier than expected, on the 21st April 1926, the duchess gave birth to

Princess Elizabeth at 17 Bruton Street, the Mayfair home of the duchess's parents. Consequently, Elizabeth became the first monarch to be born in a house rather than a palace.

The doctors present at the birth were the physician Walter Jagger and the obstetricians Sir Henry Simson and Sir George Blacker. Simson had previously been involved in the delivery of Princess Mary's two sons. A guarded official medical bulletin issued post-delivery, signed by Simson and Jagger, stated:

> 'Her Royal Highness and the infant Princess are making very satisfactory progress. Previous to confinement a consultation took place, at which Sir George Blacker was present, and a certain line of treatment was successfully adopted'.

Although not explicitly stated, *'a certain line of treatment'* is thought to be in reference to a caesarean section.[5] However, the medical update the following day stated that progress of the duchess and her baby was *'normal and satisfactory'*.

By the 1920s the contribution of anaesthetists had started to be recognised with notable physicians providing care for members of the royal family. Unfortunately, there is no mention of an anaesthetist being involved in the duchess's case, with Jagger and Simson signing the medical bulletin. Furthermore, despite extensive research, no details regarding an individual anaesthetist or their anaesthetic technique could be found.

The duchess had given birth to a healthy baby girl and, as tradition dictated, the home secretary, Sir William Joynson-Hicks, was present for the delivery at Bruton Street. Princess Elizabeth would go on to be the first royal for whom the presence of the home secretary was not required at any of her deliveries. The birth of the princess would prove to be a welcome distraction at the time from threatened strikes by the Trades Union Congress.

Queen Elizabeth II

At the age of twenty-two Princess Elizabeth gave birth to her first child, Prince Charles, on 14th November 1948. Present at the delivery was the obstetrician Sir William Gilliatt. He served as the surgeon-gynaecologist to the Royal Family for over two decades. Also, in attendance was the anaesthetist Vernon '*Sam'* Hall. Dr Hall was an anaesthetist based at King's College in London. He became a consultant at the age of twenty-seven, and was a founding member of the board of *The Faculty of Anaesthetists of the Royal College of Surgeons*. Because of his interest in education, he went on to become the dean of King's College Medical School from 1951 to 1965.[6]

After a prolonged labour, the Princess gave birth to Prince Charles at Buckingham Palace. It has been suggested that she was delivered of the Prince via caesarean section under general anaesthesia.[7] However, this remains unverified. Hall described his involvement with the princess's pregnancy, and subsequent delivery, in his memoirs '*Reminiscences and anaesthesia in India':*

> 'It was during the period starting about 1948 that I first became involved in the royal family. Sitting in the dean's office one day I was approached by William Gilliatt and asked if I would give the anaesthetic to the Princess Elizabeth for her soon expected baby. So, in due course having visited, been introduced, and carried out the necessary examination, I went to Buckingham Palace at about 8 o' clock one evening. Oddly enough in those days one drove a car through the gates of the palace quite without query and dragging my anaesthetic apparatus (complete with two gas and two oxygen cylinders) I reached the right room somewhere in the basement and carried out the necessary task'.[8]

Hall continued to work with Gilliatt for the birth of the princess's second child, Princess Anne, who was born in 1950 at Clarence House. Elizabeth was crowned Queen in 1952 and Hall served as the

anaesthetist for her remaining pregnancies; she gave birth to Prince Andrew in 1960, and Prince Edward in 1964, both at Buckingham Palace. However, for these deliveries he worked with the obstetrician Sir John Peel, who was the surgeon gynaecologist to the queen between 1961 and 1973. There is scarce information regarding his anaesthetic techniques for these deliveries. It has been suggested that at the birth of Prince Edward, Hall administered *'gas, oxygen and pethidine'*,[9] but this source cannot be verified.

Hall was created a Commander of the Royal Victorian Order (CVO) in 1960 and retired from anaesthetic practice in 1969. He died of an abdominal aortic aneurysm in August 1998.

Princess Diana

Epidural services in labour were well-established by the 1980s together with the role of anaesthetists in acute maternity services. The Princess of Wales's first pregnancy was announced on the 5th November 1981, with Sir George Pinker being named as her responsible obstetrician. He was the surgeon-gynaecologist to the queen from 1972 until 1990, and throughout his career attended nine royal births.[10] Pinker would attend the princess following her fall down the stairs when three months pregnant. For Diana, her pregnancy was marred with morning sickness, with her describing it as '*appalling…. almost every time I stood up, I was sick'*.[11] On the advice of Pinker a decision was made for the birth to take place in hospital, following in the footsteps of Princess Anne in the 1970s.

The princess's labour was induced at St Mary's Hospital, Paddington, on the 21st June 1982. A healthy baby boy, Prince William, was born sixteen hours after Diana's admission to hospital. Princess Diana described the event as follows:

> 'When we had William, we had to find a date in the diary that suited him and his polo. William had to be induced because I couldn't handle the press pressure any longer, it was becoming

> unbearable… Anyway, we went in very early. I was sick as a parrot the whole way through the labour, very bad labour. They wanted a caesarean, no one told me this until afterwards. Anyway, the boy arrived, great excitement.'[11]

The official announcement posted at the gate of Buckingham Palace stated:

> 'Her Royal Highness the Princess of Wales was today safely delivered of a son at 9.03pm. Her Royal Highness and her child are both doing well'.

As is customary, the medical team overseeing the delivery signed the Royal announcement: George Pinker (obstetrician), John Batten (Head of the Medical Household), David Harvey (paediatrician) and Clive Roberts (anaesthetist). Other than the delivery being led by Pinker there is scant information regarding the direct involvement of the remaining medical team.

Detail that can be corroborated is that the Princess had an induced non-instrumental delivery. In her script discussing her labour, Diana made no reference to any further medical intervention during the birth. Of interest, in his official biography which was written in conjunction with the Princess, Andrew Morton described the use of regional anaesthesia,

> ' …In the end, Diana, who had an epidural injection in the base of her spine, was able to give birth thanks to her own efforts, without resorting to forceps or an operation'.[12]

This information suggests that the Princess did have medical assistance with analgesia. If this is the case what remains unclear is who administered the medication. In two further unofficial royal biographies it states that Pinker administered the injection.[9 13] With the royal announcement also being signed by the anaesthetist, Clive Roberts, it is probable that it was he who undertook the procedure, particularly as obstetric anaesthetic practice was well established at

that time. Unfortunately, there is no further information to substantiate the role played by the anaesthetist in the birth of Prince William.

Little information could be collected on the practice of Clive Roberts. However, the three remaining medics who signed the royal announcement were highly regarded in their fields. Pinker and Batten were knighted for their services,[14 15] whilst Harvey was seen as a pioneer for the development of training in neonatal medicine.[16]

Duchess of Cambridge

In 2012 the Duchess became pregnant with her son, the Prince George. Details of the pregnancy were released earlier than expected due to her suffering with hyperemesis gravidarum, which required hospitalisation in December 2012.[17] Marcus Setchell, who succeeded George Pinker as surgeon gynaecologist to the Queen in 1990, was responsible for overseeing the Duchess's pregnancy and delivery. He had previously delivered the children of the Countess of Wessex.

