

**THE HISTORY OF  
ANAESTHESIA SOCIETY**



**Volume 12**

**Proceedings of the Joint Meeting of 6th March 1993**

**with the Section of Anaesthetics**

**of the Royal Society of Medicine**

**London**

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### **Proceedings of the History of Anaesthesia Society**

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**The History of Anaesthesia Society**  
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## JOSEPH THOMAS CLOVER - 1825-1882



A new branch of King (chemists) of Norwich was recently opened in the Market Place in Aylsham, Norfolk, on the site of Clover's birthplace. Following the suggestion of Dr C H Woollam, a member of HAS, Mr Joseph King kindly arranged for the erection of a plaque commemorating Clover on the wall of his new pharmacy. On 6th May 1992 Mr and Mrs King invited about 100 guests to the opening ceremony, including several members of the Council of HAS. The President, Dr Aileen Adams, gave a short account of Clover's importance in the history of anaesthesia. Dr Woollam had prepared a poster exhibition to be displayed for several months in the shop window. Mr James Clover, great great grandson, a medical student, and his mother, Mrs Anthony Clover, were also present.

Great care was needed in the design of this building, which also includes some sheltered housing, because the Market Place consists entirely of listed buildings. After the opening speeches, the President unveiled the plaque, following which the guests attended a buffet lunch at Blickling Hall, the beautiful Jacobean House about a mile away owned by the National Trust.

This was a delightful occasion, and it is gratifying that Mr King's generosity resulted in Joseph Thomas Clover being brought to the attention of the public.

A K A



PROCEEDINGS OF THE HISTORY OF ANAESTHESIA SOCIETY  
Volume 12

PAPERS PRESENTED AT THE JOINT MEETING with the SECTION OF ANAESTHETICS  
THE ROYAL SOCIETY OF MEDICINE on 6th March 1993

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## HISTORY OF ANAESTHESIA SOCIETY

Those present at the Joint Meeting on the 6th March 1993 with the  
Section of Anaesthetics of the Royal Society of Medicine

Dr C K Adam	Dr B Hayes	Dr J E Riding
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Dr M Harrison	Brig J Restall	Dr D Zuck
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## ANAESTHESIA IN THE LATE 1930's AND EARLY 1940's - REMINISCENCES

Professor T C Gray

### The Barnes Hall

This hall has played an important part in the professional life of anaesthetists. It has been the scene of so many happy and controversial highlights of our activities over the last half century. Up to the middle forties, the Anaesthetic Section of the Royal Society of Medicine, the successor to the Anaesthetic Society, was the only forum in which anaesthetists from all parts of the UK could meet to discuss their work. The Scottish Society founded in 1914 and the Liverpool Society in 1930, the oldest anaesthetic bodies outside London, were small and only locally influential. There was no Anaesthetic Research Society and membership of this Section was obligatory for anyone who had ambition to make a contribution to the advancement of the specialty. I hope it will remain so.

I aim to paint a picture of the life of an anaesthetist, hopefully not atypical of the generality, over a period from shortly before war broke out up to the foundation of the NHS in 1948. Unfortunately, to do so I must brave the embarrassment of autobiography.

### Staffing and training

Before the 2nd World War, with very few exceptions, the anaesthetic staff of our hospitals consisted of general practitioners, ladies who combined anaesthesia with 'clinics', and medically qualified wives of surgeons. Hospital service was voluntary and not remunerated, except for small sums from medical boards. Consequently, anaesthesia was a sideline but it gave the practitioner a little extra kudos through association with the hospital. When I first joined the Association Council in 1947, there were still members of Council in general practice. It is often forgotten that in smaller towns, and in the suburban cottage hospitals of large conurbations, most of the specialist staff were in general practice.

GP anaesthetists looked after the day sessions, but out-patient anaesthesia and most of the night work was covered by newly qualified house staff. It was a situation fraught with danger. During the thirties a resident anaesthetist was appointed in some teaching hospitals. But they too were untrained except by experience in house jobs.

There were no formal postgraduate training programmes in anaesthesia. One learnt by practice generally under the supervision of surgeons or, in some teaching centres, of the visiting anaesthetists. The undergraduate course was minimal. In Liverpool and, I believe, similarly in other centres, the student was supposed to be signed up for six lectures and 20 anaesthetics, personally administered under supervision. For the unscrupulous it was too easy to be signed up by the GPs who, on completion of a list, were anxious to get back to their surgeries. Not atypically, I received the necessary certification having given five anaesthetics. Magill used to say that when, after qualification, he was appointed to give anaesthetics as a resident in a

Liverpool teaching hospital, he had given one anaesthetic. Yet, every doctor was expected to be able to give an anaesthetic. Many, but by no means all of the visiting anaesthetists, exercised considerable skill in the 'art' of

anaesthesia and some made significant contributions to its advancement. But severe postoperative pulmonary complications, often contributed to by prolonged deep ether anaesthesia, were certainly not uncommon; physiotherapy was not available nor, until 1941, were antibiotics. Death from postoperative bronchopneumonia was not rare; indeed, this period appears to have been a particularly lethal time to have an operation under anaesthesia. Figure 1 shows the deaths officially reported as being associated with anaesthesia between 1850 and 1950<sup>1</sup> and probably makes a fair point even allowing for a surgical contribution.

## Deaths recorded as associated with anaesthesia in England & Wales by decades

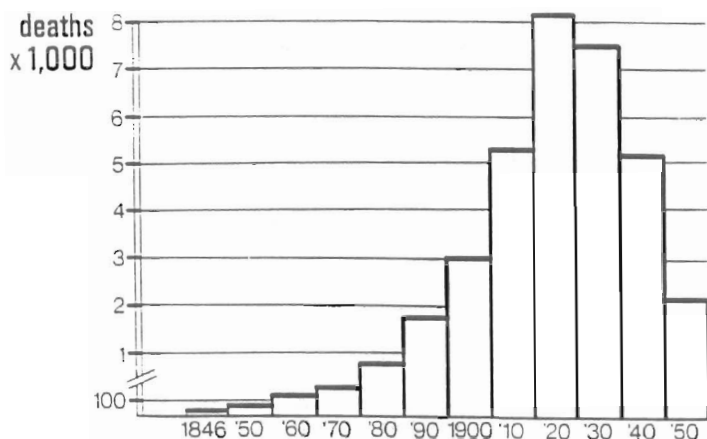


FIGURE FROM SYKES 1961 & REGISTRAR GENERAL'S ANNUAL REPORTS 1951-5

Figure 1

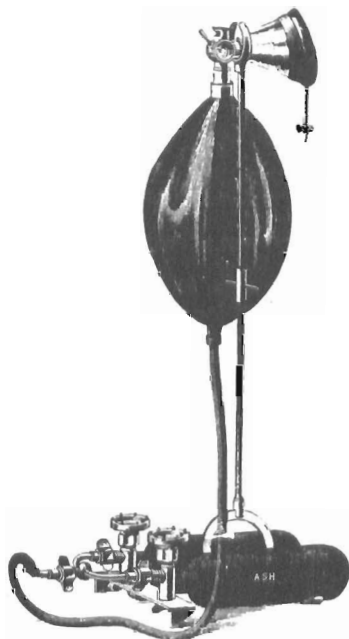
### Methods

Two hospitals in Liverpool exemplified different approaches to anaesthesia. In one, the Royal Infirmary, the subject was fossilised. The methods used were open ether and insufflated air/ether which Kelly, later Sir Robert and Professor of Surgery, introduced in 1912 after visiting Elsborg in the States. In order to pass the gum elastic catheter through which the air/ether mixture was insufflated into the trachea, the patient was anaesthetised with open ether. One of the middle-aged lady anaesthetists,

who was about 5 feet in height and only a little less in breadth, was noted for causing fires through spillage of ether around the clearly visible and exposed sparks of the electric motor of the air pump. I recall seeing her,

when I was a student, chasing a big, tough Liverpool docker down the long corridor outside the operating theatre, gown flying, an ether bottle and mask in her hands, shouting: 'Come back, come back!' The late Professor Wells used to tell how the same lady having inserted the gum elastic catheter into the oesophagus, turned on the insufflation pump and, not surprisingly, the patient's abdomen was seen to swell. Suddenly, there was a series of rude noises as the patient began to pass flatus per anum. Wells, scrubbing up in the theatre as was the custom, looked round, assessed the situation and shouted: 'Connie, for heaven's sake, do something, or we'll all be anaesthetised'.

The only other apparatus in the Infirmary was in the outpatient department for the delivery of nitrous oxide (Figure 2). The two cylinders without reducing valves rested on the floor, the gas flow being controlled with one's foot. Spikes were on the circular tap to enable grip by the sole of the shoe. One textbook warned: 'It is wise first to have loosened this', i.e. the tap 'with a hand key and have it just "on the swing" otherwise one's boots are apt to suffer!'.<sup>2</sup> The Hewitt valve by the mask had three positions marked: 'air', 'valves' and 'no valves'. The latter permitted complete rebreathing. The procedure was to asphyxiate the victim with nitrous oxide, first with 'valves', allowing inspiration of nitrous oxide and expiration into the air and, after about 30 or 40 seconds, to turn to 'no valves' for 20 seconds and then give one breath of air for every three or four of nitrous oxide.



Nitrous oxide apparatus showing foot control and Hewitt valve



Figure 3: Dr R J Minnitt

Open ethyl chloride, a lethal anaesthetic in the hands of the tyro, was commonly used and consequential deaths were certainly not unknown specially in children. Such deaths under anaesthesia in childhood were generally accepted by coroners as due to 'status lymphaticus', although doubts on the existence of such a condition had been expressed as early as 1931.

At the Northern Hospital where the Senior Anaesthetist was R J Minnitt, the situation was very different. Figure 3 shows Minnitt in the routine theatre dress of the time, but does not reveal that, as was customary for anaesthetists, he was wearing his outside trousers and shoes. Minnitt was a popular and respected general practitioner who gave a great deal of time to anaesthesia and whose mission was to raise the standard of anaesthesia in Liverpool. Incidentally, I doubt whether he ever missed a meeting of the Anaesthetic Section of the RSM, until he retired. He became its President, a Hickman medallist and, eventually, an Honorary Fellow of the Society.

The methods used in Minnitt's hospital were open ether for training and, only when that was mastered, gas, oxygen, ether with a primitive Boyle's apparatus, a feature of which was a net of cord around the reservoir bag. When the bag became over-distended as, for example, due to respiratory obstruction, the cords of the net ruptured in sequence, causing repetitive loud bangs, resembling a machine gun - an early example of a simple and efficient alarm system. Minnitt had a McKesson Nargraf machine which he alone was allowed to use but it was never used for the infamous McKesson secondary saturation technique, in which the patient was made hypoxic with nitrous oxide until 'the pupils became fixed and dilated and respiration slows down and finally ceases. If, at this point, or immediately before it, the lungs are inflated with a high percentage of oxygen, natural respiration is re-established, the colour returns to normal and it is possible

to continue a pure nitrous oxide/oxygen anaesthesia with a very considerable degree of muscular relaxation. This method has some vogue in America.<sup>4</sup> The KcKesson apparatus, specifically designed for that technique, was widely used in dental surgeries. Most dental anaesthetics at the time involved a period of hypoxia. Later, standard Boyles' tables were introduced to which, when cyclopropane became available, a circle absorption circuit was added. I was given permission to try ethylene which proved more satisfactory than nitrous oxide, but had to be abandoned because of the intolerable odour.

As to monitoring, a finger on the pulse, observation of the patient's colour and respiration with, as a refinement, assessment of the capillary refill, were advised for routine use. Before the war, to my recollection, blood pressure was only measured in critical situations or in surgery likely to involve heavy blood loss. Prior to antithyroid drugs, patients with thyrotoxicosis undergoing thyroidectomy were frequently very toxic and liable to postoperative thyrotoxic crises. Nervous anticipation was thought to predispose to this, and on Minnitt's unit 'stealing the thyroid' using Avertin was routine. The inviolable rule was that the anaesthetist had to measure the dose of Avertin for the patient's weight in the 'dispensary', as the pharmacy was known, add it to the distilled water at 40°C, and test the solution with Congo Red to ensure that hydrolysis had not occurred. The anaesthetist then personally took the solution in a Thermos to the ward and infused it into the rectum. Under no circumstances were these duties delegated to dispenser or nurse. No patient ever received a wrong dose nor was the wrong patient ever given one, both of which happened occasionally when there was delegation.

### Personal history

On qualification in 1937, engaged to be married, I went into general practice and became interested in anaesthesia. Just before war started, Minnitt suggested that I should work with him for two half days a week and accumulate the 500 anaesthetics, 250 for major and 250 for minor operations, necessary for the diploma. The texts one read are listed in Table 1; of these, Beecher's Physiology broke new ground in reviewing the pharmacokinetics of anaesthetic drugs as known at that time.

- PHYSIOLOGY OF ANAESTHESIA: H K Beecher (138)  
 INHALATION ANAESTHESIA: A Guedel (1937)  
 TEXTBOOK OF ANAESTHETICS: R J Minnitt (1940)  
     R J Minnitt & J Gilles (1944)  
 ESSENTIALS OF ANAESTHESIA: R R Macintosh & F Pratt  
     (Bannister) (1940)  
 RECENT ADVANCES IN ANAESTHESIA: C Langton Hewer  
     (1932, 1937, 1939, 1943, 1944)  
 APPLIED PHYSIOLOGY: Samson Wright (1934, 1936, 1940)  
 REGIONAL ANAESTHESIA: G Labat (1930)  
 TRIUMPH OVER PAIN: R Fulop-Miller (1937)

**Table 1. Essential Texts - late 30's and early 40's**

Exempt military service on grounds of health, in 1941 I passed the DA, largely due to having heard, a couple of months earlier, Michael Nosworthy deliver his classic paper on 'Controlled Respiration for Thoracic Surgery'. Inevitably, it was the main essay question in the paper. The less said about the viva the better. It consisted largely in the identification of pieces of equipment. One I remember was a Howard Jones spinal needle. I got it right, but was flooded by the next question: 'Who is Howard Jones?'

I sold my general practice and due to the absence of colleagues rapidly became involved in an extensive hospital practice with the basic financial support of two sessions a week in a municipal hospital at £250/year and a few Emergency Medical Service sessions.

### Private practice

In the wartime situation, private work was abundant: 1 guinea for a dental, £5-£10 for a minor operation and £10-£15 for a major unless the surgeon advised a larger sum. A senior anaesthetist who, some years earlier, had given up general practice and become the first fulltime anaesthetist in Liverpool, used to say: 'If you are good and work hard, you may make £1,000 a year; but you will never make £1,250!' He was a pessimist.

Most of the work was in nursing homes, but they were a far cry from the private hospitals of today. They had no anaesthetic equipment, so you had to take your own machine, cylinders, tubes, laryngoscope, Magill's forceps etc. and, with the exception of ether, drugs. Most operating theatres were upstairs and most rooms downstairs or vice versa. There were lifts in only two such establishments; in the others, surgeon and anaesthetist had to carry the patient up and down the stairs to the theatre. As the few surgeons around were also extremely busy, one found oneself responsible for most of the postoperative care.

One was in the theatre all day, every day and frequently at night and often on Sundays down in North Wales. It became clear to me that I was perfectly fit, so I enlisted in the Army and this time was warmly welcomed, for it was just before the invasion of Algeria. Things were tense and specialist anaesthetists were few. After a shortened introductory course at Leeds, I was posted to Oxford to mobilise with the 5th of Hugh Cairns' Mobile Neurosurgical Units. These were the best equipped units in the Army. We had a circle absorber and, a great luxury, cyclopropane!

Oxford offered the opportunity to visit Macintosh at the Nuffield Hospital. He was modelling his prototype laryngoscope. It had a stiff but flexible blade enabling him to vary the curvature until it slipped inevitably behind the tongue, anterior to the epiglottis. He allowed me to try it on a few patients: it was a revelation. Before relaxants, the mark of a good anaesthetist, in surgical eyes, was speed in induction and recovery. In this respect, two innovations transformed one's practice: Macintosh's laryngoscope and a little book by a Dr Human on blind intubation. To assist rapid blind nasal intubation in light anaesthesia, Human recommended CO<sub>2</sub> induced hyperventilation. Inspiration was deep, cough and spasm inhibited and the pharynx a rigid tube; the endotracheal tube was almost inhaled.

