

**THE HISTORY OF
ANAESTHESIA SOCIETY**



Volume 6a

Proceedings of the July 1989 Meeting
with the Scottish Society of Anaesthetists
University of Edinburgh

Editor Dr D.J.Wilkinson.

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The History of Anaesthesia Society

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PROCEEDINGS OF THE HISTORY OF ANAESTHESIA SOCIETY

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the History of Anaesthesia Society
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JAMES YOUNG SIMPSON

Dr N.H.Gordon

'Pain', wrote Galen in the second century, 'is of no use to the pained.' The attitudes prevalent in the early nineteenth century certainly did not concur with Galen and pain was considered to be of physical as well as of moral benefit to the individual. However, the patient dreaded the pain of surgery and scenes such as the following were commonplace: 'The patient would be dragged screaming from the ward and held down by grim force on the operating table until leather belts were buckled tightly across the squirming body and writhing limbs.'

It therefore followed that the surgeon's reputation was usually based on his speed rather than his skill with the knife. James Young Simpson's contribution to anaesthesia, when viewed in this context, was much greater than simply his use of ether and chloroform in obstetrics. By philosophical argument he changed the theological, the medical and the public's attitude to pain.

James Simpson was born on 7th June 1811, the eighth child of a baker in the village of Bathgate, west of Edinburgh. (His middle name, Young, was adopted after his qualification). In 1825, aged 14, he walked the eighteen miles to Edinburgh University, enrolling in classes in Greek, Latin and mathematics. In his second year he changed to medicine, serving in due course, as dresser to Robert Liston. His ambitions were severely tested when he witnessed an operation, a breast amputation on a Highland woman. With an instrument like a bill-hook, Liston lifted the soft tissue and swept around the mass with two clean cuts. Unable to watch the horror on her face, Simpson left the room to enquire about a career in law but unlike Charles Darwin in 1828, Simpson returned to medicine.

Early career

He qualified as a Licentiate of the Royal College of Surgeons of Edinburgh in 1830 and after a spell in rural practice, developed an interest in pathology. His MD thesis 'Death from Inflammation', attracted the attention of the Professor of Pathology. Simpson became his assistant and at his suggestion, developed an interest in obstetrics. He began to lecture on pathology and midwifery in the extra-mural school and, to support himself, established a modest private general practice.

He first made his mark with his Presidential address to the Royal Medical Society entitled 'Diseases of the Placenta' which was published in a number of languages. When he made his first European tour in 1835, wherever possible visiting hospitals, his name was already widely known and that at the age of twenty-four.

The practice of obstetrics was still very primitive. The maternal death rate was one percent. Blood letting, purgation and opiates were common

remedies and lard was the answer to the tedious labour. Teaching of the subject was confused and quackery, superstition and incompetence were rife. It has been said that 'Simpson adopted obstetrics when it was the lowest of medical arts: and left it a science'.

As his own obstetric practice grew, Simpson began to explore new means of pain relief, including Mesmerism. He also set his sights on the Chair entitled 'Medicine and Midwifery and of the diseases of Women' established in 1726 by the Town Council to which it, and not the University, made the appointment. When it became vacant, Simpson threw himself with the utmost energy into what became a very public campaign, even bringing forward his intended marriage to make himself more eligible as a candidate. At the age of twenty nine, in 1840, he became the fourth professor.

He was a compelling teacher and his classes were always overcrowded. This was due to his meticulous research of his subject and especially to his style of lecturing in which he shared his experience and discoveries with his audience, in contrast to the dogmatic form of delivery more typical of the age. He wrote copiously, and using his ability to marshal facts, employed statistics in his papers. Only days after the wooden paddle steamer 'Acadia' berthed at Liverpool, accounts of ether were carried to Dumfries and London. On hearing the news, Simpson travelled to London and stayed with Liston and no doubt observed its use. A contemporary account records Simpson's reception:

'he breakfasted with the Secretary of war,
had tea and an egg with the Premier,
and dined with the Mistress of the Robes.'

His reputation and status in society were such that he was about to be appointed as the Queen's Physician and Accoucheur in Scotland.

It was on the 19th January 1847 that Simpson first used ether to relieve the pain of labour, and he was soon to be using it for almost all his cases. Dissatisfied with the limitations of ether, Simpson set about the search for a better agent. He and his assistants experimented with a variety of substances obtained from both the University and the Chemistry Department as well as from local manufacturing chemists. Chloroform had been independently described in 1831 and 1832 and its chemical and physical composition analysed by Professor Dumas in Paris, in 1835. In 1842, Dr Mortimer Glover MD of Edinburgh discovered its narcotic properties in animals but dismissed it as being too dangerous.

The first chloroform anaesthetic

Chloroform was in use in Liverpool in a dilute oral form as a stimulant and antispasmodic for asthma, and it was from there that Dr David Wardie, another Edinburgh graduate, suggested to Simpson that he should experiment with it. A supply was obtained from the local chemists, Duncan and Flockhart. It was on the evening of 4th November 1847, in the dining room of his house in Queen Street, that James Young Simpson and his assistants, George Keith and John Matthews Duncan slid unconscious onto the floor under the influence of chloroform. On 8th November,

Simpson used chloroform on an obstetric patient, Jane Carstairs, a doctor's wife.

On 9th November Simpson was to have used it for a patient of Professor Miller who had a strangulated hernia but, fortunately for the reputation of chloroform, he arrived too late. The incision was made without anaesthesia and the patient died before the completion of the operation. On 10th November, Simpson did give chloroform for three surgical operations, one of which was on a child of six years. All were successful, and by chance, Professor Dumas was present. On the evening of 10th November Simpson read an account of the new agent to the Edinburgh Medico-Chirurgical Society. On 15th November he published this as a pamphlet quoting the use of chloroform in over fifty cases. Sales of this pamphlet were counted in thousands. On 20th November he published an account in the 'Lancet'.

Throughout 1847, Simpson had been a target of attack, first because of his use of ether and then because of his enthusiastic introduction of chloroform. 'My conduct' wrote Simpson, 'in introducing and advocating anaesthesia in labour has been publically denounced as an attempt to contravene the arrangements and decrees of Providence'.

His opponents argued variously that : 'Sickness and disease were punishments meted out by the heavenly father to sinful man and his even more wicked woman'. 'Anaesthesia was unnatural and unnecessary. How could a mother love her child if she did not suffer for it ? After all, pain was of moral value, to be borne unflinchingly'. 'Anaesthesia was a breach of medical ethics, and it was an act of cowardice to avoid pain.'

Even the eminent obstetrician, Professor Meigs, of Philadelphia, wrote: 'I have always regarded labour pain as a most desirable, salutary and conservative manifestation of the life force. Actually pain did woman a lot of good.' The most vociferous attacks of all came from the clergy; typically: 'Chloroform is a decoy of Satan, apparently offering itself to bless women, but, in the end, it will harden society and rob God of the deepest cries for help which arise in time of trouble.'

Similar criticism was directed at anaesthesia for surgical operations and even to the extent **that to lose consciousness was to be losing moral control of oneself**. Simpson wrote a detailed rebuttal of the religious, moral and medical objections to the use of anaesthesia in obstetrics and surgery, publishing it in pamphlet form. The bible was the major weapon of attack. Simpson countered by showing that the interpretation of the curses on man and woman which resulted from Original Sin in the Garden of Eden, were hypocritical and, we might say today, sexist. Man had been cursed thus: 'In the sweat of thy face shalt thou eat bread, till thou return unto the ground; for out of it wast thou taken: for dust thou art, and to dust shalt thou return.' Simpson argued: 'If man had to earn his bread by the sweat of his face, then the labour saving devices, animal or mechanical, must also be sinful.' and also: 'if man is intended to return to dust, is not the physician (inevitably male at the time) interfering with God's will when he postpones death by his professional skills?' In other words, man had acceptably circumvented this part of the Curse, but when it came to anaesthesia, especially in

woman, this was not the case. A favourite line of attack was the text in Genesis, chapter 3, verse 14: 'Unto woman he said, I will greatly multiply thy sorrow (itztahohn); in sorrow (etzebh) thou shalt bring forth children.'

Attack and defence

This time Simpson took to literal interpretation himself and studied the derivation of the English language bible, especially the origins of the English word 'sorrow'. Turning to the Hebrew text, he showed that the verb 'itztahohn', and the noun 'etzebh' refer to physical exertion, toil or labour but not in any way to pain or agony. He ridiculed those moral attitudes which demanded no interference with 'natural' processes: why did man's skin require to be clothed, why did his digestion require food to be cooked, why did his legs require horses or carriages? When challenged by an Irish woman that it was unnatural for him to take away the pains of labour, Simpson retorted: 'How unnatural it was for you to have travelled from Ireland to Scotland, against wind and tide, in a steamboat.'

To those doctors, reluctant to adopt inhalational sedation or anaesthesia, he pointed out that: 'there is no greater impropriety or sin in producing sleep and freedom from pain by exhibiting a medicine by mouth, than by exhibiting it by the lungs. Attitudes, as they had been with the introduction of inoculation by Jenner, were slow to change, much in contrast to the impatience of Simpson. He certainly wasted no time applying and publicising his discoveries: from personal trial to the obstetric use of chloroform within four days. Another two days and he had persuaded his surgical colleagues of its advantages and read a paper on it. Advertisements offering chloroform for sale were just as quick in their appearance.'

A case Simpson records on the 21st November illustrates the confidence he had in chloroform: 'Labour started at 10pm. Chloroform was exhibited (as he described it) from 6am with the delivery completed at 7 pm. The depth of anaesthesia was varied to suit the degree of pain and the mother thought she may have dreamed but felt no pain herself. The baby required some encouragement to breathe, but both baby and mother obviously survived thirteen hours of anaesthesia without any ill effects.'

Simpson wrote to British and Continental hospitals for statistics to demonstrate the fatal effects of prolonged and severe pain. In the Dublin Lying-In Hospital, the maternal mortality rate rose from 0.3% with labour of less than two hours to 9% with labour of over twenty hours. Anaesthesia not only reduced the stress of pain but allowed earlier and greater obstetrical intervention.

Amputation of the leg was a common operation following trauma, especially that associated with the machinery of the industrial revolution. Simpson showed that with the use of anaesthesia, the mortality rate fell from 45% to 25%. The first recorded death associated with chloroform was that of Hannah Greener on 24th January 1848. A toenail was being avulsed. Simpson is open to criticism for the way he

dismissed the possible toxicity of chloroform, arguing instead that the fault lay with the way it was administered or with impurities of manufacture. He put the few deaths into a statistical context: 'If chloroform did produce one death, was it right to give it up? Every medicine listed in the pharmacopoeia would have to be scrapped'. (242 deaths had been recorded in 1844 as a result of poisons, all of which had been medicinally prescribed).

He recognised the need for a smoother induction of anaesthesia and advised on the best method of achieving this. It is interesting to note that he recommended the administration of oxygen when a patient did collapse under chloroform, although it is not clear as to how this was to be done. With his popularity and his clinical reputation, the services of Simpson were in great demand and he travelled the length and breadth of the British Isles. He revelled in this entree into aristocratic circles but, at the same time, he never neglected the poor of Edinburgh and never charged a fee. His own house was said often to be more like a nursing home or an hotel with the number of patients who would accept his hospitality.

Honours from many countries were heaped on Simpson. At home, these included a knighthood and, in 1866, a baronetcy confirming the nationwide admiration and the respect in which he was held. It was on his death on 6th May 1870 that the fullness of the affection of the Edinburgh citizens became evident. For his funeral, work in the city came to a halt. Two thousand dignitaries and friends formed the procession and it is said that eighty thousand people lined the route. An offer of burial in Westminster Abbey, a rare honour, was turned down in preference for the family burial ground in Warriston cemetery where five of his own children already lay buried.

Simpson continues to be honoured, but more by obstetricians and less so by anaesthetists. Surely this is a deficiency when it was Simpson who, as well as being a pioneer, fought and won the battle for the acceptance of anaesthesia. In the words of Disraeli: 'One of the greatest legacies of any nation is the memory of a great man and the inheritance of a great example.'

EDINBURGH 1850-1900

Dr J. Wilson

In the 1850's James Young Simpson virtually left the anaesthetic scene in Edinburgh, except for a few further experiments, usually with the less attractive agents such as carbon tetrachloride. Chloroform was established as the anaesthetic and its surgical exponents were totally satisfied with what they had: a rather non-scientific method of administering the agent - the most potent in the field both then and up to the present day - in variable doses, with the cheapest, simplest and most portable apparatus which they also considered the most hygienic.

Thomas Skinner,¹ a surgeon of Liverpool, an admirer and former student of the redoubtable Professor James Syme, said in 1873: 'If there be an evil more crying, more disgusting, than another in the practice of inducing anaesthesia, it is the use of inhalers.... There is not one inhaler, my own excepted, where every patient is made to breathe through the same mouthpiece, tube and chamber Sweet seventeen is made to follow a bearded devotee of Bacchus, saturated with the smoke of cigars and exhalation of cognac; the mouthpiece in time becomes loaded with grease and filthy enough to upset anyone's digestion and sleep for a considerable time to come..Speak of refinement! We turn up our noses if we have not a clean table napkin every day, if our knife, fork, spoon and plate be not clean or changed after every dish or course at dinner; ...but when we come to inhalation..after 25 years' experience....we remain the merest barbarians, everyone breathing after his neighbour. These remarks do not apply to such inhalers as those which are extemporised out of a bedroom towel, linen, flannel, sponge and the like, all of which are readily renewable or easily washed clean.'