In the early hours of 22nd July 2013, the Duchess was admitted to the Lindo Wing at St Mary's Hospital in Paddington. Being up to one-week overdue Kensington Palace declined to say if she had been induced.[18] Eleven hours later she delivered Prince George, who is third in line of succession to the royal throne. Guy Thorpe Beeston and Alan Farthing assisted Marcus Setchell with the birth. Also present were the neonatologist, Sunit Godambe,[19] and a midwifery team led by Professor Jacqueline Dunkley-Bent. The delivery was uncomplicated and the Duchess was discharged the next day.

A similar team provided medical care for the Duchess in the delivery of her second child Princess Charlotte on the 2nd May 2015.[20] Because of Sir Marcus Setchell's retirement, Guy Thorpe Beeston and Alan Farthing oversaw the obstetric care whilst Professor Huw Thomas acted as physician to the royal household following the retirement of

Sir John Cunningham. With an uncomplicated delivery, the Duchess gave birth within three hours of admission, and was discharged from hospital within twelve hours.

It would later be revealed that an on-call team of over twenty staff were available to assist with the deliveries of the Prince George and the Princess Charlotte. This included an additional two obstetricians, and three anaesthetists. Consultants Professor Tiong Ghee Teoh, an obstetrician and gynaecologist, and anaesthetist Johanna Bray, who both work at St Mary's Hospital in Paddington, were part of this on-call team. They were invited to the Buckingham Palace Garden party in 2016 and gave further insight into the role of the medical team.

Professor Teoh stated:*'We had a huge team. I was back up… but for anything that could possibly go wrong we had a team of people behind each specialty.* 'With regards to the Duchess he commented: *' She is a fit young lady and that's the most important thing… they are the best patients… At the end of the day you want to deliver a healthy, happy baby to a healthy happy mother and that's what happened.*[21] Meanwhile Bray provided some insight to the role of the anaesthetists in the Duchess's care: *'We weren't actually at the birth but were behind the scenes. We were all on-call for three months.*[21]

The Duchess of Cambridge gave birth to her third child, the Prince Louis on Monday 23rd April 2018. Being admitted in the early hours of the morning, she gave birth five hours later to a healthy baby boy.[22] The uncomplicated delivery saw the Duchess leaving the hospital just seven hours after the birth. With all of her pregnancies the duchess was fortunate enough to have normal deliveries without medical intervention.

In conclusion the royal family remain a source of fascination for many with pregnancies and births garnering widespread interest. The maternity care provided to them has been steadfast and at times invaluable, with the contribution of anaesthetists increasingly being appreciated.

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Professor William Wellesley Mapleson, 1926-2018: a Tribute

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Early Life

Professor William Wellesley Mapleson was born on 2nd August 1926 in Ealing, London. He was the third of three children, having an older brother and sister. Being initially schooled in London, his family moved to Amersham in 1937 where he continued his education at Dr Challoner's grammar school. It was here that he excelled academically, particularly in maths and physics. It was his career master and physics teacher who suggested that he should *"go to Durham and read physics"*, and he started his undergraduate degree in 1944. Beginning his studies at this time meant that he was allowed to delay his national service, with the plan to complete it following completion of the course. In 1947 he completed his degree in physics with a bias towards radio communication.

Following this, Mapleson commenced his national service with the RAF and was stationed in Debden, Essex. He specialised in radar, making use of his background in physics, and taught overseas officers on courses about the topic.

In 1949 his national service had come to an end, and he went to thank his professor as Durham for all he had done. He received a telegram a few days later inviting him to do a PhD. He was interviewed, telling the panel about what he had learnt about radar and was invited to begin a PhD in atmospheric electricity.

Towards the end of his PhD he was asked what he was going to do afterwards. His supervisor drew his attention to a small advertisement on a noticeboard for a job in Cardiff that read *"Wanted in the Anaesthetics Department in Cardiff, someone with a wide knowledge of physics, physiology or pharmacology"*. Although he had only attended the

interview for practice, he was offered the job, and began his appointment in Cardiff in 1952. He planned initially to stay for five years but his career in the department of anaesthetics extended over 60 years.

Career in Anaesthesia

Mapleson found himself in Cardiff at a key juncture in the history of anaesthesia. The 1950s saw a watershed when anaesthesia was shifting from an art-form to a more scientific discipline. As one of the only scientists employed by an anaesthetics department in the UK, Mapleson was at the forefront of driving the scientific understanding of anaesthesia. By exploring the physics, pharmacology and physiology that underpins anaesthesia, Mapleson strove to improve the safety of anaesthesia for patients across the world.

Throughout his life, Mapleson had a love of the theatre, and considered a career in stage management and lighting before pursuing his PhD. It was at an amateur theatre group production that he met his wife, Doreen and they married in 1954. They had two children together, Jenny and Roger.

His first project in Cardiff was given to him by Professor William Woolf Mushin, who asked him to measure the muscle relaxant properties of gallamine. Mushin wanted this performed by measuring the contractions of the short muscles of the thumb, elicited by stimulating the ulnar nerve. Professor Mapleson was granted £250 to buy a nerve stimulator, but such was his skill that he used the £250 to build a far more sophisticated piece of equipment than he would have been able to buy.

This first research project was fruitful and he published several papers on the subject. This exemplifies a change in the speciality of anaesthesia as the growing availability of muscle relaxants meant that anaesthetists suddenly had to become experts in the physics and physiology of the mechanical ventilation of the lungs. Cardiff became

a centre of worldwide standing, for the testing of and the experimenting on mechanical ventilators.[1] Mapleson was integral to the successful undertaking of this work.

Mapleson will be remembered for many elements of his work but none more so than the eponymously-named breathing circuits. He was given a sketch of five breathing circuit configurations by Mushin, the then head of department. Mapleson was asked to calculate the conditions that would be required to prevent re-breathing of carbon dioxide in each of the circuits. In order to identify them, Mapleson labelled the circuits A, B, C, D and E and published his findings in 1954.[2] Subsequently, the circuits became known worldwide as Mapleson A, Mapleson B, and so forth. Always humble, Professor Mapleson said of this work: *"I seem to be the only person to make his reputation anaesthesia on the strength of his knowledge of the alphabet."*

Mapleson's publishing career lasted an impressive 57 years with well over 100 publications, the last of which was published in 2012. He wrote on a diverse range of subjects, from education to ventilation, pharmacology and veterinary anaesthesia. Mapleson also appreciated how the power of computer-assisted technology would improve the safety of anaesthesia; technology, the potential of which we continue to investigate. He foresaw how computers would not only help us solve research questions that anaesthesia presented, but also how computer-assisted technology would contribute to the safe delivery of anaesthesia itself.

Mapleson collected a number of awards during his career, a DSc from Durham, an honorary membership of the Association of Anaesthetists and an honorary fellowship of the Royal College of Anaesthetists to name but a few. In addition to this, he was a founder member of the Anaesthetic Research Society.

Never without a full complement of pencils and pens in his left shirt pocket, Mapleson was a true problem solver and was always willing to offer sage advice to junior and senior anaesthetists on matters of

physics, mathematics and statistics. The academic department of anaesthesia in Cardiff will forever be proud of our connection with the distinguished career of Professor William Wellesley Mapleson.

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"All I've Got is a Photograph (Abstract)

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Joseph T Clover (1825-1882) was the leading anaesthetist in London from 1858 until the time of his death in 1882. There are two iconic photographs of him with his chloroform apparatus, taken for his display at the International Exhibition in London in 1862. As well as these photographs, there are just a handful of other photographs of Clover, taken at various times throughout his adult life. These photographs have been reproduced in many biographical articles over the years but none have been reliably dated or traced to their source.