Oxford also provided a less attractive picture of much paediatric anaesthesia of the time. In the ENT department a tonsil and adenoidectomy list was in



progress. This procedure was frequently recommended at that time. A dozen or so tiny youngsters, awake, wide-eyed, were leaning against the walls of the pre-anaesthetic room, from which a door led into the theatre. Through a loudspeaker music was playing loudly, with the hope of drowning, but in fact failing to drown completely, the screams issuing from the theatre. I am happy to report that it was not under the aegis of Macintosh's department.

#### Short visit to North Africa and conclusion

We landed in North Africa a week before Christmas 1942. When the Algiers/Tunis campaign was over, I looked forward to visiting Sicily, but developed severe bronchopneumonia and was invalided home and ultimately discharged. Life became more than ever frenetically busy and, in 1947, I was delighted to retreat into the anticipated calm of academic life. That calm, however, did not last long, largely due to Harold Griffiths;<sup>6</sup> but that is another story.

Those of my generation have lived through a time of transforming academic, social and political development in our specialty. It has resulted in widening the scope of surgery in all ages and also in a number of rapidly advancing sub-specialities with practitioners of - to an oldie - phenomenal expertise. Finally, there is our Royal College. It has been an adventurous professional life for which to be truly thankful.

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## MY TEACHERS

Dr O P Dinnick

Although I have had many mentors - not least my patients - this paper is concerned only with my anaesthetic chiefs at the Middlesex.

## Dr R E Apperly

R E Apperly was a prize-winning student who qualified at the Middlesex in 1906 and acquired anaesthetic appointments at three hospitals including Great Ormond Street, and then became assistant anaesthetist at the Middlesex in 1910. He wrote two papers about the toxic effects of chloroform<sup>1,2</sup> before serving as an anaesthetist in the RAMC during the war, and was promoted to the honorary staff at the Middlesex in 1919.

To broaden his experience of regional analgesia - he had demonstrated spinal block at St Thomas's in 1908 - he visited Vienna and Innsbruck, and then wrote a paper on posterior splanchnic block in 1925. He was an early advocate of supplementing regional techniques with very light general anaesthesia and continued to use this combination, especially for abdominal surgery for the rest of his professional life. However, during that time he remained faithful to straight chloroform for breast and some facio-maxillary surgery because of the bloodless field so produced.

He was President of the Anaesthetic Section of the RSM in 1929 and in the following year of the similar section of the BMA at its meeting in Winnipeg; also in that year he became the senior anaesthetist at the Middlesex. More importantly, he was one of those leaders of our specialty who, in 1932, resolved to form the Association of Anaesthetists<sup>4</sup> and became a member of its first Council and a Senior Fellow.

Energetic and cultured - Apperly was described by a surgical colleague as 'being of a sunny disposition' - and his teaching sessions were enlivened by amusing tales of operating in private houses. One such concerned a lady in the lithotomy position on the first floor, where the only light for the surgeon was from a window, but that light failed when a double-decker bus stopped outside: the passengers were entranced.

At the beginning of the war he had to move to our sector hospital at Dollis Hill, but he retired prematurely when he was 60, in 1943 after having a severe coronary thrombosis, though he lived on in reasonable health until 1960.

## H P Crampton

H P Crampton qualified from Cambridge and the Middlesex in 1907 and went into general practice with clinical assistant posts in ENT at Middlesex, in gynaecology at Chelsea and at Great Ormond Street. By 1908 he had anaesthetic appointments at the Central London Throat Nose and Ear Hospital and two other similar appointments soon followed. He was a member of the Medical Society of London and the Hampstead Medical Society, becoming secretary of the latter in 1911, the year in which he became an MD.

In the Great War he served in the RAMC for four years as an anaesthetist with such distinction that he was charged with writing the chapter on anaesthesia in the Official History<sup>5</sup> of that conflict.

He became assistant anaesthetist at the Middlesex in 1919 and was promoted to the honorary staff three years later but, like many of his contemporaries, continued to spend part of his time in general practice.

He was President of the Anaesthetic Section of the RSM in 1934 and his presidential address<sup>6</sup> epitomised his warm humanity and clinical wisdom. Like Apperly,<sup>4</sup> he was one of the founders of the Association of Anaesthetists,<sup>4</sup> served on its second Council and became a Senior Fellow.

Crampton was ahead of his time in another respect, for he stressed that the immediate postoperative care was the responsibility of the anaesthetist and planned his time accordingly.

When I was a student he taught me the essentials of anaesthesia with a Clover's inhaler and open wire frame mask. His popular teaching sessions were sweetened - literally by a shared bags of sweets and metaphorically by numerous memorable aphorisms such as 'increasing the strength of ether is like driving a car away on a cold morning: if you press the accelerator too hard it coughs and spits but if you don't press it enough you never get away' and 'a patient during recovery is like a bather after a cold swim': this was 20 years before halothane made shivering a topical subject.

To my regret I was not exposed to his teaching when I became resident anaesthetist at the beginning of the war as he had moved out to our sector hospital at Northwood. His skills were not restricted to open ether for he saved the life of his physician friend by an emergency intubation when the latter was being asphyxiated by a sudden bleed into a thyroid cyst. Crampton was a delightful man; he retired at the end of the war when he was 67 and lived happily until he was 91.

#### A E W Idris

A E W Idris qualified at University College Hospital in 1913, entered the RAMC two years later and was wounded on active service leaving him slightly deaf.

After the war he became senior resident anaesthetist, and in 1922 assistant anaesthetist, at the Middlesex. Several similar appointments soon followed, including the National Dental and the Hampstead General Hospitals, and he continued to serve the latter until he retired. At the Middlesex he was particularly concerned with the dental department until he was promoted to the honorary staff in 1931.

Receptive of new ideas he was an early practitioner of endotracheal techniques and of intravenous anaesthesia - using Pernoxton. He was an acknowledged master of blind nasal intubation; for which he used the contemporary wonder drug - carbon dioxide - and partly to that end was instrumental in having the theatres equipped with modern Coxeter - Boyle machines.

He was not, however, using such a machine in 1935, but an accepted technique with ether and air, when there was a serious explosion, the

precise cause of which was never satisfactorily explained, in spite of much research by the physics department. The sad result of this incident was that his deafness was seriously and permanently exacerbated so that he ceased to attend professional meetings and his early promise was not fulfilled. He was a member of the Anaesthetic Section at the RSM, and an early member of the Association of which he was later a Senior Fellow.

Nevertheless, he continued to practice, was kind to his patients, imperturbable in the operating theatre, in demand for poor risk cases and renowned for his rapid induction of the fit ones. He was an excellent and popular teacher of both students and his junior staff - all addressed as 'Laddie'.

'Pop', as he was universally known, spent the war years at our sector hospital at Aylesbury and on returning to the Middlesex became senior anaesthetist and a lovable and very supportive chief who gave me much sound and worldly advice until he retired in 1954. He died in 1960.

#### **B R M Johnson**

B R M Johnson qualified at the Middlesex in 1927 and after his house appointments went overseas, before returning to his old hospital as senior resident anaesthetist in 1930.

His aptitude for the specialty was soon shown for, three years later, he was anaesthetist to St Peter's Hospital, to the dental departments of University College Hospital, assistant anaesthetist at the Middlesex and partner in the private practice of Robert Macintosh and W S McConnell of Guy's. He was promoted to the honorary staff at the Middlesex in 1937.

Joining the RAMC early in the war he served with distinction being senior anaesthetist adviser in Italy and mentioned in despatches in Normandy. Then followed eight years on the Council of the Association three of which he served as Treasurer, while for part of his time he was also on the Council of the Section at the RSM and was its Secretary in 1948.

He played a major role in the formation of the Faculty of Anaesthetists of which he was the first Vice-Dean before becoming its second Dean from 1952-1955 and was elected FRCS in 1956.

He continued to serve the Faculty and College as an examiner and in many other ways, but I will mention only that the concept of having an Anaesthetic Research Department in the College was his and that, virtually single handed, he raised the considerable sum of money needed to bring that concept to fruition.

But that was not all. He was appointed civilian anaesthetic consultant to the War Office in 1952, was awarded the FFA RACS in 1953 and was President of the Anaesthetic Section of the RSM in 1954 as well as lecturing in Australia and several European countries including Greece, where he was made an Honorary Fellow of the Association of Greek Surgeons.

He was no less active at the Middlesex, where he became senior anaesthetist in 1954 when he served on its Board of Governors and as Chairman of the Medical Committee, and then as a member of the Medical School Council and Chairman of the Academic Board in 1956-57. He organised joint appointments for junior anaesthetists in the Medical School Departments of Physics and Pharmacology and founded a student prize in the latter subject. Yet, throughout these busy years, he did not neglect his clinical commitments where he was a stimulating teacher forever pointing out where knowledge was incomplete and suggesting other possible lines of research. Indeed, this teaching was but a reflection of his dominant and very successful purpose in life - that of improving the status of the anaesthetist and of his specialty. This single-mindedness made him a rather austere figure in public, always correct but not given to humour. Indeed, even when recounting a very early skirmish, he barely smiled. This was when, in response to a physician's opinion that a sick patient was 'fit for gas', BJ enquired simply: 'Which gas had you in mind?' Yet with his close friends, or at home - for he was very hospitable - he would be warm and relaxed, but it was there that he had his fatal coronary at the early age of 54 in 1959. I am greatly indebted to him for much sound advice, for bullying me to put pen to paper and for practical support in several fields.\*

#### F W Roberts

F W (Bobby) Roberts qualified at the Middlesex in 1933 and after his house appointments was successively junior and senior resident anaesthetist and passed the DA examination in 1935 - the year of its inception. In the following year he became assistant anaesthetist at the Middlesex and joined the private practice of Robert Macintosh - irreverently known as The Mayfair Gas Company - and became a full partner with Bernard Johnson and McConnell when Macintosh left to take up the Chair at Oxford in 1937.

He was promoted to the honorary staff at Middlesex at the beginning of 1939 and on the outbreak of war, when all his senior colleagues were dispersed, he was retained in the EMS as the only senior anaesthetist at the hospital. This was no sinecure; for though many wards were closed there was no shortage of routine work including maternity and outpatients as well as the need to man four tables for air raid casualties. To help him he had a senior and a junior resident (and the occasional student). Both posts were held in succession by me and by my future colleagues Brian Sellick and the late Jan Hewer. Bobby thus had a lasting influence on the Middlesex.

He was way ahead of most of his contemporaries in his use of Pentothal, not only for dental outpatients and routine inductions, but especially by drip infusion for abdominal and other long operations.

At the end of the war, by which time he was on the Council of the Anaesthetic Section of the RSM and a Fellow of the Association, he was about to join the RAMC as an anaesthetic specialist when he had a riding accident and broke his neck. Fortunately he recovered without permanent

\* **Editor's Note:** His name also lives on as the Bernard Johnson Adviser at the Royal College of Anaesthetists where assistance in career guidance for junior anaesthetists countrywide is given.

sequelae but by the time he had done so the Army no longer required any more anaesthetists. However, his frustrated urge to travel was soon gratified for the Professor of Surgery at Utrecht sought the assistance of the Association of Anaesthetists in finding a British anaesthetist to train Dutch doctors in modern anaesthetic methods,<sup>10</sup> and Bobby was selected by Council for that post.<sup>11</sup> But he did much more than fulfil that mission, for not only did he anaesthetise the infant Princess Maria on three occasions, he became one of a small group planning the formation of the Netherlands Society of Anaesthetists. That plan came to fruition in 1948 with Bobby as a member of its Board, and Maarten Mauve as President. Then, when Mauve was unexpectedly called up for naval service, Bobby acted as President for nine months, during which time the Society achieved its aim of having anaesthesia recognised as an independent specialty. He was later made an honorary member of the Society.

In 1949 after nearly two fruitful years in Holland he went to the University of Witwatersrand as principal anaesthetist at the Johannesburg General Hospital. This was a full time post which he held for a year, after which he worked at the same hospital on a sessional basis.

He delivered a paper in 1949<sup>12</sup> on anaesthesia for repair of congenital atresia of the oesophagus for which he had successfully used tubarine in Holland and in Johannesburg. He was probably the first person to give this drug for that procedure, while in 1950 he was the first to use suxamethonium routinely in South Africa.



**Dr F W Roberts**

He was Secretary of the South African Society for Anaesthetists for two years before becoming its President in 1955 and as such represented the Society at the inaugural WFSA Congress at Schevingenen. He was made an honorary life member of the Society in 1962 when he left Africa after 13 years - including a spell at Albert Schweitzer's famous hospital at Lambarene. His destination was Tasmania to become Director of Anaesthesia at the Royal Hobart Hospital. He became FFA RACS in 1964 and represented Tasmania on the executive committee of the Australian Society of Anaesthetists from 1964 to 1965. He reported<sup>13</sup> a successful trial of ketamine in children before this drug was marketed under that name, and in another paper<sup>14</sup> described the use of neuroleptanalgesia for the many patients admitted in one afternoon after being burnt in a bush fire in 1967. After 10 years in Hobart, his urge to travel was undiminished and he settled back in Africa this time in Rhodesia (now Zimbabwe) as honorary anaesthetist to the Bulawayo group of hospitals, and in private practice. He remained there for three years and after a further spell with his old practice in Johannesburg returned to Tasmania in 1978 for three more years in anaesthesia before concluding his influential career in five countries. He is now writing his memoirs, and one instalment about 'The Mayfair Gas Company' has already been published.<sup>15</sup>

Vivacious and gregarious with a splendid sense of humour, he was the man who really taught me my craft and I am eternally grateful to him.

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## THE CAMBRIDGE FIRST LIVER TRANSPLANT: AN ANAESTHETIST'S TALE

Dr Elizabeth Gibbs

### Introduction

In 1967, no liver transplant had been attempted in Great Britain although a number had taken place in America and in 1967 I, a young anaesthetist, was entirely unaware that such an operation could be done. I knew that renal transplants were performed successfully, but at the beginning of June 1967 I knew nothing of the anaesthetic requirements for such an operation.

### Starting at Cambridge

It was at the beginning of June 1967 that I started as senior registrar in anaesthetics at Cambridge. For the first week I was told 'it has been arranged that you should meet as many surgeons as possible, including Professor Calne on Friday morning. As senior registrar you will come into contact with him a lot because of the renal transplants. And, by the way, do NOT anaesthetise for any renal transplant until somebody more experienced can show you the routine.' The first four days of my appointment passed uneventfully and no renal transplants occurred.

On my first Friday morning in Cambridge I was in the anaesthetic room at 8.45, ready to anaesthetise a young woman for a cholecystectomy. Just before nine o'clock, a message was received that the surgeons would be late. I ambled off to get a cup of coffee and a few minutes later theatre sister popped her head into the coffee room. 'Change of plans in your theatre. They are doing a liver transplant instead.' I flew back to the anaesthetic room. It was just possible that this was a joke, but it wasn't. There, in my anaesthetic room, replacing my plump lady, was a thin middle-aged man, yellow as a guinea.

### Preoperative preparation

I went to the telephone: what I needed was a consultant anaesthetist and fast! But none could be found. I traced my fellow senior registrar. He was at Douglas House, a small hospital down the road where, among others, renal transplants were carried out.

He was about to anaesthetise two patients, each of whom was to receive a kidney from the same donor. He had heard rumours that the liver was to be used as well. He confirmed that consultant anaesthetists were in very short supply that day and said that when he was finished he would come over, but in the meanwhile I would just have to get on with it.

'But', I bleated, 'I was told not to anaesthetise for a renal transplant. I'm sure if they had thought to mention it they would have forbidden livers as well and, anyway, I don't know the routine.' 'Well,' he replied, 'nobody here does know about livers. We haven't done one before. Tell you what. I will tell you what we do for kidneys and you can adapt it for livers.'

I returned to my anaesthetic room and surveyed my patient. I suspected that there might have been some blood loss as ten pints had been cross-matched. He already had an intravenous line in situ but I was reluctant



to use this for drugs. So I inserted, not without difficulty, a Mitchell needle into the dorsum of one hand. I hoped that, when he was anaesthetised, another suitable vein would become obvious for the insertion of another drip.