The original Edinburgh method of chloroforming was variously described² by surgeons and obstetricians such as Syme, Lister, Moir and Simpson. It and was essentially a piece of cloth, single layer or folded, laid



The original Edinburgh method for chloroform

across the patient's face as a reservoir and vaporiser for the volatile liquid, with part raised by the fingers or pin to keep the liquid out of the patient's eyes. (Figure) Yet this simplest of designs persisted into the twentieth century, as the mask described by Cathcart in 1923 showed. A generic resemblance exists with the Schimmelbusch mask which was still in evidence at least in British obstetric practice until the 1970s! Apart from the obvious merits of portability, ease of replacement and cheapness, it was claimed to be safe as the agent could be titrated on to it or delivered as a large single dose to overwhelm quickly the most resilient patient. Lister claimed that the method limited the available concentration of chloroform to 4.5%; that was less than the 5% vapour which John Snow claimed was the level above which primary cardiac failure might precede cardiac arrest. In fact my colleague and fellow author, Barry Howell of Hull, showed that a concentration of 10% could be obtained by this method. Today we know this to be a colossal strength of a drug which is much more potent than any in use today and which in concentrations a tenth of that then obtainable could cause marked cardiac and respiratory depression. In addition the conditions of administration then left much to be desired in regard to fresh air supply and the recipient's respiration.

Early teaching

The control of anaesthesia in Edinburgh was jealously retained in the hands of the surgeons and obstetricians and one of their number, Edward Lawrie³, a protege of James Syme, who was to find fame of a kind through the Hyderabad Commissions on chloroform which he convened, put it thus: 'Is it that a surgeon is no longer responsible for the safety of the patient but that the responsibility is to be shared by the man who gives chloroform or ether? In certain eventualities is the anaesthetist to dictate to the surgeon so that the surgeon becomes a mere operator, a subordinate instead of a chief, who under all circumstances, retains the supreme command and the entire responsibility is in his own hands? This constitutes, in my opinion, the tendency to the degradation of surgery against which all surgeons should guard with all their might.'

One advantage of the Edinburgh method and its jealously guarded control, was its teaching. Over the 50 years from 1850 to 1900 its theocratic teaching remained in the hands of two professors, of Clinical and Systematic Surgery, who between them gave all of the four lectures per year on the subject, one of these lectures lasting all of ten minutes! The practical side of anaesthesia teaching consisted of either being one of up to 400 people allowed access to the operating theatre to watch a house surgeon, a dresser, a clerk or even a porter give an anaesthetic at the behest of the surgeon, or being the one selected, probably for reasons of expediency, to be the administrator.

Preparation of the patient for surgery in those days is worth considering. Indifferently, they might be starved for a few hours and some might be given some Dutch courage if the forthcoming trial was liable to prove too much for them. Then further to protect them from the sight of the throng awaiting them in the theatre, some would have their anaesthetic induced in bed in the ward. They would then be lifted on to a litter (sometimes referred to as a basket) to be transported to the

theatre with the anaesthetic still being given. James Stewart, a Canadian anaesthetist recalled this in a paper given to colleagues in 1914⁴: 'the patient was **carried** in the basket as was our custom, by four students. The way led **through** a long dim corridor echoing with the sound of many feet. The student **who** was giving the chloroform could not hear the patient's breathing nor see his face very clearly; indeed I was told that the towel on which the chloroform was poured lay on the man's face all the way; when he was lifted on to the table, he was dead.'

Stewart implied in this paper that the Edinburgh method of chloroform administration afforded greater safety for the patient and that mortality would have been higher with different agents and more elaborate techniques. Other anaesthetic agents required closer and more precise monitoring and more comprehensive teaching than the syllabus allowed. This is probably the case and the use of other techniques and agents have led to the anaesthetic specialisation which was not high on the Edinburgh surgical priorities at that time.

Mortality and morbidity

Deaths did occur but were surprisingly few until the expansion in operating allowed by antiseptics came along in the '70s. In retrospect, there will always be controversy over the cause of these deaths; the importance of primary cardiac failure (whether invoked by over or under administration of chloroform), cardiac failure secondary to respiratory insufficiency, asphyxia due to poorly maintained airway or the result of vomited or regurgitated stomach contents will never be agreed. The descriptions of induction remaining today bear testimony to all these possibilities and make dramatic reading, for example: 'The patient's face grows leaden and pale, sometimes with livid congestion about the mouth and nose.'

In some cases the vapour was given till the breathing became stertorous and the countenance cyanosed; sometimes the patient would yield easily but others would struggle and resist till overdosage and asphyxia caused them to succumb. In these cases death must have been a close companion as jactitations due to asphyxia replaced struggling and as one writer suggested as late as the 1880s, there **were** possibly more similarities between hanging and anaesthesia than appearance alone!

The **skill** and speed of the surgeons must have played a large part in the low mortality rate but probably a greater factor was the type of operations performed. A breakdown of the operations performed in 1847, the last year of operating in the old Infirmary, shows that of the total of 1,040, a huge proportion are minor by any criteria and only a few are not on appendages and other peripheral sites. Amputation were common as were other joint excisions and drainage, excisions of both malignant and non-malignant tumours and surgery for the trauma of railway and mining accidents. Joseph Bell in 1892 said⁵: 'the lightning-like speed of Liston and other great operators in the pre-chloroform days still lingered as a tradition.... confidence in anaesthetics and still more the devoted worship of the antiseptic fetiche have tended to make an operation a very long business. By the time the spray engine was got together in 1892 and the injured limb laved and scraped and shaved and

bandaged and every little vessel was tied and lotions at various temperatures were lavished on it by the time drainage tubes were adjusted, double rows of sutures of various materials accurately inserted the surgeon was well into his second hour, and the patient, chilled, over anaesthetised and exhausted was put to bed to die the next day without ever having a decent pulse.... It is quite possible with smart assistants to amputate both thighs and have the patient back in bed in considerably under half an hour!

Great changes in surgery were occurring with refinements in techniques allowing mastectomy, for example, to progress from a simple excision of the tumour with a small area of surrounding skin to deep and extensive dissection to include lymph glands and muscle below. Lithotomies and aneurysm operations decreased, mainly because better medical treatment avoided the necessity of operations.

Other influences on anaesthesia and surgery were improvements in hospital building design and in nursing care. The Royal Infirmary of 1853 housed 205 surgical beds with two operating theatres which were only used between noon and 1pm for elective cases, unless they were part of a clinical lecture, and if the surgical team were not present by ten minutes past noon they lost their slot to the next surgeon in line. With the move to Lauriston Place the accommodation for surgical beds rose to 279 and the number of theatres to four at least. The number of surgeons remained at thirteen, the number agreed with the College of Physicians in the eighteenth century, but the greater utilisation of the larger number of theatres allowed an expansion of almost four times in the operative throughput! This improvement in the numbers operated on was also aided by better facilities for patient care and this is reflected in the hospital expenditures of the two periods. The average stay was longer but considerably cheaper in 1854 (42 days at 52 shillings 10½ pence) compared with 1891 (25 days at 87 shillings 3½ pence), and surgical dressings were blamed for much of this difference; a rise by a factor of 10 times occurring in this item, from £286 to £2,821 per annum. The cost of chloroform never figures in these balances as it would be a mere fraction of these costs. In truth, it was not only a simple, portable, easily taught and 'hygienic' means of anaesthetising, it was also very cheap.

Nursing services

The Crimean war of the 1850s caused Edinburgh to lose several of its budding surgeons who volunteered for war service but then fell to cholera. On the credit side, the war brought Florence Nightingale to the fore and gave her the power to change the face of nursing forever and give Edinburgh her great nursing tradition and cause some of the changes in its hospital buildings. Today, anaesthetists rely on the support of the nursing profession (often nurses with special training) in the anaesthetic room, the theatre, the recovery room and in the ward both pre- and post-operatively. The situation in Edinburgh was quite different in the first six decades of the nineteenth century. Joseph Bell, who was a house surgeon to Professor Syme in 1854 and a surgeon in charge of wards in the 1890s noted:

'For the 72 patients I as house surgeon had to look after, distributed in six wards and six little rooms, the nursing staff consisted of nine women, aided in an emergency by the possible services of a drunken old porter who looked after the waiting room. The nine women were : two staff nurses each with about 36 beds to look after, and seven so-called night nurses who also had to do the scrubbing and cleaning of the wards and passages. The two nurses, Mrs. Lambert and Mrs. Porter, were wonderful women....of immense experience and great kindness....probable that no two finer specimens of the old school nurse could be found. All honour to their pluck and shrewdness! But the other seven,- poor old useless drudges, half charwomen, half fieldworker, rarely keeping their places for any length of time, absolutely ignorant, almost invariably drunk, sometimes deaf, occasionally fatuous, - these had to take care of our operation cases when the staff nurses went off duty. Poor creatures, they had a hard life! Their day's work began at 11pm when, in a mournful procession, each with a blanket round her shoulder, they walked to the wards from a dormitory, so-called, in the East end of the grounds.

'There, they were supposed to keep up the fire and nurse the patients until 5am when they had to set about cleaning the wards, scouring the tins and preparing for the patients' breakfast. During 'the visit' they used to prowl about and help at the meals of dinner and tea, and it was not till 5pm that they were allowed to trudge back to the dormitory. What wonder that at night they snored by the fire and when an accident came in, their bleary eyes and stupid heads were of little use except to rouse up one or two tired house surgeons to help the one on duty. Serious operations were doubled in risk by want of ordinary care haemorrhages were unnoticed, amputation cases allowed to rise from bed,; indeed a zealous house surgeon had his heart ready broken by their unwisdom and neglect The matron was a housekeeper and kept a baker's shop and knew no more of real nursing than the poorest of the scrubbers. Dressers volunteered to look after patients following big operations, on four hourly watches, and these patients were watched, fed and looked after for the first few days.'

Changes in nursing were attempted in the 1860s but these were mainly in training the untrainable and it wasn't until the 1870s that real change and improvement occurred in nurse organisation with the development of a career structure and the selection of vocationally oriented girls. In 1872 a Lady Superintendent of nurses was appointed with four acting superintendents, (two for day and two for night duty) 11 staff (head) nurses, 12 assistant nurses, 16 night nurses and 20 probationers. By 1881 their day was organised as follows: rise at 6am, breakfast at 6.30 am, ward at 7am luncheon and tea in their own rooms on the wards, dine in the 'nurses' home' at 3pm, supper and prayers at 8.45pm and bed by 10.30pm. Two hours were allocated 'off duty' each alternate day and friends were only to be seen in those afternoons. A one day and one half day holiday were allowed each month. Night nurses rose at 7pm, breakfasted at 7.30pm, prayers at 8pm and attended the ward from 8.30 pm to 9am, then had dinner at 9.15am exercised from 10.30 to 11.30am and were in bed by 12 noon. They got one day's holiday per month. All nurses got two weeks holiday per year. This was no sinecure but was a vast improvement in patient care. It is hardly surprising that the cost of nursing rose from £1,100 in 1854 to £4,000 in 1892. It is amazing that

the rise was not more, considering the increase of the workforce and must reflect on the vocational attitude of the new generation of nurses and also perhaps on their socio-economic backgrounds.

Status quo

In conclusion, it is salutary to observe what changes occurred in anaesthesia in the rest of the world in the period 1850-1900 when the status quo was Edinburgh's motto. Everywhere outside Scotland (Edinburgh in particular) vaporisers were introduced for volatile agents and some were very sophisticated. Nitrous oxide was reintroduced in Europe and the USA and oxygen was used with nitrous oxide. Klikovitch in St Petersburg even pioneered pre-mixed nitrous oxide and oxygen in 1881 as an obstetric analgesic and illustrated his papers with graphs of uterine activity, showing that nitrous oxide had no deleterious effect on uterine contractions.⁶ It is more salutary to reflect that, at the same time, chloroform was still in use some 30 odd years after its introduction without the benefit of any real scientific publications and that the same method of 'chloroforming' was still in vogue in the Royal Infirmary, Edinburgh around 1900!

Acknowledgements

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EDINBURGH 1900 - 1950

Dr A.H.B.Masson

The transformation of the anaesthetic scene which was started in the 1890s by Silk, Buxton and Hewitt, spread slowly to the rest of the country. In general, the dentists were much more progressive than their surgical colleagues. For instance, the two Scottish founder members of the Society of Anaesthetists, founded by Silk in 1893, were from the Dental Hospitals of Glasgow and Edinburgh. By 1900, when there were no anaesthetists in any of the Edinburgh surgical hospitals, the Edinburgh Dental Hospitals had several to supervise the administration of anaesthetics by students. It was not until 1901 that Dr T.D.Luke, who had sessions in the Dental Hospital, and Dr McAllum were appointed to the Deaconess Hospital and the Royal Hospital for Sick Children respectively.