Recently, Jan van der Wal (www.the-eastern-window.com), a collector of Victorian photograph albums, purchased an album which had once belonged to the Clover family, mostly likely Clover's son Martin. Jan searched for information about Joseph Clover, who was clearly identified in some of the photos, and found me through my website, www.josephclover.com. He has since kindly provided high resolution scans of every photograph from this album, including any information printed on the back.

The carte de visite was a popular photographic product between 1860 and 1880. Small, pocket-sized photographs were passed between friends, dropped off in lieu of calling cards and collected in family albums. These albums became status symbol, with people collecting photographs of famous friends and displaying in their parlours. The album described here is a carte de visite album. It contains many photographs of people who cannot currently be identified. But it also contains photographs of Joseph Clover, some of which have never been seen in any publications or archival collections. Many of these photographs also have information on the back about the photographer and the date on which they were taken, providing us with far more information than was previously available about the

photographs of Joseph Clover. There are also photographs of Clover's wife, children and other family members. The album spans many decades and contains photographs of some of the children long after Clover's death in 1882.

Joseph Clover's private papers have been dispersed around the world and while many are stored safely in museums and archives, some still occasionally surface at auctions. In the ten years I have been actively researching his life, several written sources have come to light; a photographic album was, however, completely unexpected. This album provides us with a more complete photographic timeline of Joseph Clover's life and further insights into his private life. We are extremely fortunate that his album ended in the hands of a collector who is interested in the story behind the photographs he collect and had the generosity to share his find with someone he realised would benefit for this discovery. This paper will present the story of this recently discovered album and an expanded photographic timeline of Joseph Clover and his family.

Drs Jeffrey Cooper and Ellison "Jeep" Pierce (Abstract)

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Dr Jeffrey Cooper was a bioengineer working at Massachusetts General Hospital in Boston. Dr Ellison Pierce was an Attending Anesthesiologist at New England Deaconess Hospital in Boston, and former president of the American Society of Anesthesiologists. Together they were the prime movers in the development and subsequent worldwide adoption in anaesthetic practice of pulse oximetry, capnography and the oxygen nitrous oxide interlink on anaesthetic machines which resulted in a sea change improvement in patient safety. These came into use nationally in the USA in 1985 and there was a dramatic fall in the number of avoidable deaths in anaesthetic practice along with a similar fall in anaesthetic malpractice premiums. They were instrumental in the introduction of The Harvard Monitoring Standards, and the formation of the Anaesthesia Patient Safety Foundation (APSF), whose mission statement was "*that no patient shall be harmed by the effects of anaesthesia*".

The Wit and Wisdom of David Zuck

Dr Henry Connor

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I have identified more than 230 publications by David Zuck and there may be many more. They encompass books, papers and other articles, letters, book reviews and obituaries. Members of this Society will be familiar with his contributions to publications related to anaesthesia, so I will draw mainly on other sources to demonstrate the immense breadth of both his interests and his reading, his encyclopaedic knowledge and remarkable memory, and his facility for grasping concepts which many of us find so difficult to understand. In the process I shall provide examples of David's wit and wisdom and I hope to show what lessons we can still learn from his work.

More than any other member of this Society David was fascinated by the history of concepts and ideas but, as a practical man himself, he enjoyed nothing better than constructing a paper which combined theory and practice in the design of a piece of apparatus, especially a vaporizer. Following in the tradition of his nineteenth century heroes like Snow, Nooth, Goodman Levy, Julius Jeffreys, Waller and Alcock, David was himself a prolific inventor of equipment. For example he designed and described the Whittington Syringe Stand,[1] a cuffed oesophageal tube to minimise the risk of inhalation of gastric contents during emergency anaesthesia,[2] a ripple mattress for the operating table,[3] a disposable air filter for use during intermittent positive pressure ventilation[4] and, displaying an advanced knowledge of electronics, a transistorised time marker[5] and the Barts-Enfield Drip indicator.[6] He also helped to design the Enfield Ventilator. As early as 1982 he had programmed a Sinclair ZX81 computer to permit self-assessment by trainee anaesthetists.[7]

While chairman of his hospital's Medical Staff Committee, David became involved in the sometimes bitter medical politics arising from the renegotiation of the Consultant Contract in 1970 and he

published four letters on this subject in the *BMJ*. As you might expect, some of his comments were incisive and pithy. For example:

> "Sir- The Central Committee for Hospital Medical Services, discussing the decision to appoint a medical representative from the Department of Health to Chair the Central Manpower Committee, resolved that the chairman of the committee should be democratically elected. It then went on to agree to co-operate with the [Department's] proposal to appoint its own chairman and to review the arrangements about chairmanship in one year's time. How could it possibly do both? What was the Chairman doing when the second resolution was proposed? The C.C.H.M.S. is as weak and indecisive in its dealings with the Department as the B.M.A. is over the G.M.C. Anyone reading the reports of meetings over the past months will see that it is consistent only in eating its own words. It is time for a democratically elected body to take over. I am, etc."[8]

David's sharp eye for slipshod reasoning, inexactitudes and lack of attention to detail is perhaps most apparent in his reviews of books and papers. Of Caton's *What a blessing she had chloroform* he wrote:

> "The author paints in broad sweeps, which have a tendency to blur the timescale and obscure the facts. For example, according to the accepted authorities, …Pravaz did not invent the syringe; oxygen and carbon dioxide were not discovered in the early nineteenth century; and if there is any evidence that John Snow and Benjamin Ward Richardson were prominent in the animal rights movement in the first part of the nineteenth century I would love to know what it is."[9]

David wrote a scathing review of Stephanie Snow's *Operations without pain*.[10] So irritated was he by this book that he over-stated some of his criticisms but the justification for each of them cannot be faulted. He showed how she omitted well documented information which did not support her contentions and how some of her conclusions were

distorted by a disproportionate emphasis on the practice of John Snow who was certainly an exemplar but was far from being representative of anaesthetic practice in Victorian Britain. Echoing some of his strictures on Caton's book, he was particularly critical of some glaring mistakes, writing that:

> "It is not apparent that Dr Snow consulted any anaesthetists during the course of her research, since they would surely have advised her, among other things, that ether and chloroform are not gases; that chloroform kills by inducing ventricular, not atrial, fibrillation; …[and] she would have been advised also not to dismiss Joseph Clover…because '*he published less than Snow and did not champion anaesthetic matters through medical networks*'. Clover spoke at meetings, taught medical students, published papers in journals and wrote the article on anaesthesia in Quain's *Dictionary*. Snow does not explain what other medical networks she has in mind."

David was of course meticulous in his own work. I have always thought of myself as reasonably precise but, when David and I published on a newly recognised ether vaporizer designed by John Snow, I had to prepare five drafts of our paper before David was finally satisfied.[11] When we met to study the vaporizer in the Royal College of Physicians I brought a ruler, David a micrometer.

David had been meticulous in his preparations before embarking on his own historical research. I quote now from an email which formed part of a correspondence that we had on historical methodology:

> "Some forty years ago, while working for the Diploma in the History of Medicine, I immersed myself in writings about historical methodology, starting with Marwick's *The Nature of History,* in which he gives seven different ways in which the word may be used; then Bloch's *The Historian's Craft,* Elton's *The Practice of History,* Kuhn's *The Structure of Scientific Revolutions* (of course), Fleck's *Genesis and Development of a Scientific Fact,* Tosh's

> *The Pursuit of History*, and Kragh's *An Introduction to the Historiography of Science.* Apart from these there were histories of science, such as Koyré's *From the Closed World to the Infinite Universe,* and the standard histories of medicine."