### **Anaesthesia**

I anaesthetised the patient when requested to do so; it was obvious that whatever the operation involved, the patient would have to be relaxed and ventilated. He was unpremedicated so I gave him some atropine, followed by a small dose of thiopentone and used Scoline to facilitate intubation. If the operation was going to be prolonged, a Scoline apnoea would be of little account. As it happened, he metabolised his Scoline fairly fast and I then gave him Flaxedil (gallamine) reasoning that as this was excreted by the kidney it should be the relaxant of choice in this patient. Anaesthesia was maintained using nitrous oxide, oxygen and Trilene from a Boyle's bottle, whilst an East Radcliffe ventilator was employed.

It was an hour or so into the operation before one of the surgeons asked who I was and introduced himself as Professor Calne. We agreed to shake hands later.

### **Monitoring**

How did I monitor this patient? I had very little to help me - I had my eyes and fingers, of course, and a sphygmomanometer. What anaesthetic assistance did I have? Five years later, John Farman was to write that two experienced anaesthetists were essential. All I can tell you is that my fellow senior registrar came in early in the afternoon to say that he couldn't stop as he was late for his afternoon list. Beyond that, I was alone with only an anaesthetic nurse to help.

There was no biochemical or haematological assistance, except that blood was provided when further supplies were requested. I do recall that a total of 54 pints of citrated blood was transfused with doses of calcium intermittently and that I had attempted to warm the blood by placing the tubing of the giving set in a washing-up bowl of warm water.

The operation lasted all day, and at about seven in the evening the patient was transferred to the ITU. He continued to bleed and an hour or so later he was taken back to theatre where valiant attempts were made to stop the bleeding. Nineteen hours after the start of his operation he died.

### **Conclusion**

I fear I cannot show you any anaesthetic chart of this patient. All of his records have apparently been lost. This may account for the postscript to this anaesthetist's tale.

The first patient recorded as having a liver transplant in the Cambridge/King's College series was a woman and the operation took place on May 2nd 1968, eleven months after the events I have described.

## PERSONAL REMINISCENCES OF THORACIC ANAESTHESIA AFTER 1936

Dr Ruth Mansfield

### Introduction

Magill stated that 'Many of the notable advances in chest surgery which have been made since the end of the First World War would not have been possible without concurrent advances in anaesthesia'. This was also acknowledged by Tudor Edwards with whom he worked.

My personal reminiscences from 1936 are mainly related to the Brompton Hospital; most patients had pulmonary tuberculosis with cavitation and positive sputum, and were treated by 'collapse therapy'. Others had bronchiectasis with copious sputum which had to be controlled. At that time there were no antibiotics, antituberculous drugs, relaxants, ventilators or a blood bank as we know it.

### Staffing at the Brompton

The anaesthetic staffing of the Brompton comprised one anaesthetist to the Ear, Nose & Throat Department. The Thoracic Departments were served by a list of visiting anaesthetists as required. These included Ivan Magill, Langton Hewer, Frankis Evans, Rait-Smith, Machray and Rink, all of whom charged 3 guineas a session. There were two surgical firms who hardly spoke to each other and as there was an odd bed in the surgical ward, at each ward round each firm asked whose patient was in that bed?

There were no anaesthetic registrars, SHO's or residents and it was only after the war that part-time consultant staff anaesthetists were appointed. A senior registrar was shared with the Westminster Hospital. Any help for the anaesthetist was provided by a theatre technician, such as Crowley, who was badly paid, I think £11 a week. Magill encouraged the upgrading of these technicians and the formation of their 'Association' of which Crowley was a founder member.

### Drugs and monitoring

The drugs at our disposal were nitrous oxide, oxygen, chloroform and ether. The latter agent was avoided as it was thought to be too irritating to the lungs. Later on cyclopropane became available. All these inhalational agents were administered via an endotracheal tube because of the frequent need for suction of secretions from the highly infected lungs. Nembutal, Evipan or thiopentone, could be employed and Novocaine, amethocaine or Nupercaine were available for regional blocks or spinal analgesia. Alternatively, parenteral narcotic analgesics could be given.

Monitoring was essentially clinical and by today's terms fairly basic with observation of the patient's colour, pulse and blood pressure. Rectal saline was used for fluid replacement and I have known this to drip into the surgeon's boot if displaced. If necessary, a blood donor was obtained and cross matched, on the day.

## Anaesthetic techniques

The operations could be divided into those suitable for those on the chest wall, and intra-pleural procedures causing paradoxical respiration and therefore needing controlled ventilation.

Operations on the chest wall were mainly for collapse therapy for pulmonary tuberculosis and were most suitable for regional block anaesthesia. After a heavy premedication, a mixture of Novocaine (for its rapid effect) and amethocaine (for a prolonged action), was used, with added adrenaline for haemostasis. At first, an intercostal block of two nerves above and two below the ribs to be resected was performed and this was followed by infiltration of the line of incision with a weaker solution of the mixture. Later an improved technique for an 'upper thoracoplasty' was a brachial plexus block combined with a para-vertebral block and local infiltration.

The advantages of this regional analgesia were haemostasis and the preservation of some degree of a normal cough reflex to control 'spill over' and although sedated, the patient was conscious.

## Cyclopropane

Pre-war, Ralph Waters visited the UK and popularised the use of cyclopropane. It was thought to have considerable advantages, as it was non-irritating and could be used with a high percentage of oxygen. However, although effective in low concentrations it was expensive and very explosive and so had to be given in a closed circuit with  $\text{CO}_2$  absorption by a to-and-fro method using a Waters canister (the gas inlet was near the patient and the bag was free for positive pressure ventilation). The dangers of explosions meant that cyclopropane could only be used for operations on the chest wall, and it was important to ensure that there was no leak from the apparatus. Diathermy was not used!

Its explosive properties were demonstrated to me personally in Sully Chest Hospital near Cardiff. The case was a pneumonectomy for bronchiectasis in a teenager. Topical analgesia to the pharynx and larynx was followed by intravenous thiopentone and intubation. The tube was connected to a Waters cannister and bag, and 50% cyclopropane and  $\text{O}_2$  were given while the throat was packed to steady the tube. Suddenly, the bag - which was new and had been washed and dried by Sister - blew off, splitting nearly in two. We waited about an hour and the patient seemed stable so we proceeded with the pneumonectomy. The patient fortunately made an unevenful recovery, but the postoperative chest X-ray showed some evidence of 'blast' injury to the mediastinum.

## Intrathoracic operations

Intrathoracic operations presented problems of the open pleura, paradoxical respiration and sputum control, particularly in those operations performed with the patient placed in the lateral position. Sputum control was achieved by three possible methods: firstly, the use of blockers or endobronchial tubes, secondly, by using posture and, in particular, the prone position and, thirdly, by employing spinal analgesia in a conscious patient with an intact cough reflex.

With general anaesthesia in the lateral position, the surgeon (and the patient) depended on the anaesthetist to protect the sound lung from secretions from the infected side. Magill initially used a gum elastic suction catheter with a small rubber balloon fixed to the distal end, which he placed in the bronchus to be resected by direct vision through a rigid bronchoscope. On the first occasion this was tried, (Crowley told me) Magill didn't tell Tudor Edwards what he had done, neither did Tudor inform him when he was about to clamp and divide the bronchus, so a few words were exchanged when a foreign body was found in the specimen!

The commercially developed Magill blocker was a long narrow double rubber tube with an inflatable latex cuff at the distal end for blocking the bronchus into which it was inserted. The small tube for inflating the cuff was moulded into the wall of the larger suction tube, where a stylette was placed to enable its introduction through a small 8-9mm rigid bronchoscope. The stylette was removed after a cuffed endotracheal tube was placed alongside the blocker, for ventilation of the lung and lobe which remained unblocked. The lung or lobe beyond the blocker was then deflated and the secretions lying there were drained or sucked out. Later, Thompson designed a larger blocker which could only be introduced through an 11mm bronchoscope, but this larger tube provoked an increased leak, during ventilation, between the blocker and the endotracheal tube placed alongside it. When the bronchus was about to be clamped, the blocker and endotracheal balloons were deflated and the blocker withdrawn, aspirating at the same time. The endotracheal cuff could then be reinflated.

For a right pneumonectomy, Magill used an armoured endobronchial tube made of latex over a wire spiral which he passed into the left bronchus. The endobronchial tube for the right bronchus (used for a left pneumonectomy) had the lower 3cm of wire spiral uncovered by latex, so that the right upper lobe bronchus which is nearer the carina, could be ventilated. These tubes had a large cuff at the carinal level and the tube was introduced under direct vision over a straight Magill bronchoscope.

A wide variety of special tubes for thoracic anaesthesia were developed by those who worked in this field. These included:

1. Machray - a small cuffed rubber tube to be placed in the left main bronchus.
2. Macintosh Leatherdale - also for the left side with an incorporated sucker and shaped for blind intubation.
3. Pallister tube (Brompton) with a small balloon in the left side and a larger one in the trachea, introduced over a Magill or Mansfield bronchoscope with a side inlet for  $O_2$  supply.
4. Carlens tube had been used for bronchspirometry for either lung but its main drawback was a narrow lumen which offered some resistance to ventilation or suction.
5. Gordon and Green designed a tube so that the right upper lobe could be ventilated if passed into the right main bronchus.

## Posture

A prone position could be used to control secretions if the surgeon was willing to have his patients so positioned. Several of these were described, including:

- Overholt's, who had the affected side lower so that secretions were retained 'unless squeezed out'. The patient lay on a 'special' Overholt table with the abdomen free to enhance ventilation via an endotracheal tube.
- Parry Brown used a simpler method with sorbo-covered wooden blocks placed under the shoulder girdle and another under the pelvis leaving the abdomen free with the affected lung uppermost. Free drainage of secretions into the trachea took place which were removed by intermittent suction by the anaesthetist who had to crouch almost under the table. This often proved difficult especially when employing hand ventilation!

As blockers or endobronchial tubes were unsuitable for small children with sputum, the prone position was the method of choice.

## Other techniques

In 1937-38 spinal analgesia was tried for thoracotomies using the Howard-Jones technique with 1:1500 Nupercaine. After some success, the Etherington-Wilson's method was tried, also with light Nupercaine 8-12ml with the patient sitting up with head bent forward for 60 seconds giving a limited analgesia to T4.

One afternoon, one of the frequent visitors to the unit was asking about the case and I mentioned we used Etherington-Wilson's technique: he said 'I am Etherington-Wilson'!

The importance was soon realised of postural drainage and physiotherapy to improve the patient with sputum, and a Physiotherapy Department, was developed at the Brompton.

## War experiences

Just before, and during the war, chest surgeons and anaesthetists travelled to various chest hospitals and sanatoria away from London (even as far as Sully, which was near Cardiff, every other weekend). Cases from Brompton were transferred to Frimley, the country branch, which had a converted theatre with stained glass windows. The Brompton surgical sisters and nurses were housed in a nearby mansion and were ferried to the sanatorium by minibus until it rolled off the road one day! Fortunately, only bruises resulted. We returned to a theatre in the Brompton Hospital Outpatient Department on the ground floor.

The King's College 'Sector Hospital' was set up at Horton, an Epsom mental hospital, and a chest unit staffed by chest personnel from Brompton, St Thomas's, Guy's and King's. Norman Barrett of St Thomas's and Brompton described the hospital as too complicated, once inside, to find the way out. It is noteworthy that if a private room was needed for a patient, then a padded cell could be used!

On D-Day, teams of doctors and nurses from Scotland came there to deal with the expected casualties but after the start of a more concerted bombing campaign and the use of V1 Doodlebugs, it became too dangerous for them to travel round London from their billets to the hospital. We then received some German prisoners, so the Scots returned once more. A rota for duty was set up by Sir Victor Negus and we were told to tackle any bomb casualties, regardless of who was on duty. On one occasion a King's gynaecologist was on duty when a bomb casualty was transferred from Croydon with splinters on the mediastinum and I was asked to anaesthetise. Having prepared suckers and IV drips etc. the gynaecologist plunged a Volsellum forceps into the wound and extracted the foreign body with great triumph and much sarcasm aimed at thoracic surgeons, but the patient was later transferred to them for treatment of her haemothorax.

### Conclusion

As pulmonary tuberculosis and bronchiectasis have declined, other problems have increased, such as carcinoma of the bronchus and cardiac disease both congenital and acquired. These have needed the expertise developed from the earlier thoracic cases and this need for expertise still exists, but this will require another story.

## EARLY DAYS IN PAEDIATRIC ANAESTHESIA

Dr G Jackson Rees

My involvement in paediatric anaesthesia began in 1948. This was a time of very exciting development in adult anaesthesia, for we were still learning how best to use the relaxants and the surgeons, revelling in the freedom provided by the advances in anaesthesia, were undertaking increasingly radical and, in retrospect, sometimes bizarre operations. I was very reluctant to be diverted from this scene to one which, in my ignorance, I believed would comprise open-ether anaesthesia for hernia repairs, orchidopexies and most of all, the excision of tuberculous glands in the neck, leavened by the occasional hare-lip or cleft palate repair. I was soon to learn how wrong I had been.

### Influence of Isabella Forshall

The reason for my diversion was that Isabella Forshall, the paediatric surgeon, asked Professor Gray if his newly formed Department could interest itself in the development of paediatric anaesthesia, a task which he passed to me.

Isabella Forshall was a remarkable woman. She was born in 1900 into an extremely affluent background in West Sussex where her family owned substantial properties. She never went to school, but was educated by a succession of tutors, and by her mother who was one of Girton's earliest students. When asked what her family thought of her ambitions to study medicine, she always said that they expected social responsibilities and obligations to take priority, but there was no active discouragement. This attitude is typified by the response of her father when she went to his room to say goodbye, before catching the very early train to London to start her studies at the Royal Free Hospital: it was 'I have forgotten where you said you are going, but do have a good time'. This might be thought to be an unpromising background for a girl of that era to pursue a career in a male dominated and prejudiced world, but she did achieve great things, and became the second President of the Association of Paediatric Surgeons.

Not only did Isabella Forshall initiate the development of paediatric anaesthesia in Liverpool but, for the succeeding years, she was a stalwart support and constant and generous in her appreciation. For this she deserves inclusion in any account of the story of paediatric anaesthesia in Liverpool.

### Early beginnings

The anaesthetic service which she felt so inadequate was, one imagines, not uncommon at that time in most parts of the country, but today is unbelievable. The anaesthesia for routine lists was provided by a great number of honorary anaesthetists, each doing one or two sessions a week. There were no residents, and anaesthesia for all emergencies was provided by the duty house physician. There was a widespread belief that children did not tolerate prolonged anaesthesia, and therefore fast surgery was greatly admired. There was one surgeon who retired shortly after I arrived who could normally

complete a Ramstedt's pyloromyotomy in 3 minutes, and a baby hernia in 4 minutes. I found on the few occasions that I anaesthetised for him with open-ether that I could usually get the patient induced by the time the surgery had finished!

I was soon to learn that there was much more to paediatric surgery than I had imagined. In Boston in the late 1920's Ladd, who is considered the father of paediatric surgery, had been carrying out a new specialty, and his work continued in the 1930's in association with Gross. Their contributions to children's surgery were emulated in a few centres in Europe and the United States. In the UK, notably by Twistington Higgins and Denis Browne at Great Ormond Street, and by Dodd in Edinburgh. During the war years isolated reports of successful surgery for a number of congenital anomalies in neonates began to trickle in. These included diaphragmatic hernia in 1940, primary repair of tracheo-oesophageal fistula in 1941, and gastroschisis in 1943. The emergencies of the war delayed progress in this field in Great Britain. The first successful repair of tracheo-oesophageal fistula in the UK was reported by Franklin in 1947, and the anaesthetist was J P Payne.

### Developments

It was Forshall's awareness of these developments and her determination to become part of them, which accounted largely for her plea for paediatric anaesthesia.

Her other concern was for the welfare of the children and she hoped we might reduce the trauma of the induction of anaesthesia. These were the bad old days when parental visiting was restricted to a few hours twice a week, between which the children spent hours in a state of withdrawn apathy; there was little awareness of psychological needs.

Most of the problems of anaesthesia were solved by adapting the Liverpool adult techniques for children, but this in turn demanded the development of a means of ventilating the infant with a T piece. The use of a bag aroused a certain interest and we had a number of visitors to see this, amongst them, Philip Ayre himself, and he did not whole-heartedly agree with what we had done, and in common with others felt that there must be a significant re-breathing. The only way to establish that this was not so in those far off days was to measure the total blood CO<sub>2</sub> with the Van Slyke technique, lowering the fresh gas flow until the value began to increase. We found this to occur if the fresh gas flow was reduced below 220 ml/kg. A figure surprisingly close to the minimum fresh gas flow requirement found by successive authors of the numerous papers published over the next 30 years.