New appointments

The surgeons in the Royal Infirmary viewed these new appointments with interest. At the end of October 1901 it was reported that 'a suggestion had been made that the Managers should appoint an Anaesthetist to the Infirmary, a proposal which met with the approval of the Surgical Staff but the Medical Managers Committee desired to meet and discuss the matter with the Surgical Staff before making any recommendation to the Board on the subject'. The suggestion had come from one of the gynaecologists and his letter detailed the advantages of having a 'special and qualified anaesthetist' rather than a senior student to give anaesthetics.

The letter was discussed by the powerful Surgical Staff Committee which consisted of the Senior Surgeons, headed by Professor Annandale who was Lister's successor in the Chair of Clinical Surgery. They met in Annandale's house and a majority, including Annandale, supported the proposal. Three, however, did not. Their reasons were predictable. One doubted if greater safety would accrue since most fatalities occurred in trivial or minor cases. 'It shifted responsibility and when fatalities occurred, it would be found that there was a dual control, no-one being personally responsible. It would reflect on members of the staff as having neglected their duty in giving suitable instruction to those whom they have permitted to anaesthetise the patients under their care. It would cause a serious loss of confidence in the relations between the staff and their patients.' But the nub of the matter was 'Above all it would lay those surgeons who could not or did not desire the services of the special anaesthetist open to blame and question. And once this disturbing element was introduced, there would be an end to the suitable education of the medical student and the anaesthetist's services would be almost obligatory in every case.'

As a result, the Managers reported in November that it had been agreed 'practically unanimously' that an Instructor on the administration of anaesthetics should be appointed to teach students and to give practical demonstrations on minor, though not major cases. This Instructor would

be empowered to grant a certificate to all students who attended his demonstrations and passed a satisfactory examination thereafter. They also recommended that all future candidates for the appointment of Resident Physician or Surgeon must hold a certificate of proficiency in the administration of anaesthetics.

The Managers approved these recommendations and remitted them to the Managers Committee to prepare and submit a set of Rules to govern the appointment. However, at the next meeting of the Board, it was reported that 'The Medical Managers had had a further meeting with the members of the Surgical Staff when these gentlemen indicated that they did not desire the appointment of an Anaesthetist who would be at liberty to demonstrate anaesthetics but merely a teacher on the subject' and, 'as matters of teaching are not dealt with by the Board', the whole matter was dropped. At the same meeting, a letter from Annandale was submitted requesting that Dr Luke be permitted to act as tutor of anaesthetics in his department. 'Dr Luke is a thoroughly skilled and experienced anaesthetist and will not in any way interfere with the patients or their treatment (but) simply give tutorial instruction to my class. His remuneration will be arranged by myself.'

Another of the Senior Surgeons had Dr McAllum appointed to his unit. As a result of the Board's decision however, these two anaesthetists had no official status in the hospital and they were not allowed to give or even demonstrate how to give anaesthetics. They were graded as Clinical Tutors, the equivalent perhaps of a Senior Registrar, the same as the Surgical trainees and because of this, they had to apply annually for reappointment. Moreover, although they were unpaid, the maximum term of office was five years.

Luke's five year term expired at the end of 1906. He had meantime been appointed as a University Lecturer but he complained to the Board that it was not possible for him to carry out his duties without access to the wards. The Managers were adamant. Despite the fact that Luke was manifestly not a trainee and was not even paid an honorarium by the Board, they agreed to reappoint him for only one year and that was 'for the convenience of Professor Annandale'.

Luke was intelligent, hard working and an excellent anaesthetist. A good teacher, he wrote two textbooks and he was popular. When his appointment was terminated, no fewer than thirty of his surgical colleagues wrote to the Board asking that he and McAllum be appointed as Instructors in Practical Anaesthesia with the same privileges as Physicians and Surgeons on the staff but this was categorically refused. So when Luke's protector, Annandale, died in 1907, Luke gave up anaesthesia and left Edinburgh. That ended the second attempt to get an anaesthetist appointed to the Infirmary.

A death; and 'Supervisors of Anaesthesia'

Four years later, there was a third attempt. This time the motivation was different. The Crown Office, with justification, was very critical about the circumstances surrounding the death under anaesthesia of an eight months old infant who had originally been admitted for a

circumcision. The anaesthetic had been given by the house surgeon. Crown Counsel directed that the matter and their opinion be brought to the notice of the Managers.

The Managers sent the letter to the Surgical Staff Committee which, after considering the matter, wrote to the Board that they believed that, 'in the interests of the Institution' the assistance of officially recognised anaesthetists should be obtained. Since the request this time was prompted by the report from Crown Counsel, it could not be dismissed quite so easily. The Managers recognised that it raised a very important and far-reaching question. If the suggestion of the Staff were carried out, the Minute reads: 'it would in all probability involve the Institution in expense in the shape of salaries'.

It was a year before they reached a decision. They recognised that 'in the Surgical wards, it is not always possible to ensure that a qualified medical man is available to devote his whole attention to, and to directly supervise the administration of, anaesthetics' but that 'it is desirable in the interests of the patients that this precaution should always be adopted'; and they decreed that such assistance should be afforded to each Surgical charge as well as the Out Patient Department. But they went on: 'They therefore recommend that the seven Surgical Clinical Tutors who at present have no official status on the staff of the Infirmary should be appointed to supervise the administration of anaesthetics at an annual honorarium of £15 each' - the Surgical Clinical Tutors! New regulations were promulgated which further stated: 'In cases of emergency and when the Supervisors of Anaesthetics are not available, the Resident Physicians and Surgeons shall be held responsible.'

Luke's colleague Dr McAllum, died in 1914 just after he had been elected President of the newly formed Scottish Society of Anaesthetists, the oldest national Society in the world.

For another twenty years there were no further attempts to have an anaesthetist officially appointed to the Infirmary. In practice, there was a very gradual change in that three were working as 'Supervisors of Anaesthesia' by 1920 and five by 1925 and the Board did not now limit the term of their appointments, but when in 1920, Dr J. Stuart Ross, a University Demonstrator, resigned to take up another appointment, the Board minutes note that 'by the regulations, the Clinical Tutor is the person to occupy the post of Instructor and the appointment of Dr Ross was made by special arrangement'.

Where anaesthetists were appointed, they had been specifically requested by a Senior Surgeon and they worked only for him. They were all dentists or general practitioners because anaesthesia in Edinburgh did not generate a sufficient income to allow them to survive on that alone. They did not do any of the emergency work and that was what prompted the next attempt to get a proper appointment. Once again, the move seems to have been triggered by the Crown Office. In 1931, the surgical staff asked the Managers to appoint two resident anaesthetists 'who would be available at any hour of the day or night' and suggested that two nurses might be trained for this special work. The Medical Managers

rejected the idea of nurses and asked the Board to authorise the appointment of one anaesthetist for night work.

Unsupervised anaesthesia

A short time after this request was received, the Board got a letter from the Crown Agent which read: 'I am directed by the Lord Advocate to draw the attention of Hospital Authorities and members of the medical profession to the danger of allowing unqualified medical students to administer anaesthetics in cases in which the administration of the anaesthetic is not under the immediate personal supervision of a qualified medical practitioner.'

It appears from a case which has recently been under his Lordship's consideration that the supervision so exercised may on occasion be merely nominal and that the qualified person may not be present in the room where the patient is being anaesthetised..... His Lordship recommends that in no case should an unqualified person be permitted to administer an anaesthetic except in the presence of a qualified medical practitioner and under his immediate personal supervision.'

Where this death occurred I do not know but it could have been in the Royal Infirmary because over the years there were many deaths there. They included 'died while being chloroformed in preparation for an operation for whitlow', 'died during an operation for varicose veins', 'died before operation', 'died of heart failure preparatory to an operation being performed' and many more. These were all considered by the Medical Management Committee before being reported to the Procurator Fiscal and in none was any blame attached to the person giving the anaesthetic. The minutes solemnly declared in each and every case that the anaesthetic was carefully administered and everything possible was done for the patient. A memorandum produced and circulated by the Medical Superintendent about that time is typical. It is self-congratulatory rather than critical and purports to show that the deaths per thousand anaesthetics had not increased over the years. In no case did the Board discuss or comment on the circumstances of any specific death.

The figures are interesting. In the 8 years from 1921 to 1929, there were 74,769 operations with 80 deaths, almost exactly one death per thousand operations. The memo then stated: 'Of the 80 deaths four had been cases of acute emergency and if this number were deducted, the average proportion of fatalities fell to 0.74 per thousand'. However, not all the deaths were included. Thirteen were excluded because they did not have a general anaesthetic and six because the total number of administrations was not known!

The administrators

To return to the request for an anaesthetist for emergency work. An advertisement was placed for an anaesthetist to work every night for an honorarium of £200 per year. Dr Sheena Watters bravely applied and was appointed. Although she was the first person appointed to the Royal as an anaesthetist, her status was far removed from that of the physicians

and surgeons. Problems soon arose when she had the temerity to go on holiday and a locum had to be sought. It was manifestly impossible for one person to do this night work all year round and, within a year, the work had been split into sessions and divided among three people. The honorarium was increased to £350 per year, shared by the three, ie a person working two nights a week, every week for a year was paid £100!

It should not be thought that the Royal Infirmary was unusual in its anaesthetic mortality or in its attitude to anaesthetists. As an example of the state of affairs elsewhere in Edinburgh at this time: in 1935, 901 operations, 550 classified as major, were carried out in the Western General Hospital. But the first anaesthetic appointment to the hospital was not made until 1939 when Dr Frank Holmes, then recently qualified, was appointed as resident anaesthetist at a salary of £150 per annum. For holidays, he had to find and to pay for his locum.

One of the three anaesthetists appointed in 1933 to do the night work was Dr John Gillies who had left general practice in Yorkshire to take up anaesthesia in Edinburgh. His only certain income to support himself and his family when he came was a £50 honorarium from one of the hospitals. Between leaving Yorkshire and starting in Edinburgh, he spent some time at his own expense in London with Ivan Magill and others. In 1934, Dr Torrance Thomson, a distinguished anaesthetist who had introduced Dr Langton Hower to nitrous oxide/oxygen anaesthesia in France in 1917 and who was Supervisor of Anaesthesia in the Professorial Unit, retired and John Gillies was appointed in his stead.

The effect of his arrival was immediate. Prior to that time records were kept rather erratically and techniques were limited to ethyl chloride/ether or chloroform/ether. From the day he started, the anaesthetic book was kept in meticulous detail with his name opposite at least one major case and that of a student, clearly under good supervision, doing the rest. The techniques were more varied - spinal (done by him, not the surgeon), intravenous agents and the first endotracheal anaesthetics, as opposed to endotracheal insufflation which had been done on rare occasions.

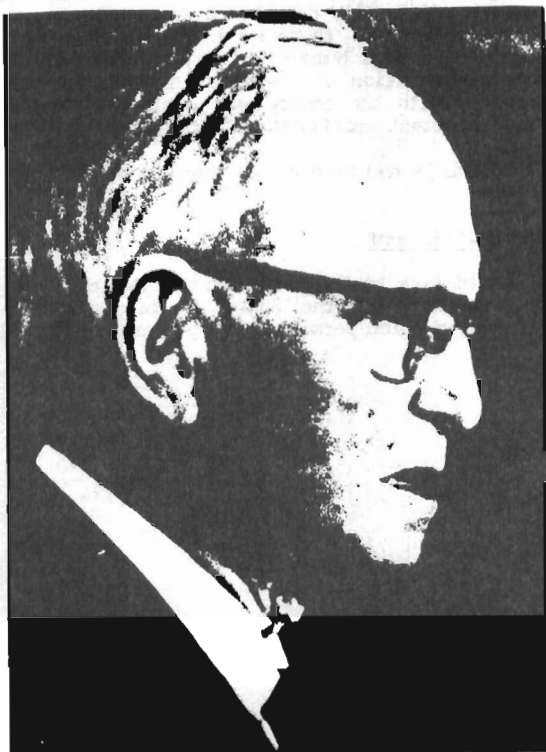
Even more significant was his impact on his colleagues. In 1938, the Honorary Staff Committee of the Royal Infirmary set up a subcommittee consisting of two surgeons and three anaesthetists. Dr Gillies, Dr David Middleton a dental surgeon - and Dr Benny Wevill recommended that the anaesthetist to each surgical charge should be recognised as a Lecturer by the University. They also recommended that there should be an anaesthetist for each surgical charge and that they should be represented on the Honorary Staff. These proposals were accepted and recognition was achieved at last.

The subcommittee further advocated the appointment of two fulltime junior anaesthetists for emergency work. So it was that Dr Wheeler and Dr Leslie Morrison were appointed in 1940, thus forming under John Gillies' tutelage, the original Department of Anaesthetics in the RIE. It was also the first Department of Anaesthetics in Scotland and one of the first in Britain.

Not everyone wanted their services. Some of the more elderly obstetricians were particularly resistant to an anaesthetic service and the Out Patient Department was still a troublesome area. In 1940, a proposal was made to appoint a fourth House Surgeon to that department to administer anaesthetics but this was over-ruled. Instead, a third resident anaesthetist, Alastair McKinley, was appointed. He, like the other two was, for a month, on probation without pay. Thereafter, 'provided his work was satisfactory', he would be paid £150 per year.

Postwar department.