I wonder how many of us can lay claim to such exhaustive background reading?

In 1978 the *Lancet* published a review by Thomas Dormandy of a book commemorating the 400th anniversary of the birth of William Harvey.[12] Dormandy commented unfavourably on the enduring relevance of the work of great scientists in comparison with that of great writers and artists. He suggested that the work of the latter endured indefinitely but that of scientists was always superseded by later discoveries and there was therefore little point in celebrating their anniversaries. David was never going to let that pass unchallenged.[13] He argued that those who belittled the work of Harvey claiming

> "that he took one idea from Servetus and another from Fabricius, or perhaps the whole from Thomas Hariot," had missed the point. It was Harvey and none of these others who effected the scientific revolution that opened the way for the development of modern medicine, and in particular, the science of cardiology which was soon initiated by Lower and further developed by Hales."

Moreover, we

> "should read our great scientists to see what they said and not what someone else tells us they said; and how they said it, and why, in what circumstances and under what difficulties."

For example, if Keith and Flack had

> "carefully considered Harvey's beautiful description of the temporal sequence of the cardiac contraction, the motion

> appearing to begin from the auricles and to extend to the ventricles, and the almost poetic account of the dying heart ('*all other parts at rest and dead, the right auricle still beats*')"

they might have

> "found the sino-auricular node earlier, by design, rather than later, by accident. Or if someone had read Lower on the effects on the venous return in the pregnant woman of '*the pressure of the uterine mass on the vena cava and both iliacs in the pelvis*' more perceptively, the supine hypotension syndrome might have been described much earlier, and we would have been spared the nonsensical theories about the peculiar susceptibilities to anaesthetics during pregnancy that my generation was taught, and many deaths."

All too often I, and perhaps also some of you, go back to the original reference only to check that we have quoted a single fact correctly rather than to read the whole work "*more perceptively*". As David wrote, we should be reading the works of the great scientists because, so often, "*they have said it all before, and so much better*."

In 1984 the *BMJ* carried a review of an English-German medical dictionary of medicine in which Dr Freedman criticised the inclusion of what he described as "*excess ballast*", that is of a large number of "*obsolete, archaic, or arcane words*", one such being '*aposteme*', an old word for an abscess.[14] Ever so slightly tongue in cheek, David responded that:

> "Rather than complain of redundancy he [the reviewer] should have taken the compiler to task for parsimony. Here in Enfield we recognise, with Guy de Chauliac, that '*there ben 6 names of simple apostemes, and of compownede apostemes, there beeth endless names*' But this dictionary, seemingly, giveth only one, and even that he would excise. Sadly Dr. Freedman regards such expressions as obsolete and archaic, as ballast, and therefore to be thrown

> overboard, but without ballast how is one to keep an even keel?... As I have observed before, to re-read the writings of our predecessors is neither an eccentricity nor an irrelevance."

David argued that, if we are to understand the works of our predecessors, we need dictionaries which contain the words which they used.[15]

Nowhere is the importance and value of a careful reading of the original work better illustrated than in a single paragraph from David's review of Fink's translation of Pirogoff's work on etherisation:

> "To compare Pirogoff's approach with John Snow's is irresistible. Strongly influenced by Magendie, Pirogoff's pharmacology was precisely of his own time, anatomical pharmacology, the search for sites of action. It became the pharmacology of the great school of Dorpat, of Bucheim, Schmeiberg, and the other luminaries of the nineteenth century. But Pirogoff shows no signs of understanding the application of the basic sciences to the design of an effective vaporizer. John Snow, on the other hand, starting from the same base, but influenced initially by Dalton, concerned himself with such twentieth century topics as saturated vapour pressures, anaesthetic uptake and the correlation of blood levels with degrees of narcotisation, the relationship between potency and blood solubility, and the effects on cellular respiration."[16]

Who else but David could have written that paragraph? I could continue to quote almost indefinitely from David's book reviews, but one last example is irresistible:

> "The book is well produced, well referenced, and well illustrated. Two of the essays are blemished by misspellings, and one author, by his use of what might be called the unconditional prophetic - *'in a few years Beddoes would give up his*

> *research on gases'* - has neatly disposed of the argument as to whether all historical knowledge is in the past or the present. For him, at least, some of it is in the future."[17]

That leads me to David's wit and again I turn mainly to the *Lancet* and *BMJ*.

In 1984 David wrote to the *Lancet*:

> "I am surprised that some of your correspondents still feel compelled to assert the efficacy of acupuncture. Not only does it work, but it works also at a distance. During the 1950s the senior medical staff of a hospital with which I am acquainted kept in secret a small wax image of the then group secretary, into which from time to time sharp needles were inserted and waggled about. This practice was abandoned when it became clear that its only observable effect was to keep the so-and-so in the best of health."[18]

In 1987 Dr Ross of Northampton wrote to the *Lancet* commenting on a paper by a professor who referred to a "*centre of excellence*". Presumably, wrote Dr Ross, the professor's hospital is one such. He continued:

> "I believe the hospital in which I work is quite good, but is it a centre of excellence? Is there a statutory body which defines such centres?"[19] David's was the briefer of the two responses:
>
> "…my definition of 'centres of excellence' is that they are excellent places in which to work, but not necessarily in which to be patients."[20]

David was a champion of DGHs and those who worked in them. When a Wellcome Witness Seminar on the History of British Intensive Care overlooked the very early contribution of two anaesthetists at Barnet General Hospital, David was quick to recall their work, pointing out that most of the 'witnesses' at the seminar

were too young to have had any personal experience of the early days of intensive care![21]

In 1979 when a Dr Rosner resurrected Maimonides' recommendation of chicken soup for near moribund breathing, David responded that his suggestion had been anticipated in the *Enfield Medical Gazette* in 1972; but was rejected.

> "principally because of uncertainty about Maimonides' grandmother's recipe and its relation to what often passes nowadays for chicken soup, and the lack of an appropriate method of pharmacological standardisation, in favour of the much more potent and efficacious remedy known to our forefathers as accubitus [a method of heating devitalised people by causing a young person to lie next to them]. This was employed by such famous people as King David, William Harvey and Thomas Sydenham"

but David thought that the *Enfield Medical Gazette* was the only journal to have published a scientific evaluation.[22] When I saw the reference cited by David[23] I assumed that the report was a hoax, especially as I was unable to find any trace of this journal in any library or catalogue or at the London Metropolitan Archives where the archives of David's hospital are now held. However I have since come across other references to the journal, some at least of which appear to be genuine.[24]

I have exceeded the word limit for this paper but I simply cannot finish without drawing your attention to David's paper in the Christmas *BMJ* for 1984.[25] David begins:

> "On leaving [an anaesthetists' conference] I noticed further down the street a sign 'Books'. To me this is as pheromones are to others, poor souls. I sometimes wonder whether there are such things as bibliomones. So like a guided missile I homed in. In the 50p box outside the shop a copy of the 1896 edition…of

> Kirklees *Handbook of Physiology*…held promise. I already had Kirklees own third edition of 1856, the physiological contemporary of John Snow. To my enquiry for medical or scientific books I was directed through an archway into the back part of the shop.
>
> It was like entering Aladdin's cave. Books that I had been looking for years twinkled on the shelves and at one third of the London prices. Whewell's *History of the Inductive Sciences* and his *History of Scientific Ideas*, some volumes of Gunther's *Early Science at Oxford*, Anstie on *Stimulants and Narcotics*…The proprietor put his head round the shelves and held up a bundle of papers. 'You might be interested in these. They only came in yesterday. You can have them for…'"

David named a trivial sum for which he acquired eight unread copies of the *BMJ* from 1874 which

> "For 110 years had remained in the state known in the trade, I believe, as 'unopened', though more commonly but incorrectly called 'uncut'. As I have firmly resisted all attempts by my nearest and dearest to vandalise them with the breadknife, they can only be read by spreading them out on a table and turning them this way and that and over and back. Their state confirmed one of my long held suspicions. There is the tradition in Enfield of a local doctor, well within living memory, who had a whole room full of *BMJ*s still in their original wrappers. As they dropped through the letterbox each week he opened the door and threw them in."