The problem of expanding the department to provide some semblance of adequate cover took several years. We started with one SHO in the first year, who was my dear colleague Alan Stead, and between us we provided an emergency service. In the second year he became research Fellow and we had a new SHO. Over the years, Stead, Bush and Nightingale joined the consultant staff, and so what started with one totally ignorant young chap became what I hope was a moderately effective Department of Anaesthesia.



## IN CUSHING'S FOOTSTEPS

Dr Jean Horton

### Introduction

Harvey Cushing was the founder of modern or twentieth century neurosurgery and his contributions are inextricably linked with the development of neuroanaesthesia. He introduced the first anaesthetic records, monitoring of blood pressure and local anaesthetic techniques for major surgery and suggested controlled hypotension.<sup>1-3</sup> He also trained three of the founders of British Neurosurgery, Norman Dott of Edinburgh, Hugh Cairns of the London and Oxford, and Geoffrey Jefferson of Manchester and, over the years, I have had the privilege of working either in departments they had founded or with neurosurgeons they had trained.<sup>4,5</sup> I wish to trace some of the developments of neuroanaesthesia from 1953 to 1990 from my personal experiences in London, Edinburgh, Cambridge and Hong Kong.

### London

My interest in anaesthesia for neurosurgery began in 1953, when I was training at the Hospital for Sick Children with Sheila Anderson who gave anaesthetics for Wylie McKissock, and at the London Hospital where anaesthetics for the neurosurgeons Douglas Northfield and Jack Crawford were always given by one of the anaesthetic registrars.

Although in the 1950's neuromuscular blockade and manually controlled ventilation were widely used for abdominal and thoracic surgery, it was still believed that spontaneous ventilation should be preserved for craniotomies, so that the integrity of respiration could be monitored, and it was customary to use the Magill breathing attachment, and nitrous oxide, oxygen and trichloroethylene vaporised from a Boyle bottle. The tachypnoea induced by the latter was controlled with intermittent doses of pethidine. Endotracheal intubation for neurosurgical cases at the London was accomplished with an induction dose of thiopentone, and an injection through the cricothyroid membrane of 4ml of 4% lignocaine, since Douglas Northfield did not approve of muscle relaxants. He did not know that I had used suxamethonium to facilitate intubation while we were in the anaesthetic room, and he was not there to see what was happening. Brain bulk was reduced by ventricular drainage and the surgeon had to be warned to hold on to the brain if there was a risk that the patient might cough.

### Edinburgh

My full-time career as a specialist neuroanaesthetist began in Edinburgh in 1960, where the Department of Surgical Neurology was led by Norman Dott who was well aware of the contributions already made by anaesthetists to neurosurgery,<sup>4</sup> and my senior colleague was Allan Brown. By that time several people, the Australian, Diana Furness, Peter Mortimer from Bristol,<sup>7</sup> Allan Brown and Andrew Hunter<sup>8</sup> had realised that controlled mechanical ventilation with the use of neuromuscular blockers improved operating conditions, and so it became the practice to use controlled ventilation for all supratentorial craniotomies and spinal operations. Since positive ventilation elevates the mean intra-

thoracic pressure,<sup>10</sup> we tried to overcome this problem by using a negative pressure of up to 10cm of water on the Newcastle 3 ventilator,<sup>11</sup> and the Barnet ventilator, often by attaching the wall suction to the ventilator.<sup>12</sup> This practice was abandoned following adverse reports in the literature, observation of air trapping in the open chest, and that operating conditions did not seem to be improved.<sup>13,14</sup>

The introduction in 1960 and 1961 to the United Kingdom of the potent analgesics phenoperidine and then fentanyl led to their use as analgesic supplements replacing pethidine, and reducing the need for inhalation agents.<sup>15</sup> Halothane gradually replaced trichloroethylene, but there were suspicions that it raised intracranial pressure and it needed the late Gordon McDowall to show us that this indeed was so.

### Hyperosmolar diuretics

When I first started in Edinburgh we used 100ml of 15% saline intravenously to control cerebral oedema, and urea when a commercial preparation became available. Both of these agents were very effective, but caused vicious sloughing of the skin if given extravascularly or there was any extravasation. In 1961 mannitol became available, used at first in a 25% solution, but crystal formation in the bottles was such a problem that it was replaced by the 20% solution.

### Elective hypotension

I was introduced to hypotensive anaesthesia by Hale Enderby in 1951 while I was a Senior House Officer anaesthetist at the Queen Victoria Hospital, East Grinstead, and subsequently was always interested (and inspired by Sheila Anderson) in its application to neurosurgery as part of a continuous search for improved and safer operating conditions for aneurysm surgery. My friend, Dr Margaret Rooms, had been given some trimetaphan by a colleague in the United States, and I started to use it at the London in 1954. By 1960, when I went to Edinburgh, Allan Brown had already evaluated and abandoned hypothermia and arteriotomy as hypotensive techniques for neurosurgery and the usual technique in the 1960's was to use trimetaphan. At that time I avoided using halothane as a supplement. In 1965 and 1966 we had an interesting time. Having visited Jack Small and Victor Campkin and their team in Birmingham, we did eighteen aneurysm cases in which, under hypothermia, a cardiac pacemaker was inserted, tachycardia of 200 to 250 beats a minute induced, and with a fall in cardiac output the blood pressure rapidly and dramatically dropped. Such a technique was complicated,<sup>16,17</sup> time consuming and dangerous and did not prove to be of any advantage.

In 1970 I had moved to Cambridge and at that time there was renewed interest in the use of sodium nitroprusside (SNP) as a hypotensive agent. At first, our pharmacy prepared it for me, and then a commercial preparation became available. I found that despite the tachyphylaxis and tachycardia seen with SNP, when it was combined with a low concentration of halothane, a satisfactory and controllable level of hypotension was obtained. This can now be achieved, as I practised when in Hong Kong, by using isoflurane alone, with or without the aid of beta blockers. As the years have passed and neurosurgical techniques have become easier and improved with the introduction of the operating microscope, there is now probably no need to use a hypotensive technique.

## Brain protection

With the growth of knowledge about intracranial pressure and cerebral blood flow and the effects of 'physiological trespass', there had always been a search for techniques to provide 'brain protection'. Hypothermia had of course been one approach. In 1978, in Cambridge, we tried the use of high doses of thiopentone, 30mg/kg in fifty cases, but found it to be of no benefit.

## Head injuries

In Edinburgh, Norman Dott and John Gillingham, and in Cambridge, Walpole Lewin, had set up and developed specialised head injury units. Decerebrate spasms, hyperventilation and hypoxia were common observations in severe diffuse brain injuries, and it seemed that the lessons learned in the operating theatre could be applied to the patient in the ward. In 1960 we had in the head injury unit operating theatre in Ward 20 of the Edinburgh Royal Infirmary, one of the two Newcastle 3 ventilators which were available for the entire hospital. The only other available ventilators in Edinburgh at that time were four Barnet ventilators, which belonged to Surgical Neurology at the Western General Hospital.

In 1964 six serious head injuries were managed with controlled ventilation and, at the suggestion of John Gillingham, I went to the Ospedale Maggiore in Milan, to see Drs Mimmina Bozza and Marina Rossanda, who provided increased enthusiasm and inspiration for the use of the technique. They, together with Emeric Gordon of Stockholm, were the real pioneers of controlled ventilation and intensive care for head injuries, but I did not agree with their practice of ventilating every head injury that was admitted and preferred to rationalise the practice with clear indications for the therapeutic use of controlled ventilation.<sup>18,19</sup>

In Edinburgh we conducted all explorations of the posterior fossa in the prone position, but in Cambridge, Walpole Lewin and his colleagues, and in Hong Kong the neurosurgeons preferred the sitting position. The hazard of air embolism being well known, I preferred to monitor the end-tidal CO<sub>2</sub>, which gave adequate early warning of such an incident. Before the introduction of the CT Scanner, the only way to outline the cerebral ventricles was by the introduction of air to the ventricles. When performed by the lumbar route, lumbar air encephalography (LAEG) was very uncomfortable for the patient. Combinations of the butyrophenones (Droperidol) and analgesics were used with some success to decrease nausea and discomfort. Ketamine, in spite of reports of increased intracranial pressure, was successfully used and facilitated LAEG and then CT scans in children.

## Hong Kong

The descendants of Cushing, be they anaesthetists or surgeons, are now working all over the world and I have been able to work with many of them. I was able to end my anaesthetic career in Hong Kong at the Chinese University of Hong Kong and its teaching hospital, the Prince of Wales in Shatin in the New Territories, where we had all the state-of-the-art monitoring equipment. My neurosurgeon then was Wai Poon, a Glasgow trainee.

## Conclusion

We have come a long way since this statement, appeared in an editorial of the British Journal of Anaesthesia in 1965.<sup>21</sup>

'However, if the contribution of anaesthesia to neurosurgery is firmly established, its basis remains largely empirical. There is little precise knowledge of the numerous and inter-related ways in which anaesthetic agents influence surgical exposure of the brain. To extend this knowledge, and to participate in (initiate, even) the circumvention of those formidable anatomical and physiological obstacles which appear to bar the way to radical new progress in neurosurgery, is the challenge for the future.'

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## 'Worm's Eye View'

Dr W K Pallister

### Introduction

In the 19th century, doctors in Europe, notably Henry Hill Hickman, searched for a method of relief of pain during surgery. He used inhalation of carbon dioxide on rats but unfortunately, the narcosis produced was often fatal. Why then did it fall to Crawford Williamson Long, Wells and Morton to invent inhalation anaesthesia, the name suggested by Oliver Wendell Holmes? Ether 'frolics' were known from colleges in America and itinerant so-called 'Doctors of Chemistry' demonstrated the effects of 'laughing gas' at fairs. A pioneer society, pushing west for land and fortune, was prepared for utmost privation and tremendous risk. Long and Morton were prepared to push ether beyond the stage of simple frolics to full anaesthesia. What then did James Venable feel when he underwent anaesthesia for the removal of a tumour from his neck in 1842?

### Childhood anaesthetics

Much the same I suspect as I did in February 1930 - aged 3 years and 11 months - taken down a dark corridor, a sheet put over my mouth and a sickly smelling liquid poured on, presumably chloroform, by the ugliest man I have ever seen. It turned out later it was a lady anaesthetist. I had been taken by my grandmother for a day in Newcastle-upon-Tyne in the North East of England. On the station I vomited over her and complained my cap was tight. Twenty four hours later I was taken by Rolls Royce taxi - since in those days there were few ambulances - to Sunderland Royal Infirmary with acute mastoiditis.

Aged 6 and a half I had my tonsils removed on our pine kitchen table in the sitting room of the house, cleared of all furniture and with papers on the floor. The anaesthetist was our general practitioner, Dr Bruce Lowe, a Scot. He asked if I knew any nursery rhymes but I thought this was 'cissy' and anyway was not going to cooperate. He put what I now know to be a Schimmelbusch mask (of a superior variety, bound with leather) over my face; my first open ether induction. (A taxi driver took me home recently. He said he had had his tonsils removed at Outpatients at St Bartholomew's Hospital at the age of 4 and a half, and they had put what he thought was a tea-strainer over his nose and mouth.)

Aged 7 and a half, I woke on the floor of a dental surgery, having had a nitrous oxide/oxygen anaesthetic - maybe there was no oxygen. Who knows what brain damage I sustained. Perhaps otherwise I may have been able to become a surgeon or even a successful lawyer. In 1935 my father was promoted to Newport in South Wales and I had the good fortune to go to the local grammar school, Newport High School.

Aged 15 and a half, I rode home from school on my bicycle with right iliac fossa pain which even then I knew was retrocaecal appendicitis, unable to straighten my right leg but fortunately uphill, standing on the pedals. That night there was the usual air raid when we sheltered

under the stairs. One night we had been bombed, and had to move home. when you hear a stick of bombs dropping, each one becoming louder in its scream, then even the most ungodly pray and the bomb that nearly kills you is the one you do not hear, the fifth of the stick.

The next day I was carried out on a stretcher to hospital, and again an open ether induction. You breathe until you can no longer tolerate the burning vapour, your head spins but when you try to remove the mask, your right hand has lost its cunning. Again, I should have died in those pre-antibiotic days.

### Post qualification

When I qualified in 1949, I had been taught the rudiments of anaesthesia on ten adult patients. On the second day of my second house job the registrar said: 'Tomorrow we have a list of children, 3 months to 3 years old, for outpatient operations - circumcisions, herniotomies. You will do the first operation, I will give the anaesthetic, then you will give the next anaesthetic.' This is the principle of 'see one, do one, teach one' (Tale of the Three Wise Monkeys) - normal training 50 years ago. In the time I was house surgeon I gave up to 100 anaesthetics, using ethyl chloride/ether, fortunately without any mishaps since we had not been taught to resuscitate.

I became House Anaesthetist at Westminster Hospital, when Barrie Fairley - now Professor and Chairman at Stanford - was leaving, not because I wished to become a career anaesthetist but because I wished to have a further year at my Alma Mater, to play cricket and rugby. I was taught by such outstanding men as Sir Ivan Magill, pioneer and master of the art of blind nasal intubation, Sir Geoffrey Organe, J B Wyman, Cyril Scurr and Tony Edridge, pioneers of induced hypotension by ganglion blockade.

When there I took part in an amputation under refrigeration analgesia, as suggested in the 16th century by Severino, to relieve pain during perineal lithotomy and by the relief of pain noted during amputation by Baron Larrey on the winter battlefield in the retreat from Moscow. I also gave two anaesthetics with chloroform without a death, although I myself expected to be struck dead any minute. I also used compression analgesia, as suggested by Ambrose Paré and James Moore, before piercing my sister's ears for earrings with a needle and which had been heated to red heat and mounted in a cork. She felt no pain and had no infection.

I was told that if I wished to become registrar I must take the two-part Diploma in Anaesthesia. Perhaps because this was not all important to me, I was not worried by the prospect. I passed the exam with minimal effort - I had no wish to become an anaesthetist.

I then did my National Service in the Royal Air Force in Aden - now in Southern Yemen - where I was the only trained specialist anaesthetist in the colony; I also attended the civil hospital and locally-recruited Arab troops' hospital. The Arabs often did not trust one to give them a general anaesthetic, liking to be awake, so I learnt spinal anaesthesia which most in England were afraid to do because of litigation after two famous catastrophes ending in paraplegia.

## Thoracic experience

I returned to Westminster Hospital where I had my first thiopentone induction of anaesthesia before going to the Brompton Hospital where I was privileged to work with such eminent surgeons as Sir Clement Price Thomas, who encouraged me to develop the Brompton endobronchial tube for use in reconstructive bronchial surgery. He had done a pneumonectomy on King George VI. Lord Brock, Bill Cleland and Os Tubbs were pioneering blind mitral and aortic valve surgery, then open heart surgery, with hypothermia by surface and veno-venous cooling. Later, Charles Drew at Westminster used deep hypothermia down to 12° using the lungs as oxygenator. When pump oxygenators were introduced, the results were catastrophic. On Wednesdays in London, at Guy's, Bart's, Middlesex, London Chest and Brompton hospitals, patients were put on the table at 8am and twelve hours later we were desperately trying to stop bleeding. 'The red ink syndrome' we called it - no coagulation.

While at the Brompton I was the only doctor looking after an early intensive care unit when many of the patients had undergone lung resections and although we were measuring FEV1 and FVC at that time, we did not know that one could not resect a lung in a patient whose FEV1 was less than 1 litre. We had to ventilate for long periods and were ultimately unable to wean them from the ventilator. Blood gases were purely academic. We had them twice a week, courtesy of the research physiology department.

I was then lucky to be appointed to the Middlesex Hospital where I was involved in major reconstructive gynaecological and urological pelvic surgery with Richard Turner-Warwick and lucky to travel with him to lecture and demonstrate our technique in Madrid, Mainz, Darmstadt, Lyon, St Gallen and Alexandria. Later I was lucky to return to lung and heart surgery which had always been my main interest, with Jack Belcher and Sir Thomas Holmes Sellors, using the face-down Parry Brown position for lung surgery. Later I was with Tom Treasure during cardiopulmonary bypass surgery.