In 1944 the Medical Management Committee for so long the centre of opposition considered proposals for the creation of a post of Senior Anaesthetist who would organise an anaesthetic service, act as Chairman of the anaesthetist staff and organise investigations for anaesthesia. The principle was agreed but as some of the potential candidates were away on service consideration was deferred until after the war. On July 6 1946, John Gillies was invited by a delegation from the Infirmary and the University to be Director of Anaesthesia to the Royal Infirmary and also Lecturer (later Simpson Reader) in Anaesthesia to the University. The Department which John Gillies started was one of considerable academic excellence. In its early post-war years no fewer than 7 future professors of



Dr John Gillies

anaesthesia worked there, and the work which Gillies and Harold Griffiths carried out on induced hypotension by total spinal sympathetic blockade was a major advance. He rewrote a 'Textbook of Anaesthesia' which was the sixth edition of a book first published by Luke and Ross.

Nationally and internationally, too, John Gillies made his mark. In 1943 he was elected to the Council of the Association of Anaesthetists and became its President in 1947. Probably at no other time in its history has that office assumed such importance because that was the year before the start of the National Health Service, when the terms and conditions of the various hospital specialists were under discussion. But these matters are outside my remit of 'Edinburgh 1900 to 1950'. Suffice it to say that the importance of John Gillies to Edinburgh and to the specialty in general was enormous. He shared, as he put it himself, in the rapid and striking progression of anaesthetic practice from a dubious restricted art to a broad-based comprehensive discipline. He fought for and obtained enhancement of the status of anaesthetists in a city traditionally hostile to anaesthetists; and he did it by obtaining the respect of those with whom he worked, by his gentle charm, integrity, good humour and a profound conviction of the importance of 'the integration of training in basic sciences, clinical medicine and surgery with the theory and practice of anaesthetic administration and its important ancillary, patient care.'

Anaesthesia had come a long way since 1900.

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I would like to thank the Lothian Health Board from whom I obtained the Minute Books of the Board of Management of the Royal Infirmary of Edinburgh which permitted the preparation of this paper.

SIGHTS AND SITES

Dr D.Wright

My title was chosen to encourage the compiling of a list of places in Edinburgh of historical interest to anaesthetists. As for definitions - a sight is a spectacle, an object of especial interest and a site is the situation, especially of a building. Some places I mention are indeed objects of especial interest in themselves: other places merely mark where something has been in the past. Knowing what was there, however, allows us to retain our historical perspective and may help us to preserve other pieces of our past.

In compiling my list I've looked at books, journals and maps and walked around town. I have a map* on which the sites are shown and on the back of this are some helpful hints about access and transport. All the places are within 2 or 3 miles of the University and several within ten minutes walking distance.

My list of places starts with two sites within 300 yards. The buildings do not exist but I have pictures of the houses as they were. Joseph Black lived at 58 Nicolson Street and James Syme ran a surgical hospital in Minto House.

Joseph Black

Joseph Black, one of the great figures of 18th century Scottish science, lived from 1728-1799 and was best known for his discoveries of carbon dioxide in 1754 and the principle of latent heat of 1762.

As one of the characters of Edinburgh medicine he was admired for his science, and for the general character of his life. He was described by Lord Cockburn as a 'striking and beautiful person, tall, very thin and cadaverously pale: his hair carefully powdered though there was little of it. He wore black speckless clothes, silk stockings, silver braces and either a slim green umbrella or a genteel brown cane. The general frame and air were feeble and slender. No lad could be irreverent towards a man so pale, so gentle, so elegant, so illustrious.'

'He died while sitting at table with his usual fare, a few prunes, some bread and a little milk diluted with water. Having the cup in his hand and feeling the approach of death, he sat it down carefully on his knees, which were joined together and kept it steadily in his hand in the manner of a person perfectly at ease, and in this attitude, and without a writhe on his countenance, he expired placidly, as if an experiment had been wanted, to show his friends the ease with which he could die.'

* Map available from the author at Dept. of Anaesthesia, Western General Hospital, Edinburgh on receipt of a S.A.E.

He lived for a number of years at 58 Nicolson Street and the house afterwards became the Asylum for the Blind in 1807. There has over the years been widespread change in this street and the site, about 100 yards south of the College of Surgeons is now occupied by a Co-operative supermarket. I think of Black when I go past because of the CO2 in COOP.

James Syme

James Syme moved into Minto House in 1829. Syme, who lived from 1799 to 1870, was Professor of Clinical Surgery from 1833 and is probably best known to students of the history of anaesthesia as the subject of scathing attacks by Stanley Sykes in his 'Essays on the First Hundred Years of Anaesthesia'. Earlier, in 1820, Syme had failed to get on to the staff of the Royal Infirmary when a vacancy arose. Piqued, he decided to open his own hospital, and collecting money by subscription, bought and equipped Minto House. It was, at this time, a 3 storeyed building of 15 rooms surrounded by a garden and situated to the north of Argyle Street. It overlooked the Cowgate with an entrance from Horse Wynd. Two house surgeons, John Brown and Alexander Peddie, paid Syme £100 each for the privilege of working with him and the hospital took public patients, particularly those involved in accidents. It rapidly became popular, developing an international reputation, and was a major factor in Syme's advancement to the Chair. John Brown became among other things, an author of some note, and is perhaps best known for his short story 'Rab and his friends', which poignantly describes an operation carried out in Minto House by Syme in those pre-anaesthetic days. In 1833 Syme was successful in his application for the Chair and Minto House closed as a surgical hospital, being a medical charity for some years until in 1852 it became, for 4 years, the maternity hospital. This was one of the six sites which the maternity hospital occupied between 1844 and 1879. Minto House was finally demolished during the construction of the present Chambers Street, which started in 1871.

In parenthesis we may consider where the maternity hospital was between 1846 and 1852. Milton House which, like Minto House, no longer exists, stood in the Canongate, to the east of Moray House near where Milton House school now stands. This is where the first hospital use of chloroform in obstetrics took place. By 1848 the hospital report, presented by James Simpson, was able to state: 'Since the use of chloroform became general, in the maternity hospital, shortly after the discovery of chloroform, 95 women in all have been delivered in this house under its influence... The women have been invariably found deeply grateful for the relief to their sufferings afforded by the anaesthetic influence of chloroform'.

Old and new surgical hospitals

Returning to Chambers Street, we find at either end sites of considerable antiquity, relatively unchanged, both of which are worth visiting. At the east end of Chambers Street, across the South Bridge, is Infirmary Street. Walking down Infirmary Street we come within view of what started its life as the High School and was converted in 1832 into what became known as the Old Surgical Hospital.

It was in this hospital that the first operation was performed using chloroform as an anaesthetic, with Professor James Miller as the surgeon and Simpson holding the patient, a 4 or 5 year old gaelic speaking child with osteomyelitis of the radius. Also attending were Robert Christison and, by chance, Professor Dumas of Paris (who had first ascertained chloroform's chemical composition in 1835).

The building started life on the 24th June 1777, the foundation being laid of what was to be the second High School (the first had been built in 1578). One of the first pupils in 1779 was the young (Sir) Walter Scott. By 1828 the school decamped to its third site, newly built on Calton Hill, and the disused school house was sold to the managers of the Royal Infirmary for £3500. It was adapted to form a surgical hospital and opened in 1832 with 32 surgical beds, an operating theatre having been built on the back. The New Surgical Hospital was added to the Old, when in 1853, a purpose built extension was opened with a further 128 beds. The Infirmary also purchased or leased other houses in and around the area of Surgeons' Square which was behind the old High School and it was in this complex of assorted and often unsuitable buildings that Simpson, Syne and Joseph Lister worked.

Today the buildings appear almost unchanged from the outside, the same patterns of lichen blackened stones are visible in three photographs spanning 136 years. The old surgical hospital is part of the University's Dental school and the new surgical hospital the Geography Department. The area behind the old surgical hospital was called Surgeons' Square and the Old Surgeons' Hall of 1697 still stands there. On the west side of the Square used to stand the dissecting rooms that Robert Knox used and which were supplied with bodies by the infamous Burke and Hare. Next door to this were the rooms of the Royal Medical Society.

These buildings - the old and new surgical hospitals and the old Surgeons' Hall can all be viewed from the outside and are well worth a visit, the atmosphere on a quiet weekend is most impressive. No noise but a clamouring of memories.

At the other end of Chambers Street is the Kirk of Greyfriars - the first church to be built after the Reformation and opened in 1620. The National Covenant was signed in the church in 1638 and many famous Edinburgh inhabitants were buried in the churchyard in succeeding centuries. Two graves of interest to anaesthetists are those of Joseph Black and Alexander Monro secundus. Black's is in a part of the churchyard now kept locked, but Monro's grave, with that of his father, is easily found by taking the path which goes due south from the south west corner of the kirk. The grave of father and son is a little way down on the right. Monro secundus (1773-1817) is known from our anatomy as the namer of the foramen of Monro but he's important for his thoughts on resuscitation.

William Cullen wrote a letter to Lord Cathcart 'concerning the recovery of patients drowned and seemingly dead' which was published in 'Journals of the Board of Police' in 1774.

'Dr Monro informs me, it is **very** practicable to introduce directly into the glottis and trachea, a crooked tube, such as the catheter used for a male adult. For this he offers the following directions. The surgeon should place himself on the right side of the patient and introducing the forefinger of the left hand at the right corner of the patient's mouth, he should push the point of it behind the epiglottis, and using this as a directory, he may enter the catheter, which he holds in his right hand at the left corner of the patient's mouth till the end of it is passed beyond the point of the forefinger and it is then to be let fall, rather than pushed into the glottis, and, through this tube, by a proper syringe attached to it, air may be with certainty blown into the lungs.'

Greyfriars Kirkyard has an atmosphere of its own. The older seventeenth century graves leave an eerie sensation with their carvings of skeletons and latin mottoes, usually of the 'Hodie mihi, cras tibi' type.*

Leaving Greyfriars, I would now like to consider the New Town. Although parts of the town seem quite unchanged, there is no trace of Alexander Monro's house in St Andrew's Square. He lived at 30 and 32 at various times. No.32 is now replaced by an Insurance Office and No.30 was on the site of what is now the entrance to the bus station.

Princes Street - Syme and Simpson

Princes Street has several sites of interest. James Syme was born at 56 Princes Street in 1799. The house is now replaced by a hotel. The Scottish Society of Anaesthetists was founded at the Balmoral Hotel on February 20th 1914. This was, I think, where Littlewood's store now stands to the west of the foot of the Mound. Just off Princes Street at the east end, on the North Bridge under the North British Hotel there is a plaque marking the site of Duncan and Flockharts' premises in 1847 when the chemists provided chloroform for Simpson. I have met and anaesthetised the daughter of the man who was reputed to have delivered this first bottle.

At the west end of Princes Street in the gardens on the south side of the street, is the statue of James Simpson. This was paid for by public subscription after his death, was sculpted by William Brodie and cast in bronze in London. When it was unshipped at Leith an arm came off but in 1873 it was unveiled by Lady Galloway before a distinguished gathering with due ceremony. It is not set off to advantage by its leafy surroundings but it has a certain attraction. There is irony in that it overlooks James Syme's grave in St John's Churchyard just to the west, Syme dying a few weeks after Simpson.

Syme's town house, at the peak of his powers, was 9 Charlotte Square and after his death the house was lived in by his son-in-law, Joseph Lister. Three houses close to this on the north side of Charlotte Square are now owned by the National Trust and it is possible to visit No.7 as a member

* For those who have little Latin, I believe this means 'today for me: tomorrow for you!' Ed.

(or for £1.70 per adult, 85p. concession, if not a member). Five rooms on three floors can be seen in No.7, called the Georgian House and these give a good understanding of what these houses were like, at least in the eighteenth century.

Moving out of Charlotte Street into Queen Street we come to No.52 which was the home of James Simpson from 1845 until his death in 1872. The house now belongs to the Church of Scotland, and they allow visitors in to see the downstairs front room, known as the Chloroform Room, where the experiments of 1847 took place. The ground floor was, in later years used as a consulting room for poorer patients, usually seen by Simpson's assistants, with the well-to-do patients being seen by Simpson himself on the first floor. The family lived in the upper reaches. The house must have seen some entertaining occasions during the 40's, 50's and 60's. Apart from chloroform and other post-prandial inhalations, people came from all over the world to see Simpson whose hospitality was proverbial. There were always visitors, coming for breakfast, for lunch and even for dinner though he tried to keep the evening meal a family affair. He eventually acquired in addition, a house in Trinity, to which he escaped at times for peace and quiet but it was at 52 Queen Street that he died on May 6th 1870.

He was buried on May 6th 1870 and a contemporary account tells the story: 'The day was warm and bright and vast crowds thronged every street from his house to the grave on the southern slope of Warriston Cemetery, and on every side were heard ever and anon the lamentations of the poor, while most of the shops were closed and the bells of the churches tolled. The spectators were estimated at 100,000 and the most intense decorum prevailed. An idea of the length of the procession may be gathered from the fact that although it consisted of men marching in sections of four it took upwards of 33 minutes to pass a certain point'

Warriston Cemetery is approached via Warriston Gardens which comes off Inverleith Row to the south of Heriot's sports ground. On entering the gates of the cemetery, there is a path leading almost due south off which several paths run to the east between lines of graves. Between the 4th and 5th paths from the gate, about 100 yards from the south running path, lies the Simpson family grave and it may be approached by via either the 4th or 5th path. The family grave is marked by an obelisk engraved with the names and dates of Simpson's wife and children. Several feet in front of the obelisk on plain sandstone, with a simple squared design is engraved 'Sir James Young Simpson, Bart MA DCL, born 1811 died 1870'. The grass grows high on either side and the last couple of times I've been there, there has been an aura of quiet repose, with a sense of damp decay and perhaps unintentional neglect.