David goes on to explain that his uncut journals contained all the original adverts which, being on the outer sheets, were normally discarded when bound.

> "Naturally", he wrote, "these are the most interesting part. Colman's Mustard takes up the whole of one back page;…

> [There are] various celled air or water beds, for the prevention and cure of bed sores, showing yet again that there is no new thing under the sun…there is a whole page of wine advertisements, and another for the transfer of practices, in the bottom corner of which nestles a 'Wet nurse, aged 18, healthy, can be conscientiously recommended by a medical man…Nepenthe at eight shillings a pound; and, if the worst comes to the worst, an Aberdeen polished granite monument, carriage free, for £5. There are residences for students, 'Gentlemen pursuing their Studies at any of the Schools of Medicine in London, are offered Board and Residence, with unusual advantages, in the house of a Lady…."

and much, much more but you will have to read David's paper in full for yourselves.

He ends by remarking that

> "… as one of those who is constitutionally unable to do other than buy dear and sell cheap, how nice it is for once to be on the receiving end of a bargain."

So what can we learn by reading David's works? I believe he teaches us that we must read widely, starting with historical methodology and any relevant basic science, and we must read original papers, carefully and for their own sake and not just to check references in our own papers. We must be precise, exact and meticulous in the construction of our writing while also trying to emulate his willingness to help and the warmth and kindly humanity of his personality.

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BBC Science for Schools: John Snow and the Broad Street Pump

Dr David Zuck

The following extract was found amongst David Zuck's papers and shows a lighter side to his humour. It is unknown whether if it was ever broadcast.

Chapter 1.

John Snow was worried. Something had happened to Fergusson. Two weeks ago he had taken to wearing a bit of cloth like a muffler, or one of Julius Jeffrey's respirators, across his mouth, last week he had washed his hands *before* the operation, and today he had turned up with a gadget like a plant spray which was pumping a mist that smelled like carbolic all over the room. *'Got the idea from Syme,'* he explained. *'It's all the rage in Edinburgh - his son-in-law started it. Impresses the patients, and of course you charge extra.'* But Snow was annoyed. It was making his coat smell like a chemist's shop. Jane wouldn't be pleased - and of course there was no question of *him* charging extra. Couldn't afford to antagonise the great man though.

He rammed his stovepipe hat over his head, slammed the vaporizer to auto, and picked up The Times. *'Not doing too well in the Crimea,'* he remarked. Fergusson grunted. *'I only look at the football.'* Snow turned the page. *'Celtic beat Rangers,'* he said. *'Bloody Irishmen,'* Fergusson snarled, *'not a Scot among them. That reminds me,'* he continued, *'can you do a case on Thursday evening? A re-do of haemorrhoids, at Almond's Hotel. You'll remember the woman - enormous thighs.*' Snow stabbed at his blackberry. *'I've got an appointment with the Board of Guardians at St. James's, Piccadilly, for eight o'clock, but it's not urgent. I can put it off until next week.'*

Chapter 2.

'Oh bother!' said John. 'We shall have to go round by Somerset House to collect this week's morbidity and mortality statistics. What a nuisance!'

They were on their way home from the new Magic Lantern show at Egyptian Hall, Piccadilly, *Wonders of the Dark Continent*. He had taken Jane as a 'Thank you' for ironing his shirts, and to smooth her ruffled feathers when a chance remark he had let drop revealed that in the operating theatre he actually saw strange women without some part or other of their garments. She had been shocked. *'Never mind,'* she said, tucking her hand under his arm. She had been enthralled by the beautiful and exotic pictures on the screen, and it had stimulated her imagination.

'Wouldn't it be wonderful if Mr Farr had a magic lantern on the roof of Somerset House, and we had a screen on our roof, so that he could send the figures without you having to go all the way over there for them.'

John Snow shook his head in wonder. She was a Geordie, and a woman, and a skivvy, but she had thought that out all by herself. He fell to musing. It would need a very bright light, and would work much better at night. What could one call such a system? He tried to remember the classical languages he had had to learn for his MD examination. His Greek was better than his Latin. Seeing from a distance - tele, as in telescope, and maybe sight, or perhaps vision. Telesight, or television. He would try them both out as a joke on Golding Bird on Saturday evening. Typical woman's idea though. *'Anyway,'* asked Jane, breaking into his thoughts.

'Have you got any farther with the cholera? I think it's something to do with drinking water. It isn't natural. Cows drink water, all the time, and look what they do!'

John sighed. He only drank self-distilled water. Didn't everyone? Arm in arm they trudged along Frith Street. *'You know,'* said Jane,

> 'if you had lots and lots of projectors, and lots and lots of screens, everybody could be sending messages to everybody else. Every projector could be sending rays all over the place, like a whole lot of spiders webs, all joined together - all over the world,'

she murmured dreamily –' just imagine, a world wide web, with messages going back and forth twenty four hours a day ... '

John sighed again. Sometimes he wished she would just shut up and let him get on with his thoughts.

(Voice over) But Jane Wetherburn had the last laugh. Her thought trace was picked up by a receptive Scotsman seventy years later, and the first television transmission in the world was made on 26 January 1926 from the very building outside which she had had her great idea, 22 Frith Street, Soho, London, England, the World! (Fade up 'Land of Hope and Glory').

Next week – Jane invents rat poison, DNA, penicillin, and the hydrogen bomb.

Japanese World-Class Achievements in the Fields of Anaesthesia and Surgery in the First Half of the Nineteenth Century

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Introduction

The world-class innovative achievements of Seishu Hanaoka and his school in the fields of surgery and anaesthesia before the introduction of Western medicine are not well-known. We summarise the remarkable Japanese achievements in the fields of surgery and anaesthesia in the first half of the nineteenth century.

Sources

We researched the literature, including books and articles, on the history of anaesthesia and medicine in order to identify and discuss important descriptions of surgery and anaesthesia in Japan in the first half of the nineteenth century.

Results

We found seven important papers.

1. *1804: The world's first recorded case of general anaesthesia*

Seishu Hanaoka (Figure 1) was born in 1760. In 1782, he went to Kyoto to learn classical surgery for two years. Afterwards, Seishu stayed in Kyoto, buying medical books and devices. In 1785, Seishu returned to his hometown and started a medical practice. Because he wanted to alleviate the pain and suffering of patients and to save people's lives through surgery, he continued to research and develop anaesthetics, about which he had been dreaming since childhood.