During this period, while I was re-learning these skills, it was my registrars who taught me, who all rotated through the main London centres. They all had different techniques and I stood and learnt from them while taking responsibility for the patients' care. It is salutary that learning is a two-way process and we learn from our students.

In the last year of my practice, I had four operations for fistula in ano - not life threatening but extremely painful. How the medieval knights, in whom this affliction was common, tolerated this without anaesthesia, I do not know.

## Medico-legal experiences

Again, in the last year of my practice I was told I was being sued for negligence. I had anaesthetised a 75 year old man for a 35 gm transurethral resection of the prostate - hardly an ordinary office procedure - who would have died without it. He was slow to wake after the anaesthetic and confused, but left hospital in normal time 8 days later. He never needed intensive care. We heard no more - no complaints when seen postoperatively six weeks later. His wife later

complained she had expected to take him home by public transport but had to take a taxi cab which she could not afford. Ultimately, two and a half years later, we heard we were being sued for negligence. In the first claim, she thought his operation had been at University College Hospital, but it was at the Middlesex. He had died of Alzheimers dementia and it was claimed it was caused by the anaesthetic. He had been highly intelligent - at bingo - but after the operation was no good at all. He had been in charge of 50 bricklayers before he retired 10 years earlier. The widow had legal aid. The hospital had lost the notes - they didn't even know who the surgeon and anaesthetist had been! The hospital solicitors thought they should interview the junior anaesthetist, Dr Pallister. Ultimately, when they found the notes, it was a mixture of two patients' notes. Fortunately I had my personal Nosworthy record. I went to a meeting at 5pm on Friday, with expert witnesses, which lasted two and a half hours. Most agreed that this patient had a transurethral resection absorption syndrome, but the 'Expert Witness' for the plaintiff - a most distinguished man - criticised everything I had done, including the fact I had only recorded BP every 5 to 7 minutes. His systolic blood pressure was never below 95, nor was it in recovery when he bled. When the defence experts were leaving, I heard the counsel say to the defence solicitor 'You do realise I am pencilled in for that week'. So, on the Friday before we were due in the High Court I had to see a new counsel but a medical expert for the defence also came who had treated the patient for thyrotoxicosis. He said we had not seen a postoperative sub-conjunctival oedema but thyrotoxic eye disease.

The case was settled on the steps of the High Court, since even if we had won it would have been extremely expensive for the National Health Service in lawyers' fees. The only good thing was the look on the expert's face when he realised he was going to lose four days 'Expert Fees'. 'Who steals my purse, steals trash. 'Tis something nothing. 'Twas mine; 'tis his, and has been slave to thousands, but he who filches from me my good name, robs me of that which not enriches him. And makes me poor indeed'. (Othello) My name was besmirched.

This plague - the new Black Death - has spread from American to English law courts. I am glad to learn that the American Anesthesia Association is going to insist that 'experts' should both be licensed in the State and practising. Hopefully, it will immunise us in England but America did give us the great gift of ether anaesthesia.

### **Anaesthetic deaths**

My first anaesthetic death, in 1952, was a lady who had had a thoracoplasty for pulmonary tuberculosis, aged 21. Eight years later she was told she could have a baby. She was brought into hospital four weeks before term to rest. It was mistakenly believed that pushing in the second stage of labour might damage her lungs and a decision was taken to use forceps after one hour. This was delegated to the resident houseman/obstetrician. During open ether induction she regurgitated twice - not uncommon. We all feared vomiting and inhalation. She had had nothing by mouth for 11 hours. A healthy child was delivered after it had been turned from occipito-anterior to posterior then back again. Two hours later she was in acute respiratory distress, four hours later she was dead.



Mendelson's syndrome was hardly known then. The consultant obstetrician said: 'Thank God it was you, thank God it was you'. At least I had the DA. Three weeks earlier it might have been the obstetric houseman who had given the anaesthetic. But the Anaesthetic Department had insisted that they be responsible for all anaesthesia. A motherless baby, a distraught father and a dead mother. Why become an anaesthetist? But if you give in excess of 1,000 major anaesthetics a year, you will have to face this possibility.

The penalty for being at the growing edge of surgery for me was, one night after a curry dinner I was conned into anaesthetising a dog that had had a thoracotomy and experimental cannulation of major vessels. He had been fed and watered by the team of which I was no part. My colleague said he wanted to obtain an ECG of a dying heart. Anyone of the team would gladly have taken him but due to anti-vivisectionist activity, any dog in his situation had to be killed. He wagged his tail as I put in the Pentothal. Life's candle gutters, and snuffs out. I have hardly been able to look the dogs I have since had in the eyes. If Hell is as Hieronymous Bosch painted it - I shall be one of the tormented souls. The Greeks call it 'Hubris' - impiety, nemesis' - thou art found out that 'Catharsis' - admit your sins. At Balshazzar's Feast, a hand wrote on the palace wall 'Mene, mene, Tekel Upharsin - Thou art weighed in the balances and art found wanting.' (Daniel V, 25).

## JOHN SNOW'S ALMA MATTER

Dr R H Ellis

During the past 7 years I have made a complete transcription of the manuscript of Dr John Snow's Case Books, and am now preparing it for publication in 1994. The Case Books<sup>1</sup> provide an absorbing account of Snow's work as an anaesthetist and, to a lesser extent, as a family doctor, and I would like to describe the circumstances which led to Snow's giving three seemingly unremarkable anaesthetics which he recorded amongst the hundreds of others in his Case Books. Several distinct threads can be woven into a story which is very much a personal reminiscence - but that of a patient rather than a doctor. The subject, Snow's 'Alma Matter', concerns not his schooldays, but the Crimean War instead.

**The origins of the Crimean War**

In the first half of the nineteenth century the once great Ottoman Empire was on the point of breaking up completely, and this led to a power struggle between Britain and France on the one hand and Russia on the other. In essence, the Russians wished to annexe the Black Sea lands and Turkey. Britain and France (to protect their own, threatened, imperial interests) offered support to Turkey and, for a while, this discouraged Russian ambitions. The whole problem was referred to as the 'Eastern Question' and came to be an increasingly important political conundrum in the nineteenth century.<sup>2</sup> The pot boiled over at the beginning of 1854, when the Russians struck against the Turkish navy, and the Turks were massacred. There was outrage in Britain and France, and a determination to settle the 'Eastern Question' once and for all. Further attempts at diplomacy were tried, but preparations for war began in earnest.

Russia was able to menace Turkey and, in turn, threaten Europe's trade routes because of the forces which she could bring to the area through the Black Sea port of Sebastopol. Sebastopol had superb natural defences and could not be taken from the sea. The military option was to mount a shore-based offensive, to occupy the Crimea, and to assault Sebastopol from the land.<sup>3</sup> War was declared at the end of March 1854<sup>4</sup> but this was anticipated, and fleet and troop movements towards the Crimea were begun several weeks earlier when a British Expeditionary Force left for the East at the end of February.<sup>5</sup> Amongst its number was Hugh Annesley of the Scots Fusilier Guards.

**Hugh Annesley**

Hugh Annesley was born in 1831, into an aristocratic Irish family. He was educated at Trinity College in Dublin and went on to join an infantry regiment of the British Army. He fought in the 'Raffir Wars' in South Africa, and was severely injured. Later, he resumed his service career in the Scots Fusilier Guards. At the outbreak of the Crimean War,<sup>5</sup> Hugh Annesley was 23 years old, and had reached the rank of Captain.<sup>5</sup> Annesley kept a diary of his Crimean experiences.<sup>6</sup> It is a dramatic and, quite literally, a blood-stained document in which he recorded day-to-day events whenever he could. This diary, taken together with a number of other sources, enables a fascinating tale of the times to emerge. Those other sources are plentiful, for the Crimean Campaign was the first in which War Correspondents were allowed virtually unrestricted access to the allied

forces.<sup>7</sup> This (coupled with the newly established electric telegraph) enabled, for the first time, immediate and detailed reporting of news about the war.

### The slow journey towards the Crimea

In its earliest stages the war was a popular one with the British people, and there was much patriotic fervour for the preparations which preceded its Declaration. Annesley's regiment was inspected by Prince Albert as it made ready, in London, to leave for the Crimea towards the end of February 1854, and their traditional Farewell Banquet held for Annesley and his fellow officers was reported and pictured in the 'Illustrated London News'.

Annesley's 'Crimean Journal' began with his entry for 28 February 1854 recording his Regiment's early morning departure, with colours flying, from the Wellington Barracks. On reaching Buckingham Palace, they formed up as on parade, lowered the colour and presented arms. Queen Victoria, Prince Albert and the older of the royal children appeared on the balcony and acknowledged the dawn salute. The soldiers then marched off to Waterloo - going from there by train to Portsmouth. Annesley noted in his diary: 'The streets were thronged with the weeping wives and relatives of the soldiers who, as some of them truly said, they should never see again.'

On the following day the troopships sailed from Portsmouth harbour. Once in the channel the fleet set course for Gibraltar. Annesley's ship had a very rough passage near the Straits of Gibraltar, and did not reach the port for some days. On 6 March, whilst Annesley was at Gibraltar, Snow (in London) would probably have read in his newspaper that Income Tax was to be raised to fund the now inevitable war in the East.<sup>10</sup> Annesley's troopship sailed on to Malta where his regiment stayed for five weeks engaged in training manoeuvres and in various social functions.

On 27 March Britain and France formally declared war on Russia,<sup>4</sup> and this was proclaimed officially at several sites, including the Royal Exchange in the City of London.<sup>11</sup> Jingoism abounded, and the announcement was greeted enthusiastically. Malta's insularity meant that Hugh Annesley did not hear officially that war had been declared until eight days after its announcement in Britain. As a soldier he had learnt at first hand what war involved, and his reaction was subdued. He wrote: 'The declaration is said to be very popular in England, but I don't fancy the fact itself will be, when the people who now shout so loudly, begin to find out what war means.'

On April 22 the Scots Fusilier Guards sailed from Malta for the Dardanelles, arriving at Gallipoli on 26 April, which was the day, back in Britain, declared by Queen Victoria to be a solemn day of National Fasting and Spiritual Preparation for War.<sup>12</sup> (It may be relevant that Snow's Case Books show that he did no medical work on that day, even though he was usually quite busy on Wednesdays around this time.) By 28 April Annesley's ship had sailed into the Bosphorus and arrived at Constantinople. Here he learnt that his regiment was to be camped at Scutari, which was on the opposite bank of the Bosphorus. The regiment was at Scutari for just under six weeks. It fared well enough and, again, carried out its training routines and parades. For example, 24 May was Queen Victoria's birthday, and this was marked by a ceremonial parade at Scutari.<sup>13</sup> It took place against the background of Scutari's huge and disused Turkish Barracks. Of this parade

Annesley wrote: 'I could not help thinking, as those proud battalions passed onward "with all the pomp and circumstance of glorious war", how many of these fine fellows would leave their bones on a foreign shore.'

The old Turkish Barracks at Scutari were commandeered by the British Army's doctors as their main casualty hospital for the coming conflict. In the early months of the campaign (that is, prior to Florence Nightingale's arrival at the beginning of November) the Scutari hospital was infamous and - as Lytton Strachey late wrote - 'behind its gates Hell yawned'.<sup>14</sup> At this stage it was one vast, verminous, insanitary and disease-ridden slum with no provision for the healthy, let alone for the sick, the wounded and the dying.

On 6 June, Annesley's regiment left Scutari on the next stage of their slow journey to the front. They sailed across the Black Sea to Varna. Hitherto, the British and French forces for the Crimea had been quite separate, but at Varna they joined together. The combined armies stayed at Varna for three months before sailing to the Crimea early in September. Initially, the time spent here seemed to go well. Within a week Annesley was able to write: 'I dined, slept, and breakfasted on board HMS London. Very jolly set of fellows.'

His next spell aboard HMS London was to be very different. At Varna, Hugh Annesley met his younger brother, Bob, who was in a cavalry regiment also heading for the Crimea. The planners intended that the military action would be well thought out and efficient, skillfully and bravely fought, and short and decisive leading to the rapid reduction of Sebastopol. At Varna, it began to dawn on the soldiers of all ranks that this was not to be. There had been a cholera epidemic in Marseilles just as the French Army embarked.<sup>15</sup> At Varna cholera began to devastate first the French and then the British armies. Annesley's diary describes, without complaint or comment, a rapidly deteriorating situation. Within two weeks of their arrival at Varna the troops began to suffer increasingly from dysentery, typhus and cholera. Their camp was very hot and humid, insanitary, and usually very wet. The epidemics worsened and Annesley, day by day, recorded the increasing death toll from cholera. In August he wrote: 'Our company with the general hospital have as much as they can do to bury the dead'.

The allied armies were at Varna for 3 months. By the time the British Force left, at the beginning of September, it had lost 1260 men without an enemy shot being fired<sup>15</sup> - indeed, the enemy was still more than 300 miles away. Most of the deaths were from cholera. On 2 September, just as he was about to leave Varna for the Crimean itself, Annesley heard of a disturbing memorandum sent out by the Army's doctors. He wrote in his diary: 'Dr Hall (the Principal Medical Officer) advises surgeons not to use chloroform in cases of severe gunshot wounds, on account of the severe shock the system would sustain.' Later, Hall was to be greatly criticised for this advice, and for almost every other aspect of the pitiful medical provision of which he had charge.<sup>14</sup> On 3 September the British forces sailed from Varna to rendezvous with the French fleet nearby at Baltchik Bay. The conditions aboard the ships were unhygienic in the extreme, and cholera continued to ravage the troops and sailors: the death rate on some of the vessels was appalling.<sup>16</sup>

## Related events back in London

Whilst that unhygienic and disease-ridden fleet was gathering at Baltchik Bay, back in London - in the equally unhygienic and disease-ridden rookeries and slums of Soho - the great cholera epidemic of September 1854 was reaching its height.<sup>16</sup> In just eleven days some 500 people died from cholera in the area of Soho which was immediately to the west of John Snow's former home in Frith Street.<sup>17</sup> Snow observed the epidemic as it spread throughout the very neighbourhood in which he had lived and worked for 18 years and had come to know well. Within a few days he had enough evidence to prove that it was an infective, waterborne disease, and that it was the water from the pump in Broad Street which had caused the outbreak. On the evening of 7 September - just as the cholera-ravaged fleet left Baltchik Bay for the Crimea - Snow went to St James' Church, Piccadilly, to tell the Vestrymen that the Broad Street pump handle should be removed: it was taken away on the following day.

The epidemic had been fearful, and the Middlesex Hospital, just a few hundred yards to the north of the epicentre of the Soho outbreak, was inundated with cholera patients, and its staff all but overwhelmed by the numbers.<sup>18</sup> Briefly, Florence Nightingale joined the staff at the Middlesex to nurse the cholera patients who flooded in from the surrounding streets.<sup>18</sup> Within days, as the Soho epidemic subsided, she turned her attention to the scandalous lack of official concern for the well-being of the British Forces in the Crimea. This was a subject which was then occupying a great deal of attention - mainly because of the trenchant and scathing reports sent to London by William Russell, the Principal War Correspondent of 'The Times'. Russell's reports caused a public outcry. National pride in the army in the Crimea quickly turned to national disgust at the ways in which the sick, and soon the injured troops, were to be cared for at Scutari. There was an insistence that something should be done. Florence Nightingale decided that she was needed with the Army in the East, but that, of course, is another story.

## The invasion of the Crimea, and the Battle of the Alma

The allied army eventually disembarked on the Crimea, at Calamita Bay, on 19 September<sup>3</sup> and began to advance southwards towards Sebastopol. Many of the troops continued to be overwhelmed by dysentery or cholera and died, or were returned to the ships. On the following day, Wednesday 20 September 1854, the first battle of the Crimean War - the Battle of the Alma - was fought. The front extended some three miles directly inland from the coast. The allied forces were advancing through the undulating country to the north of the Alma River: the Russian troops were in a commanding position on the heights to the south overlooking the river and barring the allied advance towards Sebastopol.<sup>3</sup> Extracts from Annesley's diary record vividly what happened: '...we came to the top of a low hill (and) saw the whole crest of the lofty heights opposite to us, covered with dense masses of Russian infantry, drawn up in battle array, and supported by a very numerous Artillery, and as the Allied forces advanced down the hill, the whole valley seemed alive with armed men steadily marching onward, in the most perfect order; a most glorious sight.'