If your thoughts at this point are rather miserable and morbid, there are one or two other places to visit on the way back to Edinburgh which might dispel the gloom.

Stockbridge was where James Young Simpson spent his early years. In his boyhood, and as a student, he lived with his brother, David Simpson, who was a baker and had a shop at No.1 Raeburn Place on the corner of Dean Street. When he first began to practise as a physician he moved a few

yards into town to a first floor flat at No.2 Deanhaugh Street. In 1840 he was living in No.1 Dean Terrace, a little nearer to town and it was to this flat that he brought his wife, just before he gained the Professorship of Midwifery.

Coming closer to the centre of Edinburgh we find No.3 Great King Street which was where Sir Robert Christison lived. Christison (1797-1882) was Professor of Medical Jurisprudence and then *Materia Medica*. Famous as a toxicologist, he chaired the committee which issued the first pharmacopoea of Great Britain and Ireland and is well-known for his pharmacological researches, on amongst other things, the calabar bean.

Finally, at 28 Heriot Row, we find the house of Sir Douglas McLagan, born in 1812 and died here on 5th April 1900. He was Professor of Medical Jurisprudence from 1862 to 1897 and was in earlier life a noted wit and raconteur. He wrote many poems or lays for medical dinners or occasions and these were published in 1850 as '*Nugae Canorae Medicae*' - Lays by the Poet Laureate of the New Town Dispensary.

In conclusion, though you may have been left with the feeling that one 3-4 storey Georgian building looks much like another from the outside, I hope that the people and the events that I've described have made this an interesting tour.

EARLY HISTORY OF ETHER AND CHLOROFORM ANAESTHESIA FROM WELSH NEWSPAPERS

Dr J.M.Lewis

Weekly Welsh newspapers printed in the 1847-1848 period are a wealthy source of information on the introduction of ether and chloroform. Another source is the very detailed minutes of the management committee meetings of the old Swansea Infirmary and old Swansea General & Eye Hospital from 1817 to 1948. There is practically no clinical material recorded in these books - even the introduction of ether in 1846 is not mentioned, the only concern being the lack of funds.

One of the medical men present when Liston used ether for the first time on the 19th December 1846 was Dr James Couch, who later was in medical practice in Swansea for 34 years and whose son, Dr J.Kynaston Couch, was the first pathologist and chloroformist appointed in Swansea in 1889.

The newspapers of January, February and March 1847 record the use of ether at a number of places outside Wales. At Bristol on 31st December 1846, the second ether anaesthetic in Britain was given by Dr Fairbrother, the senior physician, who had been recommended to its use; it is significant that '....he kept his finger on the pulse' and watched the breathing. The failure of ether in three operations at University College Hospital, two undertaken by Liston, was noted as was the case of the lady at King's College Hospital who after two or three breaths preferred to be awake. Operations at Guy's, The London and Westminster Hospital under anaesthesia are also recorded.

Its first use in Ireland was in Dublin by a Mr McDonnell who submitted himself to the influence of ether five or six times before using it on his patients. Its use in Birmingham, Boston Lincolnshire, Doncaster, Dumfries, Shrewsbury and Stroud are recorded. In Edinburgh an un-united fracture of the left leg was operated upon by Professor Miller, using for anaesthesia a Squires' apparatus which had been sent to him by Liston, '...a very suitable gift from that eminent surgeon to his old pupil'.* Deaths at the Essex and Colchester Hospital and Grantham in Lincolnshire are recorded.

The first use of ether in Wales was at Swansea and is recorded in a letter dated 13th January 1847 from Mr Henry Wiglesworth to the editor of The Cambrian newspaper. It was for a tooth extraction at Mr Wiglesworth's residence. He was a surgeon to the Swansea Infirmary and a pupil of Liston. In his letter he used Liston's words: 'I feel sir, with Liston, that this remedy is indeed a great thing for operating surgeons' and added:

'I cannot but believe that it will very considerably alleviate the sufferings of thousands - that it will be the salvation of many lives -

* This original apparatus is thought to be the one that can now be seen in the museum housed at the Royal College of Surgeons, Edinburgh having been re-discovered by the museum's current curator Dr A.Masson. Editor

and one of the greatest boons which the public will receive from the medical profession'.

The first major operation performed under ether in Wales was at Wrexham in early February 1847. It was an amputation at the thigh and is of interest in that there was vomiting, '...the stomach during its administration having several times ejected its contents'. Later, on 19th February 1847, the first capital operation in Swansea - an amputation - was performed by Henry Wiglesworth at the Swansea Infirmary. On the same day 'Etherism at Aberystwyth' was described. The operation was for the removal of a large breast tumour at the lady's residence. The surgeon first submitted his two pupils (Jones and Davies) and his coachman to ether - 'to test the power of ether and the soundness of his apparatus'. The inhaler was Mr Smee's, manufactured by Horne of Newgate Street, London.

On 13th February 1847 at Blaenavon, a diseased bone of foot was operated upon. Ether was also used at Abergavenny, Bala, Bangor (on a patient from Llanfaid in Anglesey), at Llanelli, Monmouth and Llangefri in North Wales.

It is noteworthy the operating fees at that period allowed by the Poor Law Commissioners varied from £5 for amputation, strangulated hernia, or treatment of compound fracture, to £1 for simple fracture.

Of particular interest is a fatal accident in late March 1847, at Bangor. A man suffered multiple comminuted compound fractures of both legs and one thigh. Due to shock, the surgeon of the week and the senior surgeon decided to postpone the operation until the next morning. At 9am the next day a double operation was performed. The patient died after 15 minutes; this could be the first anaesthetic 'death on the table'.*

In late November 1847 the use of chloroform by Professor Simpson at Edinburgh is well documented in four Welsh newspapers. Others later record chloroform administered for:

- a mastectomy in Liverpool, using a sponge
- in Gloucester, in a case of severe burns for release of contractures of both elbows, using a handkerchief
- in Somerset for the removal of a tumour, where writing paper and a handkerchief were used
- in Cheltenham for converging squint, and
- on board ship for a dental extraction, where the surgeon sniffed the handkerchief afterwards and became unconscious
- with the headlines 'Doctor caught napping'.

Two deaths are recorded, one during and one after dental extraction. In Yorkshire, the son of the West Riding Coroner died during extraction of six teeth and Dr Anderson of Birkenhead, died 48 hours after the extraction.

* Dr T.Baillie has suggested that the first anaesthetic in Scotland on 19th December 1846 may have been fatal - see 'From Boston to Dumfries'.

Editor

Chloroform in Wales

In Wales, the first chloroform anaesthetic was given in Swansea, again in midwifery. It was recorded in a letter to The Cambrian dated 17 December 1847, from Dr Edward Howell, Physician to the Swansea Infirmary. Dr. Howell had read medicine at the Universities of London, Paris and Edinburgh. At the age of 22 he was awarded the MD at Edinburgh for a thesis on the topic 'De asthmate spasmodico'. In private practice he undertook obstetrics. Also in December 1847, chloroform was used for a boy with severe injuries, it was a life saving operation only made possible after the use of the most active stimulants. In the same month at Blackwood, a patient with compound fractures had both legs amputated. He was so shocked that operation was only possible 24 hours after the accident and the anaesthetic was given by Dr Young 'with such care'. In January 1848 at Monmouth a large tumour of the back was removed, the chloroformist was Dr Andrews. The report notes: 'we had the pleasure of inspecting Dr Andrew's apparatus and were particularly struck with its exceeding simplicity'.

In June 1848 an amputation at the thigh was performed in Swansea, ether having previously been tried unsuccessfully; removal of a cancerous breast at Caernarvon was recorded in July of the same year.

An interesting death is that of a young girl of 15 in the practice of Dr Meggison of Winlanton, near Newcastle.* The coroner's jury verdict: '.....died from congestion of lungs from the effects of chloroform'. In the Lancet of 12 February 1848¹ Professor Simpson wrote that he differed from this verdict and believed that it should have been '....died from the means to revive her'. Cold water and brandy had been poured into her mouth. Simpson justified his decision by the pathological changes, which he believed were exactly those produced by asphyxia.

A few weeks later, Henry Wiglesworth addressed a letter to Professor Simpson through the Lancet.² Wiglesworth differed from Simpson, stating '....equally, candidly I will state my opinion that Simpson's reasons are not in accordance with sound physiological doctrines' and 'I believe with the jury, with Drs Meggison and Glover, Sir John Fife and all those being immediately concerned with the case, that the poor girl died from the effects of chloroform and nothing else'.

It is of interest that a few weeks earlier Wiglesworth had gained the MB degree of the University of London, with a university scholarship and two gold medals, one in physiology and comparative anatomy, the other in midwifery and diseases of women. Wiglesworth later became Governor of Van Dieman's Land (today Tasmania).

Other uses of ether and chloroform

The improper use of ether and chloroform is mentioned on three occasions.

* This was the famous Hannah Greener case.
Editor

Firstly, by a nurse in June 1847 with the chemist saying 'ether is all the go now'. Secondly, by a respected medical practitioner in Edinburgh in February 1848 with the headlines: 'A form of mania in Edinburgh'. Instead of music and dancing, the learned doctor entered with a flask of chloroform and sponge and every guest had a trip. Some lovely lady said: 'Oh, my beloved Charles come to my arms' and some of the gentlemen 'committed slight breaches of etiquette'. Thirdly, by a sultan who ordered a quarter cask of chloroform for use of the ladies of his harem.

Ether was used for a patient with lockjaw and chloroform in a case of typhus and one of tetanus, repeated inhalations in each case.

Veterinary use of chloroform is recorded in a dog, a horse and in a rabid tigress.

Local application of chloroform was used in delayed labour and in the removal of a tumour of the sole of the foot.

The Cambrian of March 1849 records the sinking of the 'Acadia' the rapid passenger steamer of 500 horse power which carried the news of ether across the Atlantic. She had been bought by the central German government and equipped in Liverpool as a war steamer. She sank in the North Sea.

References

1. Simpson J Y. The alleged case of death from the action of chloroform. Lancet 1848; i:175.
2. Wigglesworth H. A letter to Professor Simpson on the fatal case of inhalation of chloroform that occurred at Newcastle. Lancet 1848; ii:181.

Welsh Newspapers reviewed 1847-1848:

The Cardiff and Merthyr Guardian (Merthyr Tydfil)
 The Monmouthshire Merlin (Newport)
 The Monmouthshire Beacon (Monmouth)
 The Cambrian (Swansea)
 The Carmarthen Journal (Carmarthen)
 The Welshman (Carmarthen)
 The Caernarfon and Denbigh Herald (Caernarfon)
 The North Wales Chronicle (Bangor)
 Y Protestant (Mold)
 The Salurian (Tenby)
 The Pembrokeshire Herald (Haverfordwest)
 The Tenby and Pembroke (Tenby)

COTTON PROCESS ETHER (CPE) AND HEWER'S ETHANESAL:

EXAMPLES OF BELIEVING IS SEEING

Professor J.B.Stetson

Times change; human nature remains the same. Many can remember the photographs and cine footage of Arthur Neville Chamberlain stepping from the aeroplane waving a bit of paper and plagiarizing his elder half brother's (Sir Joseph Austen Chamberlain) line 'Peace in our times'. He wanted to believe. The persistent refusal to believe chloroform can cause unexpected deaths is a wellknown tale. Elmer Isaac McKesson taught primary and secondary saturation with nitrous oxide, promising safe abdominal relaxation. His followers wanted to believe. If these comments are the obverse, the neglect of James Esdaile (who practised hypnotism under the name of Mesmerism) and the persecution of John Elliotson because of his affiliation with the London Mesmerists are examples of the reverse. In the United States the condemnation of curare in the 1950s is a fairly recent example. People did not want to believe they could misinterpret observed results and/or failed to believe that which was seen. As a day to day example from our professional lives, think about premedication.

This review will recount the desires of Drs Cotton, Hewer and Wallis to believe that diethyl ether is NOT an anaesthetic, rather that it is a volatile solvent that carried other gases or chemicals that are (were) the true anaesthetics.

J H Cotton and Cotton Process Ether (CPE)

Biographical information about Cotton is sparse. He was born in 1891, died 21 November 1952. He received both an AB and MA from the University of Toronto. He qualified there in medicine in 1915. He practised in Toronto until 1935, then moved to Willowdale, a suburb of Toronto.

He was not one to hide his light under a bushel. Less than two years after qualifying he gave a talk and ether demonstration before the Toronto Academy of Medicine. On 14 June 1917, his demonstration was before the Canadian Association at the Royal Victoria Hospital, Montreal. His thesis: 'ether, ethyl ether, with which we are so familiar, is not an anaesthetic, and the analgesia which comes from the administration of commercial ether is not due to ether, but rather to the impurities occurring in it'.