Figure 1. Seishu Hanaoka**.**

As a result, he discovered that six medicinal herbs including *Datura stramonium* and *Aconitum* contained an active component which had an anaesthetic effect. Using this discovery, he successfully developed Mafutsusan. On 13th October 1804, Seishu Hanaoka successfully operated on Kan Aiya, a 60-year-old woman to remove breast cancer under general anaesthesia, using Mafutsusan. The surgery performed by Seishu appears to be the world's earliest case of surgery under anaesthesia to have been verified as an actual case.[1 2 3]

1. *1810s An illustration of breast cancer surgery under anaesthesia (Figure 2)*

Originally, this illustration was drawn by Ryokei Amemori, at Shunrinken, in Fujinnyuron-yoku, in 1810s. This writing was hand-copied by Sazen Inoue, in 1826.[4]

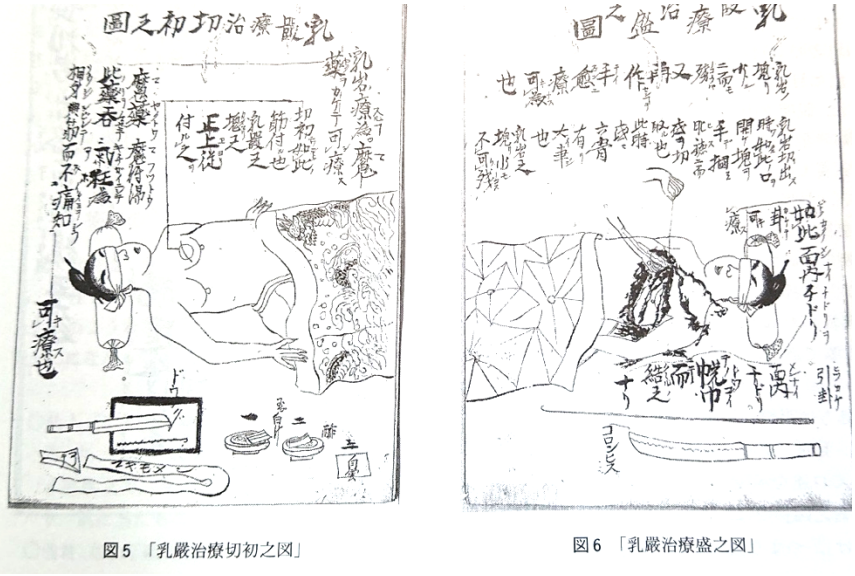


図5 「乳巌治療切初之図」　　図6 「乳巌治療盛之図」

Figure 2. 1827: An illustration of breast cancer surgery under anaesthesia.

3. 1827 A case of general anaesthesia for a pregnant woman.

The patient was a 23-year-old woman from Kojima village. Breast cancer occurred at the seven months of pregnancy. Although postpartum surgery was considered, it was decided to operate surgically during the pregnancy because of the progression of toxic

symptoms. Surgery was performed under general anaesthesia with Mafutsu-to by Hostsu Nanba (Figure 3).

Hosetsu Nanba

Keicyoku Nanba

Figure 3. Hosetsu Nanba (left) and Figure 4. Keicyoku Nanba (right)

A skin incision was made after the administration of anaesthesia. The tumour was extirpated, and the surgical wound was sutured. The patient recovered completely in 20 days, and later gave birth to a female infant at term. Both the mother and child were still in good health 30 years later. This case was reported by Keicyoku Nanba (Figure 4 right) in 1857 in Gekasyoho.[5]

4. *1830: A woman with breast cancer who underwent surgery three times under anaesthesia*

The patient was the wife of Zen-emon Tanbaya who lived in Hyogo. The first surgery was performed by Isei Sugitachi (Figure 5) in August, 1827. The second surgery was performed by Isei Sugitachi, in October, 1829. The third surgery was performed by Seishu Hanaoka,

in October, 1830. All surgeries were performed under general anaesthesia, with the anaesthetic Mafutsu-to. Therefore, the first two surgeries were performed by Isei Sugitachi in Hyogo and the third surgery (after a second recurrence) was performed by Seishu Hanaoka.[6]

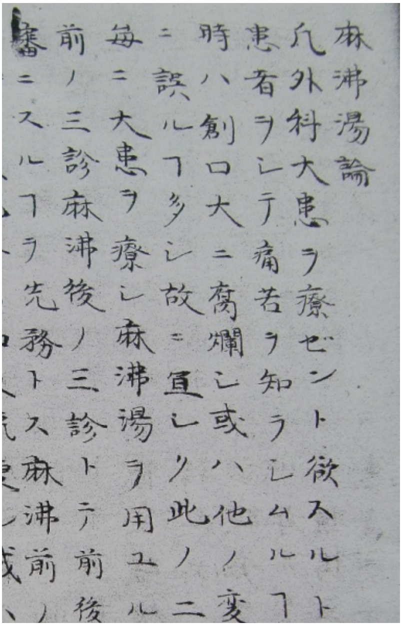
Figure 5. Isei Sugatachi.

5. 1839: Mafutsuto-ron, a textbook of clinical anaesthesia (Figure 6 & 7)

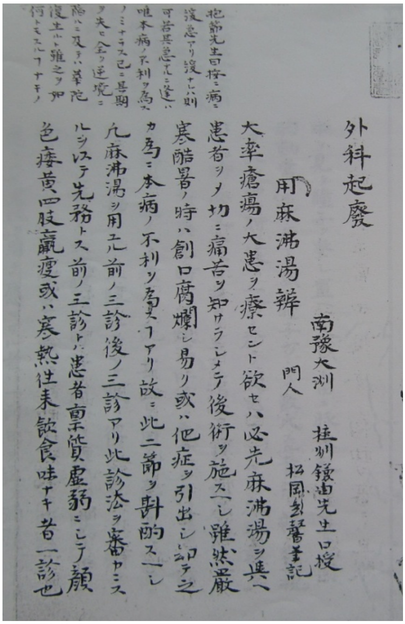
Mafutsuto-ron was written by Gendai Kamada, who was one of the best disciples of Seisyu. Mafutsuto-Ron consists of 10 pages, with

approximately 2500 characters, or 80 sentences. Mafutsuto-ron gives detailed descriptions of the anaesthetic procedures using Mafutsuto. The Mafutsuto-ron gives detailed descriptions of:

1. The indications and contraindications for anaesthesia,
2. Anaesthetic procedures using Mafutsuto,
3. Signs of adequate depth of anaesthesia with Mafutsuto,
4. Methods of intraoperative and postoperative anaesthetic management,
5. Other practices drawn from clinical experience.[7 8]



麻沸湯論
凡外科大患ヲ療セント欲スルト
患者ヲシテ痛苦ヲ知ラシムルコト
時ハ創口大ニ腐爛シ或ハ他ノ変
ニ誤ルコト多シ故ニ宜シク此ノ二
毎ニ大患ヲ療シ麻沸湯ヲ用ユル
前ノ三診麻沸後ノ三診トテ前後
番ニスルコトヲ先務トス麻沸前ノ



外科起廢
南豫大洲 門人
桂州鎌田先生口授
松岡玄馨筆記
用麻沸湯辨
大率瘡瘍ノ大患ヲ療セント欲セハ必先麻沸湯ヲ與ヘ
患者ヲシテ切ニ痛苦ヲ知ラサラシメテ後術ヲ施スヘシ雖然嚴
寒酷暑ノ時ハ創口腐爛シ易ク或ハ他症ヲ引出シ却テ之
カ為ニ本病ノ不利ヲ為スコトアリ故ニ此二節ヲ斟酌スヘシ
凡麻沸湯ヲ用ユル前ノ三診後ノ三診アリ此診法ヲ審ニス
ルヲ以テ先務トス前ノ三診トハ患者稟質虚弱ニシテ顔
色痿黄四肢羸痩或ハ寒熱往来飲食味ナキ者一診也