The centre of the Russian defences was the Great Redoubt, a heavily-manned and well-fortified earthwork, armed with at least 12 heavy guns.<sup>3</sup> It was towards this that Annesley's regiment was ordered to advance. He continued:

'The Artillery began to play ... the cannon balls bounding along ploughing up the ground, sometimes plumping down close to our line, and then clearing us by a few inches. Some bearskins were knocked off by them ... I kept my eye on the large redoubt, where their guns were, and each time they fired wondered whether it was coming to me this time or not.'

Annesley's unit was ordered to go forward, and it crossed the Alma under heavy fire: 'The fire was so hot that you could hardly conceive it possible that anything the size of a rabbit not to be killed ... The bullets came through us and before us, at about 200 yards distance we saw the Russian redoubt ... I kept on shouting "Forward, Guards", and we got within 40 yards of the entrenchment when a musket ball hit me full in the mouth, and I thought it was all over with me.'

#### **Annesley's wounds, and how he coped**

Annesley was badly wounded. When he was hit he was turning his head back over his right shoulder shouting encouragement to his advancing troops behind him. The low velocity ball tore its way into his mouth through his left cheek, knocked out 23 of his teeth, and removed part of his tongue. It then ripped his upper lip as it went out through the right hand corner of his mouth. He stumbled back through a hail of fire to the safety of the river bank, found some cover and lay down. He was covered with blood and unable to talk. At first, he could not find any medical help and could hardly walk from the shock of his injury and loss of blood. The rest of his regiment went on to close combat with the enemy and, eventually, 3 hours after the action began, the Russian defenders retreated. <sup>3</sup>The allies, principally the British forces, had won the Battle of the Alma.

The news of the victory at the Alma was soon telegraphed to London and was announced to the City at The Royal Exchange without delay, <sup>19</sup> and the Lord Mayor of London interrupted a formal dinner in the City to announce the victory and to toast the army's success. <sup>19</sup> Back in the Crimea, however, Hugh Annesley could have been on a different planet. Eventually, he found a casualty station - an empty outhouse yet to be cleared of the litter and filth which was inside. He lay down on the floor, plagued by flies and dust, and spent the night there surrounded by the groans and cries of the injured and the dying, and of those who were undergoing severe operations close by without chloroform. He later wrote: 'Notwithstanding all the horrors of the scene I still felt thankful that I had escaped with life'.

Nonetheless, his severe facial and intra-oral injuries must have been horrific. He would have been at great risk from immediate obstruction of his airway, inhalation of blood, and haemorrhagic shock: later from infection. A distinguished companion who saw him at this time wrote: 'It happened to me afterwards to see and wonder at the high courage and composure with which Annesley bore his dreadful wound ... The wound was of such a kind that it seemed to me as though nothing but death could be of use to him. <sup>3</sup> Yet, he was not only uncomplaining, but able to act and think for others.'

Next morning Annesley got up and walked two and a half miles to the shore and was taken aboard HMS London where his wounds were bathed and dressed. After this he was remarkably cheerful: 'I felt quite another being. My mouth is very painful and swollen up to an enormous size and suppurating

most unpleasantly, however in a few weeks it will be all right.' Annesley's spirit was indomitable. Whilst he was aboard HMS London his brother Bob was brought to the ship suffering, Annesley thought, from cholera. When the two brothers met on the ship Annesley recorded in his diary: 'My face is in such a state that he cannot look at me, he says it makes him sick'. Later, Hugh Annesley recorded simply: 'Bob died'.

### **His journey home**

Just over two weeks after his injury Annesley was given permission to go home, and a week later he left Calamita Bay for England. He opted to make his own way home as best he could, and went first to Constantinople. He was fortunate not to suffer the same fate as that of many of his fellows. Most of the injured were taken from the Crimea, by insanitary hospital transports, back to the foul hospital at Scutari.

Many of those who followed this course succumbed during the journey across the Black Sea or at Scutari itself.<sup>14</sup> The relevant statistics are frightening. The total strength of the British Army in the Crimea was just under 98,000 men, of whom just under 22,000 (getting on for a quarter) died during the campaign. Of these just 4,600 died from wounds received in battle: the remaining 17,200 died from diseases unrelated to combat. For every one soldier who died from battle wounds there were four who died from disease. One in every 21 of the soldiers died from wounds: one in every 6 died from disease.<sup>15</sup> This was a dismal reflection of the totally inadequate medical services for the troops at the time. Again Annesley, it would seem, accepted this situation without complaint or comment. Whilst in Constantinople he went to Scutari to see his regiment's wounded. Despite their appalling circumstances his diary note merely recorded: 'All going on well'. Later, he returned to Scutari to have his own injuries examined: 'Over to Scutari Barracks and had a medical board: Dr Hall, President. He said I should not be able to have false teeth put in for 6 months.'

Just over 4 weeks after being injured Annesley set off by sea for Marseille, sailing by way of Piraeus, Sicily and Malta. Between Malta and Marseille Annesley's ship, going to France,<sup>16</sup> would have passed Florence Nightingale's heading for Constantinople.<sup>17</sup> Annesley travelled from Marseille through France by coach and horses, train and steamer and arrived in Paris on 4 November,<sup>18</sup> which was the day on which Florence Nightingale reached Constantinople.

If he did not dally in Paris - and in his condition it is unlikely that he did - Annesley would have arrived back in London on either the 5th or 6th November to be greeted as a hero of the War. He did not, it seems, enter into the furious and public arguments which then raged about the pitifully inadequate medical provisions for the injured.<sup>19</sup> As ever, he appears to have been resigned to his undoubtedly harsh and difficult lot, and determined to recuperate and to get on with life.

### **Annesley seeks a surgical opinion and meets John Snow**

It was not until late February 1855 that he sought expert advice about his wounds. It is unlikely that he was following Dr Hall's directions (about waiting six months before being fitted with false teeth) when he made his appointment to see London's leading surgeon Mr William Fergusson.<sup>20</sup> Rather, I think, it can be inferred that Annesley had experienced some complications of his injury. In the event, he was seen not only by Fergusson, but also by

Arnold Rogers, then one of the capital's leading dentists.<sup>21</sup> Both Fergusson and Rogers had large and successful practices and they regularly called on John Snow to give anaesthetics to their patients. Snow gave Hugh Annesley chloroform anaesthesia on three separate occasions, and these are recorded in his Case Books.

The first operation was performed jointly by William Fergusson and Arnold Rogers - five months to the day after Annesley's injury. Annesley, Fergusson, Rogers and Snow all met at 16 Hanover Square, which was where Arnold Rogers lived and practised. The house still stands, bears the same address<sup>22</sup> and is just 400 yards from The Royal Society of Medicine. Snow's Case Book entry for 20 February 1855 reads as follows: 'Administered Chloroform at 16 Hanover Square to Capt. Annesley, wounded at the Alma. Mr Fergusson made a small opening on the left cheek and removed some small broken fragments of a leaden bullet, and also a little opening at the free edge of the upper lip in its centre, by which he removed a broken fragment of a tooth...'

It is likely that Annesley had sought medical advice at this time because he was suffering from one or more of the late complications of his severe injury. The fragments of lead shot and broken tooth may have been causing facial pain, but - almost certainly - they were giving rise to recurrent infections of the cheeks and lips, probably with sinus formation. The recurrences would only cease if the foreign bodies were removed, and this must have been William Fergusson's indication to operate on Annesley. Having done this Fergusson stood aside. The next part of Snow's narrative records that: 'Mr Rogers, afterwards removed the remains of three or four teeth which had been shattered by the ball...'. Snow's record then continued with an account of his anaesthetic: 'The chloroform was repeated three or four times during the various operations and the patient shewed some signs of returning sensibility again as the last stump was extracted. Immediately afterwards, however, he fainted. He became suddenly pale and the pupils became dilated and there was no pulse to be felt at the wrist. I raised his legs immediately, and Mr Fergusson lowered (him) down from the chair to the floor, and he recovered directly from the faintness. In a few minutes he recovered his consciousness and was very cheerful. No sickness.'

Annesley, it seems, was always cheerful after dicing with death. These procedures seem to have been reasonably successful. I could find no further mention of Annesley until a report in the 'Illustrated London News' of May 1855 when a ceremony was held at Horse Guards Parade, in London, at which Queen Victoria distributed Crimean Campaign Medals to wounded officers, including Hugh Annesley.<sup>23</sup> A few weeks after this, Annesley consulted Arnold Rogers again and on 19 June 1855 Snow wrote in his Case Books: 'Administered Chloroform again to Capt. Annesley whilst Mr A Rogers extracted 5 stumps and splinters of teeth. No sickness or fainting.'

This time Annesley was probably seeking relief from pain. His symptoms must have been relieved for a while, for it was not until some 18 months later that Snow met him again. Shortly before Christmas 1857, Snow's Case Books recorded: 'Administered Chloroform at 16 Hanover Square to Capt. Annesley whilst Mr A Rogers extracted two pieces of teeth. No faintness on this occasion.'



### Annesley's later life

There is no further mention of Annesley in the Case Books - in which Snow's entries only continued for another six months, for Snow died, at the age of 45, on 16 June 1858.<sup>24</sup>

Annesley's facial wounds healed well - a common outcome in those who survived similar head and neck injuries during the Crimean campaign<sup>25</sup> - and a later portrait of him in his Regiment's archive<sup>26</sup> shows that any residue of his severe facial wounds was hidden by his whiskers. He lived a quiet but distinguished life for many years thereafter, and outlived Snow by some 50 years.<sup>27</sup>

In 1857 he became a Member of Parliament and sat for 17 years until 1874 when he succeeded his brother to become the 5th Earl of Annesley of Castletwellan in Ireland. He married in 1877 at the age of 46. After succeeding to the title Annesley spent most of his time in Ireland supervising his considerable estate at Castletwellan, but he also travelled to the Mediterranean,<sup>28</sup> Japan, Canada and India, and he was an enthusiastic amateur photographer.<sup>28</sup> In Ireland, he cultivated one of the largest collections of exotic trees and shrubs in Britain.

He became ill in November 1908, and was of sufficient merit for the progress of his final illness to be chronicled in the Court Circulars of the 'Times'.<sup>29</sup> He died at his home in Ireland on 15 December 1908, at the age of 77.

### Conclusion

It was only a happy coincidence which led to my being able to reconcile some of the entries in Dr John Snow's Case Books with the contemporary diaries of Captain Hugh Annesley. What has emerged is a revealing glimpse of the times in which Snow lived, and of the background to some of his work. This is one of the many ways in which, I hope, the soon to be published transcriptions of the Case Books will be used by historians to augment the well-known, oft-repeated and now somewhat threadbare accounts of John Snow's life.

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## THE ROYAL SOCIETY OF MEDICINE AND THE EVOLUTION OF PREMEDICATION

Dr R S Atkinson

Premedication was seldom employed in the early decades of this century. The word was not used in textbooks before 1920 and it was 1928 before the 'Lancet' published an annotation on the subject. Developments in the United States were occurring about the same time when McMechan used the word in the 'American Year Book of Anesthesia and Analgesia' in 1920.

That is not to say that drugs were not given to patients preoperatively before this time. Indeed, W Stanley Sykes in Volume 1 of his 'Essays on the First Hundred Years of Anaesthesia' (p.122, published in 1960) tells us that prior to the first demonstration of ether at the Massachusetts General Hospital on 16th October 1846, Dr Morton had employed the agent for 37 private operations performed by Bigelow (not Warren), and he was accustomed to give large doses of laudanum beforehand.

The Royal Society of Medicine was founded in 1907 and the Section of Anaesthetics in 1908. At that time the Section of Anaesthetics had as its members all the influential anaesthetists in the capital and outside. 'Matters of Moment' were discussed at its meetings and among these was the growing interest in the administration of medication to the patient before anaesthesia and operation. It may be appropriate to recall these proceedings at a joint meeting of the History of Anaesthesia Society and the Section of Anaesthetics.

### March 1911

A meeting of the Section took place on 3rd March 1911 with Dr W J McCardie, President, in the chair (members of the HAS will recall the paper read by Dr Mathews at the Cambridge meeting. McCardie was the first specialist anaesthetist in the provinces and it says something for his distinction that he was elected President of the Section so soon after its formation). This meeting, almost exactly 82 years ago, heard a paper entitled 'The use of scopolamine, morphine, atropine and similar drugs by hypodermic injection before inhalation anaesthesia' delivered by Dudley Buxton. In his paper he reviewed the history of the subject as it then stood. He believed that more information was needed concerning the possible dangers associated with the practice. These included difficulties with induction and loss of eye signs. Drugs given included scopolamine gr 1/100, morphine gr 1/6 and atropine gr 1/120. But should they be administered by repeated injections overnight or over a period of 2 - 3 hours or a single injection 1/2 - 3/4 hour before operation? During discussion it is clear that few anaesthetists had more than limited experience. Mr F S Rood had documented his experience of 300 cases. Whereas more than half his patients arrived in 'profound sleep', he observed that ether induction often woke them up! Many speakers thought that medication reduced postoperative vomiting! Most speakers thought that medication was especially advantageous in cases of exophthalmic goitre. Atropine was usually of benefit in that mucus blocking of air passages was reduced and Dr Bellamy Gardner thought it advantageous that body heat was retained as a result of absence of sweating. Mrs Dickinson Berry had noted that when morphine had been given, induction with chloroform might be smooth, but the patient would

sometimes move at the time of skin incision. Some surgeons had complained that abdominal relaxation was poor, probably because patients appeared to be deeper than they really were! In summing up Dr McCardie commented on the effects of medication on pulse rate and cozing. He did not advocate a full dose of morphine before chloroform. He did like strychnine and atropine.

### March 1915

On 5th March 1915, almost exactly 4 years later, the President was Dr Harold Low. The subject of the meeting was 'Discussion on the influence of preliminary narcotics on (a) induction, (b) maintenance and (c) after-results of anaesthesia'. It was opened by Dr J Blumfeld who referred to the discussion 4 years ago. He thought that atropine was the only drug which should be used as a routine, as no harmful effects ensued. Morphine and scopolamine should only be given when the anaesthetist has seen the patient and the patient is not expected to walk in the interval between injection and operation. In particular, chloroform was not so safe after drugs other than atropine. He advocated that morphine in addition to atropine was best in (a) highly nervous individuals, (b) nose and throat cases (because the patient could be kept light with reflexes present) and (c) in all muscular, plethoric or alcoholic individuals, except for short operations. In discussion it is clear that a consensus of opinion was now in favour of narcotic drugs given before operation, provided they were used with discretion. Sir Frederick Hewitt regretted the inability to see patients beforehand. He had seen difficulties with scopolamine in elderly patients. Narcotics were contraindicated in the presence of respiratory difficulty and he advised against their use before throat, nose and mouth operations. He had heard of two or three fatalities as a result of bleeding into the airway. He was also cautious about the administration of morphine after abdominal operations because of the danger of paralysis of intestinal action.

Other speakers agreed with many of these views. Mr Boyle was particularly emphatic about the need to see the patient beforehand and pointed to the value of conversing with nervous patients. At the time of this meeting several speakers had experience of anaesthetising soldiers in base hospitals. Mr Boyle commented on the drawback of thirst and dryness of the mouth as a result of medication. Dr Shipway was in favour of narcotics whenever possible. Their use was a kindness to the patients and helped the anaesthetist.

In closing the discussion the President noted that at St Thomas's no narcotic was allowed to be used by the resident staff. As regards the title, he summarised: (a) preinduction: there was a great gain, (b) maintenance: less anaesthetic was required and (c) after-effects: sickness was rare. He himself would like to have morphine and atropine if the occasion arose.

Finally, I would like to refer briefly to a meeting of the Section on 7th December 1928, when Dr E S Rowbotham spoke on 'Preliminary medication in anaesthetics'. It is interesting that he now gives drug dosage in grains, drachms or stones with the metric equivalents in parentheses. The main purpose of his paper is to draw attention to the advantages of rectal paraldehyde. Discussants included Dr I W Magill, Mr Frankis T Evans, Mr Ramsey Phillips and Dr Mennell. It was this meeting which sparked off the annotation in the 'Lancet' of 28th December 1928, referred to above.