In brief, he termed some of the impurities irritants and divided them by where he claimed they acted (anterior nasal, nasopharyngeal, etc). He also divided the effective pharmaceuticals or impurities: 'First: narcotics (producing peripheral congestion and drunkenness); second: analgesics (producing loss of sensation and peripheral vasomotor spasm). 'Absolute ether' (made by Cotton, method not reported) was a narcotic, but not an analgesic. Therefore an analgesic must be added to act with it. The analgesic? Carbon dioxide! 'Absolute ether' was compared to nitrous oxide, and although McKesson was not mentioned by Cotton, one

wonders if Cotton had read McKesson's 1915 report on partial rebreathing². Cotton did note Henry Hill Hickman's 1828 use of carbon dioxide as an anesthetic.

Cotton constructed a can that acted in the manner of a syphon bottle so his ether could be carbonated. He then 'discovered' that ethylene was a synergist with his 'absolute ether' and therefore added it to his armamentarium. The quantities utilised were not reported. The schedule of the June 14th demonstration was listed in the report:

At -8:45am a cat received absolute ether saturated with ethylene.
 '...cat relieved of all sensation, yet capable of walking.'
 -8:55am a middle-aged Chinaman received absolute ether, carbon dioxide; 'Infected upper arm. Eight incisions were made over biceps. Patient free from sensation but not at all unconscious.'
 -9:10am Same cat, absolute ether, cat 'hyperaesthetic'.
 -9:20am A middle-aged Englishman received absolute ether-ethylene
 -15 minute operation. 'Resection splintered bone from elbow. Patient capable of carrying on conversation and yet was entirely free from sensation.'

Cotton's conclusions included: absolute gas-free ethyl-ether is not an anaesthetic and it acts only: (a) as a vehicle for analgesia gases such as carbon-dioxide and ethylene and (b) as a narcotic stimulant.

Spreading the word

The next year Cotton spoke in Indianapolis, Indiana.³ He noted alcoholics required 25 to 75% more ether than non-alcoholics. His philosophy: 'I consider anesthesia as analgesia - blocking of sensory impulses from the periphery, plus narcosis - or sleep.' George W. Crile and Wm. E. Lower had published their book entitled 'Anoci-Association' in 1914.⁴ Yandell Henderson had published an article on his 'acapnia-shock theory' in the 1915 'Yearbook of Anesthesia and Analgesia'.⁵ Cotton may have unconsciously melded these recently published ideas (plus McKesson's) to develop his theories. The 1915 'Yearbook' was published in 1916, the year after Cotton qualified. Almost all of the well-known people working with anaesthesia problems were represented as contributors (Crile among them as well as A. Goodman Levy and Willis Drew Gatch of Indianapolis.) Certainly, these 'modern' ideas would have influenced an informed audience and made them receptive to Cotton's thesis. Indianapolis, site of the meeting was not far from Toledo (McKesson), or Cleveland (Crile) and Gatch of Indianapolis employed partial rebreathing in deference to Henderson's teachings.

Cotton now had CPE (Cotton Process Ether) prepared in one ounce glass ampoules rather like ethyl chloride tubes. He had also developed a closed system with a vaporizer, but no carbon dioxide absorber. The system as fed with 10 litres of oxygen per hour !

The section of Cotton's report that is labelled 'Analgesia' contains a tantalising paragraph that is confusing. It is captioned: 'Exhibit B - Rebreathing of oxygen.' 'The ether container was filled with caustic potash sticks in order to absorb any accumulation of carbon dioxid(sic). An excess of oxygen was given, 10 to 20 litres per hour, and the blood

pressure readings were closely followed in 20 cases.' War wounds were being treated. Had the cases received ether first? Was this closed system ether anaesthesia (or analgesia) with carbon dioxide absorption? Dennis Jackson's 1915 machine used milk bottles, one filled with lime water, one with weak sulphuric acid; expired air was pumped through the fluids with a blower. Ralph Waters' 'to and fro' system was to be developed in the future. Slaked lime had been used in England in 1868^{7,8} to allow reuse of nitrous oxide. If Cotton's patients had also received ether, he was the first to have administered an anaesthetic with oxygen plus carbon dioxide absorption.

Analgesia

Cotton opened his address before the Dental Society of the State of New York (Albany 13-15 May 1920) with the comment: 'Ether analgesia of complete type was practically unknown a short time ago.'⁹ Cotton had become very proficient at administering ether analgesia or had become an expert at hypnosis without knowing it. The technique of ether analgesia employed by J. Artusio Jr.¹⁰ was different from the system used by Cotton. Artusio specified: '...ether-oxygen anesthesia to the first plane of the third stage (surgical anaesthesia) was established.' Patients were intubated and then lightened to Stage I (Artusio divided Stage I into three planes). Hewer's clinical work with Ethanesal will be detailed in the next section of this essay, but as his development of ether analgesia is prescient of Artusio, he will be quoted: 'It is sometimes possible to procure perfect analgesia without anaesthesia, and if a long extra-abdominal operation is being performed, such as an extensive tendon transplantation, the patient can usually be allowed to become exceedingly light, and may even be blinking his eyes, but will remain quite motionless, breathing quietly, and not feeling pain.'¹¹

Cotton's production of dental analgesia with his nasal mask, CPE and air is reminiscent of the gas/oxygen/trichloroethylene analgesia used in the 1950's and 60's with a demand flow apparatus.

A representative of the Du Pont Company was present at the dental meeting held in Albany. He reported CPE was: '...absolute di-ethyl ether, with 2 per cent volume of ethylene, and $\frac{1}{2}$ per cent volume of carbon dioxid(sic), and 1 per cent by weight of alcohol to keep it from frosting on a mask. (Figure) In his clinical directions, Cotton noted he used oil of rose or another essence to hide the odour of the ether (a system introduced by Gwathmey who liked oil of bitter orange). Cotton had developed a nasal mask-two tube inhaler with a one ounce CPE Bottle. He claimed his system was safe '...even for fools.' and that his patients never vomited.

In the same year that Cotton spoke to the dentists (1920), Dr. Joseph E. Lumbard of New York City presented 'Remarks on Cotton Process Ether from Personal Experience and the Reports of Other Observers' at the Eighth Annual Meeting of the American Association of Anesthetists in New Orleans.¹² Lumbard tried to obtain CPE analgesia '...in a few cases, and my experience has been that of others - some appeared to be quite successful while others passed into surgical anesthesia...' He had used CPE 400 times and felt CPE was a stronger ether during inductions but failed to notice any differences during maintenance. Recovery '...seemed

less disturbed.' CPE was less irritating, but there was '...more of a tendency to cyanosis...' Dr Freeman Allen of Boston felt '...5 to 6 ounces of CPE sufficient for the same period of semi-open etherization provided by 8 ounces of other ether'. Dr Ray Rice of Columbus, Ohio, felt it was good'....by the closed method...' but that it didn't compare with other ethers by the open method. Dr A.S. McCormick of Akron, Ohio, compared Squibb, CPE and Mallinckrodt ethers for the time taken for induction and average amounts used. CPE and Mallinckrodt ethers yielded similar results in both categories ;Squibb was inferior in both. Dr Isabella Herb of Chicago felt CPE was between ether and chloroform in action. Dr C.C.

McLean of Dayton used CPE only (400 cases) in either the Ben Morgan or the Gwathmey apparatuses and had good results. He was the only one of the responders who claimed to be successful at inducing CPE analgesia. During his discussion Lumbard reported that although ethylene was a potent synergist with ether, alone it 'acts as an inert gas like nitrogen.'

The last article published about CPE appears to be that of Paul Cassidy DDS, of Cincinnati, Ohio. It was 'Read by proxy during the Joint Meeting of the Canadian, Interstate and New York Anaesthetists with the Ontario Medical Association, Hotel Clifton, Niagara Falls, Canada June 1-3, 1921'.^{13a,b} Cassidy provided a chart of the loss of ethylene from opened cans of CPE (quoted by Colonel Webster in his 1924 textbook). Du Pont supplied CPE in tins (I believe in $\frac{1}{2}$ pound size). Cassidy developed a machine made of copper that allowed opening of the cans within the closed machine so none of the gases were lost. An electric light bulb '...hermetically sealed...' from the CPE was employed to keep the anaesthetic at '...a very even temperature..' This was '...to produce an even flow of the entire mixture as

Anesthesia and Analgesia—December, 1922

DU PONT

After Seventy-Five Years— A New Era in Etherization



SINCE Long first used, and Morton first publicly demonstrated ether anesthesia, the improvement of etherization has been predicated on the chemical achievement of an absolutely pure di-ethyl ether. Hence the surprise of pharmacologists and physicians when Cotton, after 75 years, announced that absolute di-ethyl ether, while a powerful narcotic poison, was not a desirable surgical anesthetic and that the ethers routinely used for surgical anesthesia owed their anesthetic properties, to the presence of certain synergistic gases—thereby establishing a new era in anesthesia.

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originally compounded, which is after all, the only excuse for its being utilized.' A critique of Cassidy's article entitled 'Sixty-Seven Years Ago in Anesthesia and Analgesia' was published in 1989¹⁴. The reviewer wrote: 'The theory was that ethylene (an explosive N_2O if you will) speeds induction of anaesthesia and decreases the amount of ether needed to maintain anaesthesia while the CO_2 assures that the patient keeps breathing.' It is obvious the reviewer was not familiar with Cotton or CPE. In retrospect one wonders if, in a closed system, the ethylene and carbon dioxide would bubble off (especially with the aid of the warm electric light bulb), and at the time of induction present to the patient anaesthetic gas mixtures with high partial pressures of ethylene and carbon dioxide. The resulting hyperpnoea (never noted by Cotton or the few others who recorded their results) would allow a rapid adjustment to a high inspiratory level of ether.

Christopher Langton Hewer, Robert Lauder Mackenzie Wallis and Ethanesal

C.Langton Hewer died on 28th January 1986 in his ninetieth year.¹⁵ He qualified from St Bartholomew's Hospital in 1918, served in the RAMC under the tutelage of Dr Torrance Thompson of Edinburgh and returned to Bart's in 1919. He worked with Dr HEG Boyle, promoted Ethanesal (with Dr Wallis), wrote books, chapters, articles and was the Founder Editor of 'Anaesthesia' (1946-66). He was the President of the Section of Anaesthetics of the Royal Society of Medicine and of the British Medical Association, a founder member of the Association of Anaesthetists of Great Britain and Ireland and an examiner for the Diploma in Anaesthetics. He received both the Henry Hill Hickman and the John Snow Medals in 1966. He lived through the evolution of what we may term modern anaesthesiology and was a key contributor. The bizarre Ethanesal episode, with the contention pure ether was not an anaesthetic occurred early in his career. Later in life he seemed to have wiped it from his memory.

R.L.Mackenzie Wallis MA MD died on 1st April 1929 at the age of 43. His first degree was a BA from Cambridge. He arrived to work in the laboratories at St Bartholomew's Hospital in 1911¹⁶. An LMSSA was earned in 1913. His work in the chemical pathology laboratory continued until he left for service in India in the RAMC. While in India he began studies of the purity and decomposition of anaesthetic ethers. After the war he obtained an MD (Cambridge 1919). His obituary noted: 'He took chemical pathology to the bedside with a genius and versatility that will long be unequalled.' The obituary made no note of his work with ethers nor of Ethanesal.

Wallis and Hewer read their papers before the Section of Anaesthetics of the Royal Society of Medicine on 1st April 1921¹¹. Part I of the presentation was by Wallis who lightly reviewed his work in India, his discovery that ketones are the magic part necessary for anaesthesia when ether is used. He reported that his purified ethers would not induce anaesthesia in animals. Wallis distilled the ethers with '..finely divided permanganate..', 'oxidation of impurities occurred..', '..all mercaptans were retained in the residue.' Shaking the distilled water with anhydrous copper sulphate removed any traces of water, alcohol and peroxides; it was non-irritating but was not an anaesthetic. Wallis knew

of Cotton's '...production of an ether in America (Canada)..' and treated his product with carbon dioxide. After experimentation, he concluded '...carbon dioxide played little, if any part in producing anaesthesia,..', but it did exert '...a stabilising effect...'. Ethylene prepared from sulphuric acid and ethyl alcohol had a pleasant odour and little effect; if phosphoric acid was employed rather than sulphuric acid, the odour was rather less pleasant and the ethylene less effective (the ethylene Luckhardt and Carter employed in their seminal experiments was generated with phosphoric acid; they then switched to 99% pure - other 1% unknown - commercial welding preparation for their experiments on themselves and other humans !)

Ethanesal

Wallis decided ketones were the vital impurity. He added ketones ('...those in the middle of the series,..') to his purified ether where he felt they formed a '...loose chemical combination..' with the added carbon dioxide and ethylene. The firm of Savory and Moore began producing the product for the commercial market under the trade name Ethanesal. The amount of ketone reported to be in Ethanesal varied from 2 to 5%. In a short article in the May 1921 'St Bartholomew's Hospital Journal',¹⁷ Hewer wrote that the ketones were 'fairly high up in the series.' The amount and type of the ketones seemed to be a moving target; later objective examinations of Ethanesal by outside investigators revealed the product contained no ketones. In this report Hewer listed 300 usages (ages of patients 3 months to 70 years; duration, 5 minutes to 2 hours 45 minutes) and that 48% '...had no vomiting whatever'. This finding is rather interesting. The patients all received atropine before the anaesthetic; morphia was not administered '...unless very excitable or nervous,..' but morphia was administered '...just before the patient regains consciousness..' In the later article in the 'Lancet', Hewer noted 500 administrations of Ethanesal.