Figures 6 and 7. 1840: One of the oldest printed illustration of general anaesthesia in Gekakihai-zufu

6. 1840: One of the oldest printed illustration of general anaesthesia in Gekakihai-zufu

This casebook consists of a preface, a table of contents, and 65 illustrations, explaining the pathology of diseases and therapeutic procedures, such as resection of tumours and repair after trauma, in concise classical Chinese letters and illustrations. Although most of the illustrations in this casebook depict patients undergoing surgery, several illustrations depict an entire surgical operation, showing the patient and surgeons together. Especially two illustrations clearly depict the conditions in which general anaesthesia with Mafutsuto was administered at the time. The patients are shown blindfolded, with their arms either tied up with cloth or held down by other people. The two illustrations （Figure 8, Figure 9), which were drawn on the orders of Gendai, show how surgery was performed under general anaesthesia in the 1830s. Because they were published in 1840, they seem to be among one of the oldest illustrations of general anaesthesia in the world.[9]

Figure 8. Surgery for Ectopic Pregnancy (1)

Figure 9. Surgery for Ectopic Pregnancy (2)

7. 1854: Early Surgery for Ectopic pregnancy.

The patient was a 39-year-old woman, the wife of Zenemon Kusano from Tachiya village (presently Soma City, Fukushima Prefecture). The surgeon was Shotaku Kamada (Figure 8). Surgery was probably performed without anaesthesia (There is no statement in the surgical record that any anaesthetic was administered). The patient was in a critical condition in her seventh month of pregnancy, and it was difficult to judge whether she should be treated. However, the doctor performed surgery according to his conviction that waiting without treatment is not good medical practice and there were also families' requests to consider.

Figure 10. Shotaku Kamada

A longitudinal incision of about 12 cm was made beside the umbilicus, and the mass was excised. Although the patient experienced postoperative bleeding, wound infection and intraperitoneal parasitic infection, she recovered fully in a few months. She became pregnant again and gave birth to a girl three years later. The child died the following day, but the mother had no complications.[10]

Conclusions

We found seven important achievements in the fields of surgery and anaesthesia after the development of surgery under general anaesthesia by Seishu Hanaoka in 1804. We also found three other events documented for the first time other than the world's first general anaesthetic. These findings document that high-level anaesthesia and surgery were being performed by Seishu Hanaoka and his disciples in the first half of the nineteenth century in Japan.

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The McIntyre Collection: Recently added to the Japanese Museum of Anaesthesiology

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The Japanese Museum of Anaesthesiology (JMA) was established in 2011 in Kobe. Over the years, the JMA has received exhibition materials from members of the Japanese Society of Anaesthesiologists (JSA) as well as university departments. The Museum has grown steadily, especially in the books and journals section. There is an almost complete collection of old, rare Japanese books that were donated by Professor Matsuki (Figure 1). Even with this growth, however, the JMA has had a limited collection of anaesthesia apparatuses and machines, and it was far behind, therefore, many western anaesthesia museums.

In 2021, the JSA will proudly host the International Symposium on the History of Anaesthesia (ISHA), and the JMA will be one of its main meeting places. Thus, the JMA felt obliged to fill in any gaps in its exhibits, especially those that would appeal to the expert participants at ISHA 2021. Accordingly, Prof. Matsuki last year transferred the McIntyre Collection from another Japanese museum, Ika-kikai-Siryokan[1], to the JMA. The McIntyre Collection is an assembly of inhalational anaesthesia apparatuses that was originally collected by Prof. John W.R. McIntyre of Alberta University, Canada.

Figure 1. Akitomo Matsuki, Professor emeritus Hirosaki University.

Professor McIntyre was born in the United Kingdom in 1925. He received his early education at Wellington School and completed his medical education at St Bartholomew's Hospital Medical School, London in 1948. Almost immediately, he showed an interest in anaesthesia. After an initial residency, he served as an anaesthetist in the Royal Army Medical Corps in British Malaya, where he was attached to a field surgical team with the 48th Gurkha Infantry Brigade. In 1954, he became a Fellow of the Faculty of Anaesthetists of the Royal College of Surgeons of England. He moved to Canada in 1956, where he joined the active medical staff of the University of

Alberta Hospital and remained there until his retirement in 1991. He had been appointed Professor of Anaesthesia at the University of Alberta in 1974, and upon retirement he became Professor Emeritus (Anaesthesia). Prof. McIntyre was an outstanding scholar and teacher. He had numerous scholarly achievements, especially focussing on monitoring, computing, and airway management.

After his retirement, Prof. McIntyre developed a close relationship with Japan. He became an editor for the *Japanese Anaesthesia Journals' Review*, where Prof. Matsuki was also an editor. He was invited by Prof. Matsuki, who was then Chair of the Department of Anaesthesiology at the University of Hirosaki, Japan, to visit Hirosaki. Prof. McIntyre visited the Hirosaki for a month every year, where he taught young Japanese academics how to write and present scientific articles for English-language journals (Figure 2.).

Figure 2. Professor McIntyre giving a lecture at Hirosaki University.

In 1990, Prof. McIntyre asked Prof. Matsuki if there was any place in Hirosaki that was related to Canada. Prof. Matsuki took him to a local cemetery where a Canadian missionary's wife, who had died in a fire in 1899, had been buried. Prof. McIntyre (who suffered from arrhythmia) asked Prof. Matsuki to bury him in this cemetery should he die of a heart attack. Sadly, Prof. McIntyre passed away eight years later following a traffic accident. His family, in accordance with Prof. McIntyre's will, sent his ashes and his anaesthesia collection to a surprised Prof. Matsuki.

Professor Matsuki arranged for a black granite tombstone (Figure 3) and held a memorial ceremony to honour Prof. McIntyre. He invited another editor of the *Japanese Anaesthesia Journals' Review*, Professor W. Erdmann, to the ceremony, who replied with a message of condolence, stating: "*Born in Ireland, Educated in England, Worked for North America, and Buried in Japan under an African stone*".

Figure 3. Tombstone of Professor McIntyre in Hirosaki, Japan.

Prof. Matsuki had initially donated the McIntyre Collection to another medical museum, Ika-Kikai-Siryokan[1], in Japan because in 1998 the JMA had not yet been established. In accordance with Prof. Matsuki's wish, however, the McIntyre Collection was transferred to the JMA in 2018. The Collection consists of 58 anaesthesia apparatuses, 13 masks, 22 vaporisers, nine drippers, five inhalers, eight monitors, and one other item. It also includes some Japanese anaesthesia

apparatuses, which were presented by Prof. Matsuki. The McIntyre Collection is the fruit of the friendship between the two anaesthetists.

We are planning a major renovation of the JMA for ISHA 2021 and the JMA's 10th anniversary. We hope you will be able to attend ISHA 2021 and see the JMA and the McIntyre Collection.

Acknowledgement

We are grateful to Professor Matsuki for his kind permission to publish his photographs and for providing information about Professor McIntyre and his lives.

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Citation for Honorary Membership of the History of Anaesthesia Society: Professor J.A.W. (Tony) Wildsmith

I am delighted to give this citation for Prof Tony Wildsmith to become an Honorary Member of the History of Anaesthesia Society (HAS).