**JOSEPH PRIESTLEY (1733-1804)**  
**DISSIDENT THEOLOGIAN AND EXPERIMENTAL CHEMIST**

Dr G Priestley

'The feeling of it to my lungs was not sensibly different from that of common air; but I fancied that my breast felt particularly light and easy for some time afterwards. Who can tell, in time, this pure air may become a fashionable article in luxury. Hitherto only two mice and myself have had the luxury of breathing it.' (Joseph Priestley, 1777)

### Early life

Joseph Priestley was born in Birstal, Fieldhead, Yorkshire, six miles from Leeds on 13 March 1733. He was the eldest son of a Yorkshire cloth dresser, Jonas Priestley, and his first wife, Mary Swift. His mother died in 1739 and he was sent to live with an aunt, with whom he stayed until he was 19. He was encouraged to study for the ministry and was probably influenced by English Presbyterians who met in his aunt's house. He attended local parish schools and at the age of nineteen entered the Dissenting Academy at Daventry.

At Daventry he was introduced to a range of subjects in natural philosophy, and received formal instruction in logic and metaphysics. The so-called Dissenting Academy encouraged an educational method of free enquiry on controversial subjects. Completing his studies, Priestley went to preach: first in Suffolk, and then in Nantwich, Cheshire. He was unsuccessful in these posts however, partially because of his unorthodox views - particularly on the Trinity - but largely because of a severe speech impediment! So severe was this problem that his aunt had earlier sent him to London with the sum of twenty guineas - the fee of a London quack who undertook to cure all defects of speech! This business took Priestley to London for the first time with the result that his stammer was said to be worse than ever. Despite this handicap, however, he opened a school which was so successful that he was invited to teach at Warrington Academy. He seems to have taught languages, history, law, oratory(!) and criticism, but not theology or experimental science which, he said, he would have most liked to have taught.

So these were Joseph Priestley's formative years. By this time he was apparently well grounded in Latin and Greek, could read Hebrew, Arabic, French, Italian and German, and had learnt theoretical and practical mathematics. It was from the age of 28 that he started his huge output of publications on a wide variety of subjects.

### 128 original publications

Theological and religious	70
Political and social	19
Scientific	18
Educational/psychological	8
Philosophical/metaphysical	6

His first publications were: 'The Rudiments of English Grammar' (1761) and 'A Course of Lectures on the Theory of Language' (1762). Both are

cited by modern scholars for their early recognition of linguistic principles. His general philosophy of education was described in 'An essay on a course of liberal education for civil and active life'. Whilst at Warrington, Priestley married (1762), was ordained (1764), and also received a doctorate from the University of Edinburgh (1764) in recognition of his work in education.

### Early scientific research

It was at Warrington that he began his scientific career with the writing of his 'History of Electricity', for which he enlisted the help of Benjamin Franklin whom he met in London 1765. It was for his experiments for this work on electricity that he was elected a Fellow of the Royal Society in 1766.

He described one of his experiments:

'I killed a pretty large kitten with the discharge of a battery of thirty-three square feet ....I endeavoured to bring it back to life by distending the lungs, blowing into the trachea, but to no purpose.'

Stammer notwithstanding, in 1767 he moved back to Leeds to become a Presbyterian minister. It was here that he wrote the 'History of Optics' and began his most famous scientific research into the nature and properties of gases.

Priestley's famous gas research actually stems from an interest in his local brewery! His interest in the brewery, combined with his interest in experimentation led him to perform experiments with the so-called 'fixed air' that came to the surface of fermentation tanks. He found that when this gas was dissolved in water it made a pleasant sparkling drink! This led, in 1772, to his first 'chemical' pamphlet: 'Directions for impregnating water with fixed air in order to communicate to it the peculiar spirit of Pyrmont water...'. The Royal Society awarded Priestley the Copley medal for this achievement - a discovery that only recently seems to have been eclipsed by his work regarding oxygen and nitrous oxide. The Royal College of Physicians recommended the new drink to the Admiralty, as likely to be of use in sea scurvy.\*

### Different kinds of air

Published in the same year as the carbonated water pamphlet, but given much less prominence was the appearance of his 'Observations of Different Kinds of Air'. This included the isolation and identification of nitric oxide, anhydrous hydrochloric acid gas, the beginnings of the discovery of photosynthesis, and a barely noticeable reference to 'an air extracted from nitre' - which he did not take further for many years. The task which Priestley set initially was the examination of the known species of airs and from this he set about generating new varieties: by heating substances, mixing them, or performing other physical manoeuvres. The tests he used initially in distinguishing the airs that he produced were quite simple, namely, did they turn lime water turbid, would they burn or support combustion, what was their

\* See also Priestley's Electrical Machine by Dr W D A Smith, Vol.4 of Proceedings, p.31. Editor

appearance and taste, and how long could a mouse live in a container filled with one of them? The tests gradually became more sophisticated - such as recording the colours of electric sparks passed through the different gases.

It may be that Priestley's thinking about 'airs' began when he was eleven years old when, according to his brother, he observed the survival of spiders put into airtight bottles. In Warrington he tried to repair air 'injured' by respiration, by discharging electricity into it. In August 1771 he wrote to a friend:

'I have of late been very busy about some experiments on air, with respect to respiration and vegetation, and flatter myself that I have discovered what I have long been in quest of .... that process in nature by which air, rendered noxious by breathing, is returned to its former salubrious condition. Air in which animals have died, and which kills other animals instantly, afterwards is made fit for respiration again by plants living in it, and they survive amazingly.'

### Phlogiston confusion

Priestley believed in the theory of 'phlogiston' - a conviction from which he never managed to escape - even when the theory was discredited by Lavoisier. It was Lavoisier who was responsible for re-naming dephlogisticated air 'oxygen'. Phlogiston was thought to be the inflammable part of any body and to escape on combustion. Priestley considered that oxygen owed its properties to a capacity for absorbing phlogiston, hence 'dephlogisticated air'. Nitrogen, therefore, was 'phlogisticated air'.

### Nitrous oxide

1772 is the year usually given to the discovery of nitrous oxide. In 1772 Priestley exposed nitrous air to a paste of iron filings and brimstone (sulphur) over water. After 5 to 6 hours this became hot and effervesced, the gas contracted to one-quarter of its initial volume and extinguished a candle. He thought that the residual gas was phlogisticated air, nitrogen. He had therefore **not** discovered a new air.

In 1773 or early 1774, he exposed nitrous air to iron nails over mercury, for two months. This time three-quarters of the initial volume remained. It allowed a candle to burn, sometimes with an enlarged flame, but it killed animals and its ability to support combustion was destroyed by water. These were new properties: he had discovered nitrous oxide. He reasoned that because this air supported combustion it must have been able to take up phlogiston. Nitrous air, he supposed, was already saturated with phlogiston, and **so** it extinguished a candle.

The new air supported combustion, and therefore must have been dephlogisticated and so was called 'dephlogisticated nitrous air'. Presumably, he did not find nitrous oxide in 1772 because he lost it into solution.

## Oxygen

On 1 August 1774, using a large burning lens of 12" diameter, Priestley heated mercuric oxide ('Mercurius Calcinatus') over mercury, and collected an air that supported combustion. Because of this property he assumed that it was nitrous oxide, although he was at a loss to explain it. He had, in fact, prepared the same air in 1771 by heating saltpetre (potassium nitrate), but the significance escaped him.

Priestley made progress, as he often did, with animal experiments:

'...I procured a mouse and put it into a glass vessel, containing two ounce measures of the air from mercurius calcinatus. Had it been common air, a full-grown mouse, as it was, would have lived in it for about a quarter of an hour. In this air, however, my mouse lived a full half hour ... By this I was confirmed in my conclusion that the air from mercurius calcinatus was at least as good a common air; but I certainly did not conclude that it was any better because, though one mouse would live only a quarter of an hour in any given quantity of air, I knew that it was not impossible that another mouse might have lived in it half an hour, so little accuracy is there in this method of ascertaining the goodness of air .... '

The important dates regarding nitrous oxide and oxygen are probably as follows:

1772: produced nitrous oxide but lost it into solution.

1773 or early 1774: discovered nitrous oxide.

1774: heated mercuric oxide over mercury with burning lens.

Priestley conducted further mouse experiments and concluded: 'Being now fully satisfied of the superior goodness of this kind of air, I proceeded to measure that degree of purity with as much accuracy as I could ....I conclude that it was between four and five times as good as common air'.

So Priestley discovered oxygen - but his observations did not stop there. An immediate sequel was his paper: 'Observations on respiration and the use of blood' (1776) Priestley confirmed the usual colour changes in sheep's blood, noting that the change might occur in the lungs. He found that dark blood turned red more quickly in dephlogisticated air than in common air. He concluded: '... the principal use of blood seems to be its power of receiving and discharging phlogiston ... '

## Later life

William Petty, 2nd Earl of Shelburne, Baron Wycombe and Prime Minister 1782-1783, was undoubtedly Priestley's greatest patron. Five of Priestley's six volumes on experiments on gases were prepared whilst he was the Earl of Shelburne's resident intellectual, a position he held for seven years.

Following his productive years with Shelburne, Priestley settled with his family in Birmingham. He became preacher at the 'New Meeting House' - one of the most liberal congregations in England - and became associated with a group of intellectuals known as the 'Lunar Society'



because they met at the time of a full moon! Not surprisingly, perhaps, this came to be known to outsiders as the 'Lunatic Society'! Priestley's major preoccupations at this time were, however, theological. He became well-known as a critic of political discrimination against theological dissent. His views made him intolerable to the church establishment, and he paid the price when a mob attacked his house, destroying nearly all his books, papers and apparatus. Fortunately, he and his family managed to escape. The rioting continued for a further two days. Even George III expressed himself in a letter as 'pleased that Priestley is the sufferer' though disapproving of the means employed. Seventeen of the rioters were tried the following month: three were executed.

Priestley then settled briefly in Hackney but increasing political persecution prompted him to emigrate to the United States where he settled in Northumberland, Pennsylvania. Here he was able to continue his theological writings and scientific work.

Priestley supported Jefferson in political opposition and on Jefferson's election in 1800 found, for the first time, that he was in a country where the political authorities were friendly to him. President Jefferson personally befriended the ageing Priestley who was ill and lonely: his youngest son had died in 1795 and his wife in 1796.

Priestley died in 1804 leaving two sons in the United States and a married daughter in England. He is buried in Northumberland, where his home has been turned into a museum.

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## DOUGLAS BADER AND THE ROYAL BERKSHIRE HOSPITAL

Dr A Marshall Barr

Pilot Officer Douglas Bader crashed his Bristol Bulldog aircraft on 14th December 1931 at Woodley Aerodrome near Reading. The story of his double amputation, the role of Nurse Brace in restoring his will to live, his return to flying as a Battle of Britain hero and his post-war crusade for the disabled have all been well documented in books and on film. But there are some points on the surgical and anaesthetic side which are not well known. These I have gleaned from the archives of the Royal Berkshire Hospital, from a personal interview with Sir Douglas, and from colleagues, friends and relations of the surgeon and the anaesthetist who were most instrumental in his recovery.

### Immediate medical care

Following the crash, Bader clearly remembered being trapped, tilted at an angle with his legs caught and blood pumping from the femoral artery. He remembered being lifted out, pressure being applied to control the bleeding, and this pressure being maintained during the ambulance journey to the hospital. He was later told that Sister Thornhill, in charge of the Emergency Ward, caught the senior surgeon, Mr Joyce, just as he was leaving the hospital. The surgeon's daughter Ina, now Lady Jackson [at the meeting] heard the plane crash while at lessons in the Abbey School three miles from the airfield. She confirms that the family Christmas holiday had to be postponed because of her father's concern with Bader's injuries. Bader remembered being reluctant to have anaesthesia because of bad memories of a tonsillectomy at the age of five, and disliking the mask going over his face for his first operation at the Royal Berks.

### First operation and the protagonists

We have the anaesthetic record book, or journal, for 1931 which provides the following information: Surgeon Mr Joyce, anaesthetic Ether Boyle's, Anaesthetist Mr Stevenson. Multiple injuries. Head of astragalus (left) loose - removed. Wound sutured. PPS applied. Amputation of right leg just above knee. Flap sutured. Flavine dressing.

Bader was trebly fortunate. The junior anaesthetist at least had some experience (of which more a little later). He chose probably the safest anaesthetic in the circumstances. Leonard Joyce the surgeon was the very man for the job. He qualified from St Bartholomew's in 1907 and gained the FRCS two years later. At the Royal Berkshire he progressed from surgical registrar in 1913 to senior surgeon in 1924. Most significantly, during the war he held a temporary commission in the RAMC and became officer in charge of the surgical division of Reading No.1 War Hospital (which later became Battle Hospital and part of our Acute Unit). At the War Hospital he gained experience of thousands of wounded brought up from the coastal ports by ambulance train. He published many papers on war injuries, notably on bone grafting and nerve damage.

In the early thirties Joyce was at the height of his power. Our best witness is Sir Geoffrey Organe in a letter written to my predecessor,

Dr Bryn Thomas: 'When I was at the Royal Berks (October 1936 - April 1937) Joyce the senior surgeon was excellent by any standard, as was Walker, then orthopaedic registrar, who had trained with Dunhill. The rest were dreadful. Surgical emergencies at night were dealt with by two recently qualified young men from St George's. Mortality from acute appendicitis during my 6/12 was 50% - no wonder I was in favour of a NHS!'

The young Geoffrey Organe at that time held the same position as Mr Stevenson - that of resident anaesthetist. In 1928 when new twin operating theatres were opened, the Royal Berkshire became one of the first provincial hospitals to employ a resident specifically to give anaesthetics. From the advertisement we learn that the residents were taken on for six months at the rate of £150 per annum. In 1931 the resident staff consisted of a house physician, two house surgeons, a casualty officer and the resident anaesthetist. They had one afternoon off per week and 4 weekends off in six months. If reappointed for a further 6 months they could claim 2 weeks holiday.

### **The second operation and protagonists**

Eight days after his emergency surgery, Bader had a second operation. Joyce's daughter recalls that week of postponed holiday as one of terrible anxiety for her father. The mangled left foot was severely infected and worsening. How Joyce must have regretted those sutures after removal of the bone fragment. Eventually he decided to risk saving the remaining knee joint, and he amputated well below the knee - recorded in the anaesthetics journal as amputation of the left foot. The anaesthetic this time was Avertin, gas and oxygen, and the anaesthetist was Dr Hoel Parry-Price. He was the senior hospital anaesthetist and a most unusual character. He qualified from Guy's in 1915 and immediately served as Temporary Surgeon Lieutenant in the Royal Navy. After the war he joined his father's general practice in Reading and we have pictures of both father and son. He took up a clinical assistantship at the Royal Berkshire in ophthalmology, and a second in anaesthetics. He remained in the Royal Navy Volunteer Reserve which accounts for the Surgeon Commander's uniform in the 1930's photograph.

Parry-Price became a skilled anaesthetist and was rapidly promoted to assistant and then to the senior post in 1925. Gordon Bohn, retired consultant surgeon, remembers him from the thirties as a first class practical anaesthetist who introduced the McKesson apparatus to Reading, and was expert with an endotracheal tube. He was flamboyant in style and always wore a monocle; he had a tremendous presence, so that everyone noticed when Parry-Price entered a room.

There is no doubt he lived life to the full. The family owned one of the first houses in Reading with a swimming pool; Parry-Price rode to hounds, he drove a Rolls Royce and later an Armstrong Siddeley Special. He also got into financial difficulties. Leonard Joyce was a close friend who is said to have helped Parry-Price out of money troubles - in friendship and also to ensure his best anaesthetist did not depart!

Three days before Christmas 1931 we have these two good friends officiating at Bader's second operation under Avertin anaesthesia. Avertin was tribromoethyl alcohol, introduced in the later 20's as a basal anaesthetic. It was diluted with distilled water and given

rectally. Parry-Price had a particular interest in Avertin, publishing a defence of the agent in the Royal Berks Hospital Reports of 1932, by which year he had used it over 600 times. Bader recalled Parry-Price telling him about this new stuff to allay his fears of the mask. He remembered the anaesthetist as being very jovial and breezy, full of confidence and most reassuring. Bader, mightily impressed by Avertin, said: 'the nurse put it up my bum, I said: 'that won't affect me' but then it was bloody marvellous - the operation all over and no sickness.' On Christmas Eve he was well enough to be transferred from the Emergency Ward to Greenlands Nursing Home. This was the house immediately behind the hospital, purchased by the Board in 1928 when Samuel Stevens died aged 94. He was the Stevens of Huntley, Boorne and Stevens, tin makers for Huntley & Palmer biscuits, and a great benefactor to the hospital, his next door neighbour.