Hewer's monograph 'Anaesthesia in Children' was published in 1923¹⁸. It may be the first book dedicated to paediatric anaesthesia. The chapter on Ethanesal contained illustrations of his continuous flow dripper and bottle for endotracheal insufflation. He reported 3000 Ethanesal anaesthetics in 2½ years. The same chapter appeared in 'Practical Anaesthetics' 3rd Edition, 1923, co-authored with H. Edmund Boyle, OBE.¹⁹

Boyle made a trip to North America during the summer of 1921 acting as the representative of the Anaesthetic section of the Royal Society of Medicine. He spoke at the meeting held in Niagara Falls, Canada; (as noted above, Cassidy's paper on CPE was read at this meeting by proxy). Boyle's topic was gas:oxygen:Ethanesal:chloroform anaesthesia. He spoke of 'The Anaesthetist of Today' and 'The Era of Newer Anaesthetics'.²⁰ Boyle noted he induced with 10:1 gas:oxygen, then passed the gases over chloroform: Ethanesal (equal parts), and after the patient was stabilised cut back to 4:1 gas:oxygen. He considered gas:oxygen with rebreathing the basic anaesthetic, the vapours were adjuvants. If diathermy was to be employed for treatment of carcinoma of the tongue, fauces or tonsil, only chloroform was to be employed. He emphasised that the patient's colour must always be pink. Boyle stated he had been using Ethanesal for three months and liked it (prior to the use of Ethanesal

he had employed ether in the manner he now used Ethanesal). An updated version of the paper was published in 1923.²¹

Hewer and Boyle continued to be enthusiastic about Ethanesal. Hewer, like Cotton, had the clinical ability to bring the patients into a state of ether analgesia, but the tide of opinions of others was flowing against them. The American Medical Association (AMA) had forced Du Pont to reveal the contents of CPE and treated CPE and Ethanesal as quackery (a review of the AMA's actions appears later). In the United States there were no critical and objective studies of CPE, but in Canada, England and Holland critical objective studies of CPE and Ethanesal were performed, pure ethers prepared, and the clinical utility of pure ether demonstrated.

Textbook evaluations of Ethanesal and Cotton Process Ether

Henry Robinson, the editor of the fifth edition of Hewitt's textbook presented a terse evaluation of Ethanesal: 'I have been unable to discover any advantage possessed by this anæsthetic over ether..' '..considerably the more expensive of the two'.²² Blomfield reported: 'My own observations do not support this contention [that Ethanesal can be used] . on patients suffering from respiratory affections.., and other observers also have found that Ethanesal is quite potent in causing mucous and salivary secretion'.²³

A 'Practical Anaesthesia' handbook published in Australia in 1932 noted: '..Ethanesal has passed out of vogue'.²⁴

Gwathmey's encyclopaedia 'Anesthesia Second Revised Edition'²⁵ contained information about the Boothby-Cotton gas:oxygen:ether apparatus developed by Frederic J.Cotton and Walter M.Boothby (both of Harvard Medical School and the Boston City Hospital), but nothing about James Cotton of Toronto, C.Langton Hewer, CPE or Ethanesal.

Colonel Webster as a barometer of acceptance of the 'new ethers'

In 1924, Colonel William Webster, DSO, MD, CM, was Professor of Anesthesiology, University of Manitoba Medical School, Past President of the Canadian Society of Anaesthetists(1922), author of articles on the new ethers, and of a succinct textbook. At the annual meeting of the Manitoba Medical Association, Winnipeg, 10th November 1921, Dr Webster's presentation was entitled: 'Some New Anaesthetic Ethers'. His experience with CPE seemed disappointing; long inductions by the open method and postoperative vomiting the same as for ordinary ether. He had used Ethanesal on patients from 3 months to 70 years of age with durations of anaesthesia from 10 minutes to 105 minutes. He felt '..the muscular relaxation is greater.., ..vomiting is generally less than after ether..' and he had been able to produce an analgesic state.

The Second Annual Meeting of the CSA was held in Winnipeg, June 20-21, 1922. Dr Webster, the President, welcomed the participants and spoke of the need for a journal on anaesthesia. This need was answered by F.H.McMechan who started 'Current Researches in Anesthesia & Analgesia' in 1922 and carried Webster's address. Webster spoke of 'The Era of New

Ethers, improvement in Nitrous Oxid[sic]-Oxygen-Ether Apparatus, and the problem of lay anaesthetists'. Webster noted Boyle's address at Niagara Falls the previous year and reported Ethanesal to be an absolutely pure ether' with an admixture of 2 percent of the middle ketones and a little carbon dioxid[sic]'. He had used it 700 times in patients aged from three weeks to 81 years and for cases of duration 15 minutes to 2 hours. Ether analgesia was described.²⁷ Du Pont's CPE was mentioned but he did not note clinical use or value.

The Colonel repeated the title of his 1921 presentation at a talk given before the Manitoba Hospital Association and Society of Chemists' meetings, Winnipeg, 1922. The content was similar to the above cited talks. This talk was abstracted in 'Anesthesia & Analgesia'.²⁸ The Colonel received maximum recognition for his enterprise.

In the section on new ethers in his textbook, he quoted Cassidy's research on the rapid loss of ethylene from opened cans of CPE.²⁹ Webster listed Nunneley's 1849 use of ethylene in Leeds ('...found it unsatisfactory in action.') In a separate chapter he reported the development of ethylene anaesthesia by Luckhardt and Carter, and by W.E. Brown. Webster's enthusiasm for Ethanesal seemed to be on the wane, but he did describe ether analgesia. He also reported the research results of Bourne and Stehle and of Dale, Hadfield and King. Webster concluded: 'The standard of purity at present demanded for all anesthetic ethers is not sufficiently stringent, as a purer ether can be obtained by more recent methods'. The Colonel like most successful military men, was adept at adjusting to changes in the terrain.

The facts concerning the relationship of Ethanesal to the introduction of ethylene anaesthesia

Hewer, in his 1959 Hewitt Lecture entitled: 'Forty years on' did not mention Ethanesal. He did state: 'Mackenzie Wallis also showed that 'ethylene' dissolved in di-ethyl ether altered its narcotic effects and this led to a thorough investigation of the gas which was carried out mainly in America by Luckhardt, Carter and others'.

Arno Benedict Luckhardt (ABL) was not influenced by Wallis, Hewer or Cotton. He had learned of ethylene's noxious effect on carnations about 1907 and felt that if the gas could put buds to sleep, it could have a similar effect on animals.³¹ His early researches were interrupted by World War I. After the war, with his student J. Bailey Carter (later Professor of Internal Medicine, Rush Medical College), he investigated and recorded the effects of ethylene on animals, themselves, and other members of the Physiology Department of the University of Chicago. Luckhardt and Carter administered multiple ethylene anaesthetics to each other. A.J. (Ajax) Carlson was the Chairman of the Physiology Department. ABL knew that if Ajax could be recruited for a trial he would volunteer the other members of the department and the graduate students. Although Ajax claimed he had only been relaxing and in contemplation while receiving the ethylene, it is obvious from notes that he was in Stage III. As expected, there was thereafter a steady supply of volunteers. When reminiscing about the trials, ABL noted they were on Sundays as everybody was busy with their regular work on the other six days of the

week. Because the experiments were on Sundays he felt God had been very good to them because they all had heavy Sunday dinners before taking the ethylene. Because it was after dinner, most of them were smoking Murads (Turkish cigarettes) or pipes. ABL smoked cigars. ABL was meticulous in his record keeping, including his personal accounts. His cigar purchases, 5 cents each, were carefully recorded in his diary. Because he was meticulous and a history of medicine enthusiast with a superb library, he was extremely embarrassed following the publication of his ethylene reports when he learned of Nunneley's 1849 clinical trials in Leeds.

Isabella Herb, the Chief of Anesthesiology at Presbyterian Hospital and the Professor of Anesthesiology at Rush Medical College came down to the Department of Physiology on a Sunday and witnessed demonstrations of ethylene anaesthesia on the volunteers. Within a week ethylene was in clinical use at the Presbyterian Hospital. ABL's first report on ethylene was published on the 17th March, 1923.³² Dr Herb presented her clinical review at the Joint Meeting of the American and Pacific Coast Associations of Anesthetists, San Francisco in June 1923.

Dr William Easson Brown of Toronto also investigated ethylene. Brown qualified at the University of Toronto in 1916, a year following Cotton. Brown then served at Orpington, England, with the RCAMC. Following the war he worked in the Department of Anaesthesiology, Toronto General Hospital. As he put it: 'Owing to the fact that ethylene is said to be one of the active constituents of a certain commercial ether, it was thought that this would be a good gas to experiment with'. He does not specify CPE nor Ethanesal, but Cotton did work in Toronto. Brown's article was published the same month as Luckhardt's.³² Brown's short report was 'bare bones', while Luckhardt's was a complete exposition including the human experiments. It would appear that Hewer's statement was in error.

Responses of the Council on Pharmacy and Chemistry of the American Medical Association

The February 21st 1920 issue of the 'Journal of the American Medical Association' ('JAMA') carried the note: 'About January 20, the 'News Service' of the E.I. Du Pont De Nemours and Co. Inc. circularised the press of the country with what it was pleased to term a 'good filler'; this particular piece of press agent work dealt with 'The New Du Pont Ether'.³³ The news release prompted queries to the AMA from members. The Secretary of the Council on Pharmacy and Chemistry asked the Du Pont Chemical Works for the composition of the new ether. Du Pont's response was evasive. The AMA warned physicians: 'It is many times more serious for a physician to employ a secret or semi-secret substance as an anesthetic'.

Three months after the first notice, information had been received from Du Pont and the following was published: 'An improved anesthesia ether consisting of highly refined diethyl oxid ($C_2H_5)_2O$), plus approximately two volumes of ethylene (C_2H_4), $\frac{1}{2}$ volume of carbon dioxide (CO_2), and 1% by weight of ethyl alcohol.³⁴ If Ethanesal had been marketed in the United States it would have received the same treatment; unfortunately,

the BMA did not have an equivalent department. The essence of the above reports was reprinted in 'The Propaganda for Reform in Proprietary Medicines', 1922.³⁵ The following year 'JAMA' carried a one page summary headlined: 'Claim that pure ether has no anesthetic properties, without foundation'.³⁶ CPE and Ethanesal were discussed and the '...painstaking investigations' of Dale, Hadfield and King³⁷ and Stehle and Bourne³⁸ reviewed. It is obvious the officials of the AMA considered CPE and Ethanesal as quackery.

The results of critical unbiased evaluations of pure ether as an anaesthetic

Wesley Bourne, the first recipient of the Henry Hill Hickman Medal of the Royal Society of Medicine (1935) enlisted the assistance of Raymond L. Stehle, PhD, of the McGill University Laboratory of Pharmacology in his quest to produce a pure ether.³⁸ They produced a pure ether by combining sodium ethylate with ethyl iodid[sic]. Bourne, after animal testing, used the ether to anaesthetise five surgical patients and one obstetric patient (Bourne's speciality). He noted: '...in which good analgesia was obtained intermittently for each pain over a period of forth minutes of normal labor'. Bourne could obtain analgesia without the magical CPE or Ethanesal. The pure ether was also a proper anaesthetic. The date of publication (in the 'JAMA') was 29 July 1922 - long before Boyle's final article on Ethanesal in the 'British Medical Journal'.

In 1923, a report entitled: 'The anaesthetic action of pure ether' appeared in the 'Lancet'.³⁹ H. King, DSc of the National Institute for Medical Research (NIMR), prepared an ethyl alcohol-sulphuric acid ether by multiple distillations and washings. H.H. Dale, MD FRCP FRS, also of the NIMR, performed animal testing and found the drug satisfactory. C.F. Hadfield, MD, of St Bartholomew's Hospital then used the ether to anaesthetise eight patients with excellent results. Dr King then examined commercial samples of Ethanesal and found they contained 95.5% ether, 4% n-butyl alcohol and 0.5% of a mixture of ethyl alcohol and an aldehyde.. but no ketones. Drs Wallis and Hewer were invited to comment on the report.

No ketones in Ethanesal

Dr Wallis commented: 'We are quite at a loss to explain the above observations of Dale and his co-workers..'. Dr Hewer added: 'I have no doubt of the accuracy of the work of Dale and his colleagues, ... I have now used "ethanesal" in over 4000 cases, and am convinced that whatever may be its exact chemical composition it gives, on average, better results than any anaesthetic ether that I have tried'. Hewer qualified MRCS LRCP in 1918 and MB BS London (Distinction in Physiology) in 1920. His years of experience with anaesthetics were certainly limited. Charles Frederick Hadfield, MBE MD died in 1965 at the age of ninety (less two days). Hadfield qualified at St Bartholomew's in 1904, MD Cambridge, 1906. His MBE was awarded in 1920 in recognition of his wartime work at the City of London Military Hospital. His experience with anaesthetics in 1923 was certainly greater than

Hewer's. In 1923 he also became the first man to stand on the highest ground in England, Scotland and Wales on the same day.³⁹

Professor W. Storm van Leeuwen, Director of the Pharmacotherapeutical Institute of the University of Leyden (Holland) investigated ethers.⁴⁰ He prepared pure ether by crystallisation of ether with benzidine, then distilling it off. He added known impurities to his pure ether and tested the drug on cats and mice. When methylethyl ketone, the supposed magic in Ethanesal, was tested, it was found to be toxic! '...all the cats died after having been narcotized two or three times. In all cases we found multiple haemorrhages of the lungs, liver, kidney, peritoneum'.