I first met Tony in 1987 when I was appointed to a Registrar post at the Royal Infirmary of Edinburgh, where he was a Consultant Anaesthetist. A leading light in the field of regional anaesthesia, that year he published the first edition of *Principles & Practice of Regional Anaesthesia* (edited with E.N. Armitage).

Tony was on the *founding* Council of the HAS in 1986. He presented the second paper at the very first meeting in Reading: *"Shrines of Anaesthesia in the U.S.A."* Although an Englishman, he was the sole member of Council resident in Scotland and served as Scottish representative and organized the July 1989 meeting – held jointly with the Scottish Society of Anaesthetists in Edinburgh.

Leaving Council in 1990, he had numerous commitments elsewhere, continuing his research and teaching of regional anaesthesia, and notably organizing the Scientific Programme for the AAGBI's Diamond Jubilee in January 1992. He was Assistant Editor of the *British Journal of Anaesthesia* from 1984 to 1988, and a member of its Board from 1987. In 1995 he was appointed Foundation Professor of Anaesthesia at the University of Dundee. While serving on the Council of the Royal College of Anaesthetists he implemented the change from Scottish Standing Committee to Scottish Board in 2000 (he was its first chairman), and generated reports on dental anaesthesia, conscious sedation and major complications of central nerve block.

He has received many honours, including the Gaston Labat Award from the American Society of Regional Anesthesia (2002), the Carl Koller Award from its European counterpart (2004), honorary

membership of the AAGBI (2006) and the Gold Medal of the RCoA (2008). He has been elected FRCPEd, FRCSEd and FDSRCSEng, and was President of the Scottish Society of Anaesthetists for 2003-4.

Throughout all this he never lost his love of the history of anaesthesia, returning to the History of Anaesthesia Society Council in 2004 and organizing the summer 2007 meeting of the Society in Dundee. He served as the Society's President for 2008-10, and organized the autumn 2008 meeting at the RCoA in London. He was Honorary Archivist of the RCoA for 2012-15 and through his enthusiasm the 'Lives of Fellows' project was established – with encouragement to HAS members to contribute. Over the years Tony has published over thirty quality articles on the history of anaesthesia, many in peer-reviewed journals.

The late David Zuck said there were two criteria for the distinction of honorary membership of the HAS: contributions to the study of the history of anaesthesia, and service to the Society. On this basis I can think of no one more deserving than Tony for election to our Honorary Membership, and it is my great pleasure to make the nomination.

Dr A.G. McKenzie

President, History of Anaesthesia Society

Citation for Honorary Membership of the History of Anaesthesia Society: Dr John Pring

John Pring qualified in medicine at the London Hospital in 1971. He proceeded to do two years in obstetrics and gynaecology, followed by a year in anaesthetics – during which he passed the DObstRCOG. He then left London for a year of general practice in North Devon, during which time he studied Lee and Atkinson's *Synopsis of Anaesthesia* and passed the DA. Chapter 1 in *Synopsis* kindled his interest in anaesthesia history and then he used Bryn Thomas' *The Development of Anaesthetic Apparatus* to prepare for the FFA vivas. He was rewarded by getting (in his words) "a Vernon Harcourt chloroform inhaler and a handful of easy marks!"

John is a founder member of the History of Anaesthesia Society (HAS). He started attending meetings of the Society in 1991. At the Guernsey meeting in June 1994 he presented *"Davy and the blue gas"*. He extended this at the next meeting, which was in December 1994 (held jointly with the Royal Society of Medicine in London). The title was *"The oxides of nitrogen and their early history"*. In 1996 a version of this paper was published in French: *Cahiers d'Anesthesiologie*.

John was elected to the HAS Council in 1997 and the following year stepped up to the role of Hon. Treasurer and Membership Secretary. Remarkably he ably held this office for ten years until 2007! He always had a humorous anecdote or two up his sleeve!

By the acclaim of the membership, John became President of the Society in 2014. This was a difficult time in terms of dwindling numbers of delegates at meetings – in common with most of the smaller medical societies. He organised the 2015 summer scientific meeting in the very pleasant location of Falmouth, where the Nankersey Male Choir performed at the dinner.

John passed on the Presidential Badge at the 2016 summer meeting in Iffley, but early in 2017 owing to the unfortunate ill health of the incumbent, he calmly resumed the Presidential rôle until the June meeting – where he handled the fast-track election of the next President with aplomb.

It is my great pleasure to recommend John Pring for Honorary Membership of the Society.

Dr A.G. McKenzie

President, History of Anaesthesia Society

Citation for Honorary Membership of the History of Anaesthesia Society: Dr Henry Connor

Henry Connor attended the University of Cambridge and the Westminster Hospital Medical School and proceeded to become a Consultant Physician, specialising in acute medicine, diabetes and endocrinology. From the start he developed his interest in the history of medicine. In 1969 he won the Association of Anaesthetists' Undergraduate Essay Prize, of which he was notified by a letter signed by Aileen Adams. Extracts of this *"Anaesthesia and the British public 1846-56"* were published in the journal *Anaesthesia* early in 1970.

Henry began to attend meetings of the History of Anaesthesia Society (HAS) from 1996, when at the summer meeting in Plymouth he presented a paper on the use of chloroform by the British Army during the Crimean War. In the following years he presented many more papers to the Society, always well researched. In 2004 he was elected to the Council and in September 2006 he organised the scientific meeting in Great Malvern. He remained a Council Member until 2009. In total he has contributed 13 papers to *The History of Anaesthesia Society Proceedings*. In addition, he produced a supplement to the volume of 2014 *"From Serendipity to Science: how anaesthesia contributed to the origins of pharmacology"*.

Henry presented papers at the 4th, 6th and 7th ISHAs. He has also published many papers and letters on the history of anaesthesia in: *Anaesthesia*, *Medical History*, the *Journal of the Royal Society of Medicine* and the *Journal of Medical Biography*.

However, Henry has a broad interest in the history of medicine. He has presented six papers to the British Society for the History of Medicine between 2005 and 2017, of which only one was related to anaesthesia. Also, he has published many papers in the *Journal of Medical Biography* on topics unrelated to anaesthesia.

Henry was elected President of the HAS at the summer 2016 meeting in Iffley. There he delivered the Blessed Chloroform Lecture. Sadly, he was beset by ill health early the following year and nobly stood down from the Presidency. Showing great resilience after surgery, he continued to support the Society in every possible way.

It gives me great pleasure to nominate Henry Connor for Honorary Membership of the Society.

Dr A.G. McKenzie

President, History of Anaesthesia Society

Correspondence

Sir;

I greatly enjoyed reading the paper by Peter Farling on neuroanaesthesia in the Proceedings for the Edinburgh meeting 2018 Volume 51. However I would have to disagree with the statement that Andrew Hunter was the first to publish a book on neuroanaesthesia, which he did in 1964. Bob Ballantine and Ian Jackson from Barts had written what I believe is the first such text called "*A practice of general anaesthesia for neurosurgery*" which was published by J & A Churchill Ltd , London in 1960. Bob and Ian were working on a second edition during the next few years and were very disappointed when Hunter's book was published in 1964 by Blackwell and Churchill decided not to proceed with a second edition in competition. Hunter references their book in Chapter 13 in relation to 'The control of bleeding' so he was certainly aware of it. Ian Jackson remained slightly annoyed about this even in the mid-1970s when I was a registrar at Barts!

Kind regards

David Wilkinson