Commercial Ethanesal was examined by van Leeuwen. When the containers were opened, carbon dioxide escaped. Analysis revealed no ketones, reaction for ethylene 'slightly positive, considerable amount of normal butyl alcohol' a small amount of isoamyl alcohol. When he examined CPE, he found ethylene, but 'little or no carbon dioxide'. A discussion followed van Leeuwen's presentation of his data at the Royal Society of Medicine. Hewer tried to turn black to white. Hadfield was forceful in pointing out the numerous differing pronouncements by Wallis concerning ketone type and percentage. Wallis had previously stated methylethylketone was expensive; a discussant pointed out: 'large quantities were available as a by-product at a very low cost'. Boyle closed the discussion with slides on the 10,000 Ethanesal administrations performed by Boyle and Hewer (almost all had had preliminary nitrous oxide or ethyl chloride and over a quarter were in combination with chloroform).

For the centennial of ether anaesthesia, Wesley Bourne's presentation: 'Pure ether and impurities: a review', was the leading article of the November 1946 issue of 'Anesthesiology'.⁴¹ It was a most complete review of the subject, including the investigations of the 1940's that demonstrated the safety of using ether from large bulk containers.

The bubble was bursting, but Wallis, Hewer and Boyle were slow to admit they were in error.

Memories are the yarn with which we weave the tapestry of our past life as we wish it to be seen. Hewer's 1958 Hewitt Lecture was mentioned above. Ethanesal was not mentioned and in respect of Wallis, he mentioned his interest in ethers and that he had '...showed that minute quantities of impurities could have toxic effects'. There was no mention of ketones.

The tale was over; it was not a tragedy or a comedy. Dr David Zuck of Enfield was also fascinated by Ethanesal. His publication⁴² takes precedence (obviously) to mine. I am still gathering information and leads.*

[* The author would be pleased to receive data regarding Ethanesal advertisements, Savory and Moore and the fate of Cotton. His address is: R.R.1., Box 665, Greencastle, m Indiana, 46135, USA.

Editor]

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THE ADULT RESPIRATORY DISTRESS SYNDROME: AN OLD DISEASE

Dr J.F. Searle

In 1967, Ashbaugh, Bigelow, Petty and Levine published a paper in the 'Lancet' entitled 'Respiratory distress in adults'.¹ They showed that the lungs respond in a similar way to a wide variety of insults. This paper was the first trickle in an ever increasing flood of papers on the adult respiratory distress syndrome which has continued unstemmed ever since.

Ashbaugh described 12 patients out of 272 receiving respiratory support who did not respond to the then usual methods of treatment. These patients all had pulmonary oedema. Had their left atrial pressures been measured I suspect that they would have been normal or low. Postmortem examination of the lungs in 7 patients showed hyperaemia, dilated engorged capillaries and areas of alveolar collapse. Interstitial and intra-alveolar haemorrhage and oedema were common. Hyaline membranes were present in 6 patients. Two patients who died after a protracted course had diffuse fibrosis of the lungs.

This clinical picture was certainly known to Osler. He described congestion of the lungs in his textbook 'The Principles and Practice of Medicine' first published in 1892.² He recognised that it occurred not only in heart disease but also when very hot or irritating substances were inhaled as well as following drunkenness, exposure and cold. He had seen it too in debilitating illnesses, brain injury and morphine poisoning. He observed that in all forms there was transudation of serum from engorged capillaries chiefly into the air cells but also into the alveolar walls. However, the credit for recognising the response of the lung to disease and injury, both within and without the respiratory system, belongs to Virgil H Moon, Pathologist at Jefferson Medical College and the Army Institute of Pathology, Washington DC. He described what he called the pathology of secondary shock in a classic paper in the 'American Journal of Pathology' in 1948. Forty years ago the term 'secondary shock' was used to describe shock arising from causes other than major bleeding.³

Moon examined the records and pathology slides from 129 men whom he regarded as a representative sample of the thousands of deaths which had occurred in the army during active service and training. There were 30 cases of trauma from automobile accidents and wounds, from gunfire or shells. Ten patients had been burnt. There were 20 cases of poisoning from such substances as Mapharsen, phosphorus, mercury and arsenic. One salutatory death occurred after a bout of protracted drinking. There were 10 fulminating infections. Fifteen soldiers died from asphyxia - five, unfortunately, when their oxygen supply failed at 23,000 feet. Twelve men collapsed in the heat during marching or drill. There were a few patients with intestinal obstruction or pancreatitis and a miscellaneous group. The common finding in the lungs (as it was in many other organs) was hyperaemia and oedema. There were capillary haemorrhages and leucocyte infiltration.

However, these findings were no surprise to Moon. Sixteen years earlier in 1932 he had published the results of experiments on dogs, which if carried out today would cause public outrage.⁴ The hind legs of dogs were extensively bruised under ether anaesthesia. The appearances were the same as those found by Moon in the lungs of American servicemen who died in action or training. Thus the early pathology of the lung following serious illness or accident was known long before 1967 and nearly 40 years before what was wrongly described in the early days of the training of many of us as 'respirator lung'.

How much was known about the pathogenesis of these changes? The carnage of the First World War generated a huge amount of research into the effects of trauma and its most dreaded complication, infection. Many explanations were offered for the circulatory failure which followed trauma where there was no obvious bleeding but gradually the evidence pointed to the capillary circulation. By 1923, in the Oliver-Sharpey Lecture to the Royal College of Physicians of London,⁵ Sir Henry Dale, referring to bacterial toxins, could say: 'when poisons like these are formed in such quantities as to be distributed in effective amounts through the circulation so that all or a large proportion of the capillaries lose their tonus, there arises the peril of circulatory collapse due to peripheral stagnation of the blood' and went on to observe that loss of tonus was followed by an increase in the permeability of the capillary adding 'unfortunately, methods of dealing effectively with dilated and permeable capillaries are not easy to find'.

The importance of leaky capillaries in so-called secondary shock was thus well recognised by the late 1920s. Lt Col W.B.Cannon summarised it succinctly in 1927 in the reports of the 'Medical Department of the United States Army in the World War': 'The theory of secondary shock which has the strongest support both in clinical observation and laboratory experiments is that of a toxic factor arising from damaged and dying tissues and operating to cause increased permeability of the capillary walls.'⁶

Our forebears had some pieces of the jigsaw of the pathogenesis of the adult respiratory syndrome. We have a few more but we have by no means finished the puzzle.

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THE FAMILY OF JOSEPH THOMAS CLOVER (1825-1882)

Dr Aileen K. Adams

Dr Marstop, the first Clover lecturer of the Faculty of Anaesthetists, commented¹ that one could often detect qualities appearing in one generation after another in the same family; in the case of Joseph Thomas Clover, qualities of creativeness and inventiveness. This prompted the present study of Clover's four children.

Clover married relatively late at the age of 44, had his children in quick succession and died whilst they were young, his eldest was only nine at the time of his father's death. Thus there is little family memory of Clover, either as a father or as a man. He was heavily involved in his profession as an anaesthetist in London and was never physically very robust, in spite of which he worked immensely hard. He was often away from home, leaving his wife Mary to bring up the children. They spent much time in Norfolk at the family home in Aylsham which they loved and from whence the Clovers had originated. In London they were said to have moved amongst a highly intellectual coterie, including Ruskin, Burne-Jones, the Terry's and Isambard Kingdom Brunel. Clover's will was proved in the sum of £27,932 14s 2d, a substantial sum which provided well for his family after his death.

The eldest son Martin was born on 23rd December 1873. He went to Shrewsbury, one of the first five 'public schools' recognised under the Act of Parliament in 1882. He did well both scholastically and athletically, he stroked the college boat, was Treasurer of the Boat club and played 1st Eleven soccer. He went on to medical school, qualified as a doctor and settled into general practice in Kermsey, Worcestershire where he died in 1959. He came into the cognizance of Professor Sir Robert Macintosh who once asked him if he had thought of becoming an anaesthetist. He replied he had certainly not, 'I could never have lived up to my father's reputation'. We are indebted to Martin for giving many of his father's papers and experimental models to the Nuffield Dept of Anaesthetics in Oxford, where some remain, although the bulk of them were subsequently given to the History Library of the University of British Columbia in Vancouver. Martin also gave Sir Robert all his father's diplomas, together with a set of decanters which had belonged to his parents, and Sir Robert has kindly presented these to the Faculty of Anaesthetists. Martin also loaned to the Royal College of Surgeons the lovely portrait of Clover as a young man, painted by his uncle, and this now hangs in the College of Anaesthetists suite.

The second son Harry was born on 24th December 1874. He seems to have been a clever boy who started well but failed to live up to his early promise. He was a scholar at Winchester where he is depicted as physically strong and very good looking. He kept wicket for the college and left a year early. He won an open scholarship to Cambridge, became BA and in 1900 joined the Army serving in the Boer war and earning a medal with three clasps. In 1906 he became a barrister in Inner Temple, married and later had a son, John. However Harry does not seem to have been cut out for professional life, preferring to live on his private

income and winning competitions at bridge and chess. Although he rejoined the Army at the outbreak of war in 1914 he was soon discharged, drinking heavily and his marriage in ruins. His contribution to anaesthesia may be said to be through his grandson Anthony, who has become the family historian and is today so very willing to share his knowledge of the Clover family.

The third son Alan was born on 31st July 1875 less than eight months after Harry. Like his eldest brother he went to Shrewsbury and he too did well at work and play. He was a good cricketer and cross-country runner and went on to Cambridge, subsequently being ordained an Anglican priest. He continued to be keen on cricket and also took to writing poetry. Sadly, he later became certifiably insane and eventually disappeared into a mental hospital. However, before this he married into a Bristol family and had two children. The second, Dorothea is still alive, and in 1985 she kindly donated some Clover memorabilia to the Monica Britten Memorial Collection at Frenchay Hospital.

Thus all three of 'our' Clover's sons seem to have inherited something of their father's intellectual capabilities, although only the eldest made full use of his talents. It was Clover's fourth child, his daughter Mary, who displayed not only these, but also much of her father's pioneering spirit and immense capacity for work. Mary was born on 14th October 1876 and was only six when he died. Nevertheless she was obviously proud of the father of whom she knew so little, because her archive includes a number of newspaper and other cuttings about him. Mary went to Nottingham High School, and thence up to Girton College Cambridge to read mathematics, graduating in 1898. She remained in Cambridge for most of her long life, not as a scholar, but as an academic administrator of the greatest capability, serving Girton as secretary for thirty years. Plainly she was a 'ball of fire'. Her obituary reads: 'working with Miss Clover was a lively experience. She thrived on crises, and I sometimes suspected that she was postponing some urgent matter until the eleventh hour in order to have the excitement and challenge of a last minute rush'. As secretary, Mary inherited a huge debt incurred when the College extended its buildings, overspending by £24,000; a very large sum which had to be found somehow. She received an offer from an anonymous donor of half this sum provided the College raised the rest within one year. She hurled herself into the task with relish, demanding, cajoling, threatening and persuading, and the money was raised.

During the first World War Mary became the very efficient administrator of a military hospital in Cambridge; incidentally, she liked the Red Cross uniform because 'it saved wasting time in the morning thinking what you are going to wear'. Later she was one of the first women in Cambridge to own and drive a motor car, a yellow bullnosed Morris called Phyllis, which she kept going until well into the second war and many of the older dons at Girton recall their adventures in Phyllis. For many years she was treasurer of the Women's University Settlement in Southwark, one of the earliest examples of social work in London. Mary's paperwork shows her to have been meticulously accurate, even obsessive, attitudes perhaps inherited from her father, although like many perfectionists, she was not always popular with her family, who did

not invariably appreciate her organising tendencies. Nevertheless she always helped out in crises, for example becoming John's guardian when Harry died young, and looking after Alan's family when he became mentally ill.

Mary became known to the anaesthetists at Addenbrooke's Hospital, again through Sir Robert Macintosh. He heard that in her old age she had become frail and disabled, and he asked the then senior anaesthetist Harold Youngman to visit her, to show that the anaesthetic specialty had not forgotten the surviving child of a pioneering anaesthetist, and she too passed on to us some memorabilia of her father before her death in 1965 aged 89.

Joseph Thomas Clover died at the height of his career as an anaesthetist at the age of 57, leaving his wife with four young children to educate. All went to public or grammar school and on to university; all were evidently gifted individuals, although only the eldest and youngest made full use of their talents. All four have given benefit to our specialty by passing on to us items from their distinguished father, either directly or indirectly through the kind offices of Sir Robert Macintosh. When their story comes to be written, subsequent generations will be seen to have a similar concentration of intellectual, athletic and also artistic talents.

Acknowledgements

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