### The third operation

Here in Greenlands on 29th February in the leap year of 1932, Nurse Dorothy Brace gave Bader the Avertin for his third operation by Leonard Joyce. In a heavily sedated state he would have been trolled along the long path to the operating theatres. Again, in the Anaesthetics Journal we have: surgeon Mr Joyce, Avertin, gas and oxygen, Dr Parry-Price. Also the inaccurate statement 'amputation both legs 22/12'. How difficult it is to be sure of historical accuracy, when we know such mistakes are commonly recorded so close to the original event. The operation was to trim both stumps for prostheses. Bader marvelled that Joyce did this so well that no further surgery was ever needed for his stumps. He rapidly convalesced and began to have a good time in Greenlands, being spoilt and cajoled by Dorothy Brace, having lots of visits and trips out by car. He was fitted with a temporary peg leg from Oxford, got about on crutches and even tried tennis - volleying at the net of the Greenlands tennis court.

In April 1932 Bader left for Uxbridge RAF Hospital and artificial legs from Roehampton. He stayed in touch with both Joyce and Parry-Price. The children of both families remember him coming to visit, dancing with the girls and trying cricket and tennis on the lawn, but with a lot of falling over. Leonard Joyce developed severe angina and died in 1939. Bader deeply regretted the surgeon did not live to see his patient fly again and fight for his country. Professor Girdlestone of Oxford wrote of him in the 'British Medical Journal': 'As a surgeon he was of outstanding quality, great in technique and accomplishment, but outstanding on account of his character, his care and conscientiousness, and his beautifully balanced judgement' - what a moving tribute!

His son Jim joined the RAMC and was badly knocked about at Dunkirk. After the war he became a gynaecologist in Cumberland. Jim's daughter Tessa is a senior children's nurse at the West Cumberland Hospital. Joyce's other son John became a surgeon based at Newbury Hospital and died in retirement a few years ago. Ina, now Lady Jackson, did her nurse training at Guy's and followed brother Jim to Cumbria. I have her to thank for much of my information. Mary, the youngest daughter, married a clergyman and their daughter Caroline, grand daughter to Leonard Joyce, is a Senior Radiographer at Bart's. [And was also at the meeting]

### Parry-Price

Parry-Price in 1939 went back into active naval service. He was Principal Medical Officer on the cruiser 'Sussex' and then on the carrier 'Victorious'. In 1942 he returned to Reading, formally resigned from his post as Honorary Anaesthetist and arranged for the sale of his private anaesthetic practice to Dr Basil Hill. Basil was kept in Reading by the local war committee. He is still fit and alert and happily lives only a mile from me. Parry-Price then left Reading for good. His three children were all serving in the Navy and he was posted to the Royal Naval Hospital, Plymouth, giving and teaching anaesthetics. In 1946 he published a small book, just 120 pages, called 'Practical Anaesthetics', written, he says in the introduction: 'by one who has found in anaesthetics more a hobby than a profession'. This book never became wellknown, but contained much useful, sensible advice for civilian and service anaesthesia. Naturally, Avertin is well advertised, including a discussion of his own son having Avertin at the age of 7 for an appendicectomy.

In 1949 Parry-Price went with the retirement rank of Surgeon Captain to Carlisle as Consultant Anaesthetist at the Cumberland Infirmary. Dr Robert Macmillan recalls that he was already a sick man, finances were tight and they lived very modestly in half a house. Much different from pre-war Reading, but they were a happy family, Parry-Price was always cheerful and there were plenty of parties. Just three years later, in 1951, Parry-Price died. His daughter Mary has been most helpful in my search for information. [She, too, was present at the meeting]

### Bader's later years

After the war, Douglas Bader continued as a living legend with his work for the disabled. He was made CBE in 1956. The following year he agreed to return to the Royal Berks to present the Nurses' Prizes, and to be reunited with Dorothy Brace, now Matron of Battle Hospital. To my astonishment, in the archives I found the programme on which he had made notes, jotting the names of Thornhill and Brace - a very nice souvenir of the occasion. [Incidentally, J Arthur Rank donated £250 to Battle Hospital for a pillow phone system in recognition of the help Matron Brace gave in filming 'Reach for the Sky'.]

Bader went on to be knighted in 1976. My wife and I met him in July 1982 when he kindly gave us a full hour of his time to talk about his memories of the Royal Berks. He was full of beans, looked remarkably youthful and autographed his book for us - but he too had angina and died two months later.

Opinions about Bader did vary. Some found him conceited, obstinate and selfish, which traits were probably needed in some degree to overcome his disability. Mary and I found him gentlemanly and charming. There is no doubt about the respect accorded him by the Royal Air Force. For the Hospital's 150th anniversary in 1989, the Battle of Britain Memorial Flight agreed, at no charge, to fly a Spitfire over the Royal Berks. We were thus privileged to hear the evocative sound of the Merlin engine and see a glorious sight - a salute to our Hospital and to a gallant man.

## CHARLES EMPSON - MAN OF MYSTERY

Dr D Zuck

Although their relationship was very close, and John Snow is described as having been devotedly attached to him,<sup>1</sup> Charles Empson has remained a shadowy figure in the life of his nephew.

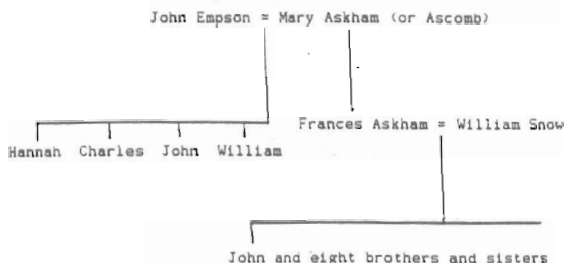


Fig 1: The Snow and Empson families

As regards their kinship (Figure), it is known that John Snow's mother, Frances, or Fanny, was the illegitimate daughter of Mary Askham. In 1792 Mary married John Empson, a weaver of York. Four children resulted from this marriage: Hannah; Charles, baptised 1st February 1795; John and William. Frances Askham married William Snow in May 1812. They were the parents of John Snow. Since Frances did not change her surname after her mother's marriage, it may be assumed that John Empson was not her father, and hence that Charles Empson was her half-brother. Leaman,<sup>2</sup> mistakenly states that Mary married Charles, rather than that she was his mother, and conjectured that Charles may have funded the childrens' education.

We know nothing of Charles Empson's early years, except that at some time during his teens he worked in the neighbourhood of Stockton, and visited many local places distinguished for picturesque scenery. Years later he described how, one morning before sunrise, he had ascended Roseberry Topping, Yorkshire's highest hill. He waited until, in his own words: 'the glorious sun, rising in sublime grandeur ... dispersed the dense and fleecy clouds that rolled beneath me ... and I thought ... what ecstasy should I not feel ... if I could tread the lofty steps of the Andean range, and ascend the yet untrodden summits of the Cordilleras!' No sooner was he free to choose his own course in life than he set about accomplishing this wish.

This last paragraph, in which is a fair example of his prose style, is paraphrased from the preface to the book, published in 1836,<sup>3</sup> in which Empson described some of his experiences in South America, and it poses a number of questions. He tells us that he spent four years, probably during the early 1820's, in what is now Colombia. But how he was able to finance his voyage and stay, how he got there and under whose auspices, and what was the real purposes of his visit, remain

complete mysteries. For the book itself is essentially a companion to a series of twelve coloured drawings elaborated from sketches from Colombian life, and published as a separate volume.<sup>4</sup> Each of the twelve chapters first describes, then illustrates by means of one or more stories or character sketches, the subject of one of the illustrations.

South America during the early 1820's was just emerging from the throes of its revolt against the rule of Spain, during which it received much British support.<sup>5,6</sup> I did wonder whether Empson might have enrolled in the British Legion some 8000 strong, that enlisted in London, mainly veterans from the Napoleonic Wars, but have been advised by an authority on the subject that this is most unlikely. Great Britain recognised Colombian independence in 1825, and the Foreign Secretary, Canning, appointed consuls,<sup>8,9</sup> two of whom, Commander Cochrane and Colonel Hamilton, later published accounts of their stay that can still be read with pleasure.<sup>10,11</sup> American diplomats and army officers also described their experiences.<sup>12,13</sup> and one remarked upon the power and ubiquity of the British in Colombia, and complained that the country was filled with agents of English speculating companies.<sup>14</sup>

But Empson appears to have had neither diplomatic nor commercial interests. Frustratingly, he provides us with no dates and no itinerary, and although he mentions companions, and that he had met many Europeans, he tells us nothing about them. His account is impressionistic, in the sense that it is made up of little patches of colour from which one has to work out a picture. However, from the place names, and from some of the geographical descriptions, it is possible to reconstruct his travels at least in outline.

The whole of Empson's wanderings seem to have been restricted to an area that extended from the coast to beyond Bogota, and perhaps fifty miles each side of the River Magdalena, and followed what had already become a recognised tourist route. He didn't actually illustrate his journey as such, so to get some idea of the conditions of travel, Humboldt's 'Views of the Cordilleras' may be consulted.<sup>15</sup> Empson must have landed, perhaps in 1822 or 1823, at Cartagena, the main port at the mouth of the River Magdalena. He describes the river, and almost certainly travelled up it by boat to Honda, about 600 miles inland on the left bank. Travel was by oar-propelled boats of different sizes, but several of the writers, Cochrane, Hamilton and others, mention the forthcoming introduction of a steamboat service, the concession for which had just been granted to a German entrepreneur. Honda was the farthest navigable point, and the town served as the port for the capital, Bogota. It was shut in by mountains on all sides, and the heat was stifling; from there Empson continued overland. He describes his travels. The standard beast of burden was the mule; and a good mule, very sagacious and loyal, was twenty times as valuable as a horse. Indian guides were licensed by the Government to convey passengers across the Cordilleras. After reaching the highest point accessible to mules, one either walked, or was carried on a light cane chair suspended from a man's shoulders. Empson dilates on the beauty of the scenery, the mountains, the plains and the rivers. All the river beds were rich with gold. Ravines were crossed dangerously by primitive cane suspension bridges constructed by the natives in a single day.

The natives mainly wore the 'poncho', an oblong piece of cloth with a slit in the centre for the head. They celebrated Empson's arrival at one place by a fiesta that lasted three days. He describes the cook at this establishment, Senora Manuela: she was a considerable character, a freed slave, who had obtained her liberty by working as a nurse in the hospital during the siege of Cartagena. She could provide a dinner of three complete courses for two hundred guests, and among her repertoire were some pythonesque dishes - roast parrot and roast armadillo, for example. Manuela also had a reputation as a healer, and took a great professional interest in the set of cupping glasses which were part of Empson's luggage.

Although the other writers only mention it in passing, Empson devotes several pages to an account of the goitre that was endemic in a large area of the country, and he is the only one to connect it with cretinism: 'The disease is called in South America El Goto, and in some areas many hundreds of miles across, it is a matter of surprise to find a single person without this deformity. Custom reconciles one to everything. When the inhabitants of Berania saw for the first time a party of Englishmen, their surprise broke out in the exclamation: 'Mira que hombres feos sin gotos', literally: 'Look at these ugly men; they have no goitres'. Far from trying to conceal these disgusting deformities, they take a pride in displaying them ... and embellish them with chains of gold, coral, amber and jet.' 'Unhappily, imbecility and idiocy result from it to such an alarming extent, that the government has decreed a very handsome reward for the discovery of a cure. The natives have certain antidotes, such as burnt sponge, which reduces the frightful development of the thyroid gland. But sometimes the goto becomes so large, that its weight becomes oppressive, and they are afraid to sleep in any but one position, lest they should die of suffocation.'

In a recent collection of early watercolours of the region, Empson was somewhat unfairly described as a 'poetic and slightly mad botanist and collector', and more justly as someone from whose writings it is not easy to extract any useful information.<sup>16</sup> Certainly he had a great interest in both plant and animal life, and describes many different species, embellishing his descriptions with appropriate tales. On the plains there were cocoa and coffee plantations, and chocolate was another product, but only palatable if prepared with cinnamon - 'The common chocolate is vile stuff'. Parrots were plentiful, and easy to domesticate, but soon learned 'those very objectionable terms with which the Spanish language abounds...'.<sup>17</sup>

Of special interest to us is the following: 'The Indians of the desert possess a poison called curare, so potent that the quantity which can be concealed beneath the thumb-nail will cause certain death'. Whether crude curare was among the many botanical specimens that Empson embarked with on his return to England we shall never know.

His ship was wrecked on Sandy Hook, at the entrance to New York harbour owing, he said, to the captain having a greater interest in chess than navigation. He was rescued, after some eighteen hours of anxiety, and landed at Staten Island, but of his possessions he managed to save only some precious objects of pre-Columbian art. We know that Empson was back in England before 1828 because, on the



6th February that year he exhibited a number of gold artefacts at a meeting of the Society of Antiquaries of Newcastle-upon-Tyne. This gives us the one fixed date that we have during this decade, but several factors suggest that he was in Colombia from about 1823 to 1827. That the items were exhibited in Newcastle may indicate that Empson had returned initially to the North. It will be remembered that John Snow was at that time articled to a surgeon in that city.

A description of the gold figurines was published in 1837.<sup>17</sup> There were twelve in all. Empson obtained the first five in Bogota, and was assured that they had been found in Lake Guataveta, into which the Indians annually threw many such images as sacrifices to the Gods. Also it was believed that much treasure had been sunk in this lake at the approach of the Spanish conquerors. A number of schemes to drain it had been launched over the years, and many speculators had been ruined by failure to find anything of great value.<sup>18</sup> The largest item, a breastplate, when it came to be auctioned after Empson's death, was described in the catalogue as part of the sacred armour of Montezuma, presented to Mr Empson by General Bolivar, but this may be regarded as auctioneers' hyperbole, because Empson himself did not make that claim in his own description of the artefacts.

Some time before 1836 Empson moved to Bath, and was living at 9 Cleveland Place when John Snow visited him in the late summer of that year during his long walk from Yorkshire to medical school in London. In most of the Bath directories he is described as a museum keeper,<sup>19</sup> but in one, more accurately, as a picture dealer.<sup>20</sup> He was very active in the social life of Bath, and was instrumental in the purchase and erection of the celebrated statue of Jupiter that stands in Victoria Park. In 1838 Empson published a more detailed account of the gold artefacts that he had brought back from Colombia. By this time his 'Narratives of South America' was already out of print.<sup>21</sup>

Empson was a friend and confidante of several Bath residents, including the poet and essayist Walter Savage Landor, who bought several paintings from him,<sup>22</sup> and the Reverend Kilvert, uncle of the more famous diarist. He became acquainted with Louis Napoleon, later Emperor Napoleon III of France, who lived during 1846 at 55 Great Pulteney Street.<sup>23</sup> Benjamin Ward Richardson described how, when Empson and Snow visited Paris in 1856, Empson had 'special imperial favours shown to him, in which the nephew participated'.

Empson moved to 7 Terrace Walks, close to the Abbey, in 1843. This is now a video shop, but the remains of a fine interior can be seen. He was very active in advancing the interests of local artists; among his other good works he was the prime mover in establishing a library for the patients of the Mineral Water Hospital. He seems to have travelled fairly frequently in connection with his business affairs. One can imagine him visiting John Snow in Frith Street, and later in Sackville Street, and can see how the company of this adventurous, romantic, artistic extrovert, who had been to foreign parts, must have appealed to the rather austere, self-contained Snow and, equally, how Empson must have appreciated that Snow, in his own way, was exploring completely new territory. It is conceivable that he provided Snow with financial support during his difficult early days in general practice.

In mid June 1861 Empson was in London again. He was staying at 60 Doughty Street, a lodging house close to Charles Dicken's old home, No.48, now the Dickens museum, and near the present Great Ormond Street Hospital, when he was taken ill with what sounds like pneumonia, and after an illness of three days he died. He is buried in the Brompton Cemetery. His grave is next to that of John Snow; he must have reserved the plot when John Snow died.

His will is dated August 1858, so presumably he remade it after Snow's death. His effects were valued at under £8000. He left some legacies to friends, and to charities in Bath, including the General Hospital, but most of his assets, including some land that he had bought near the family home, went to members of the family still resident in Yorkshire. Among the legatees were John Snow's mother, Frances, and several of Snow's brothers and sisters. Empson's death was marked by a lengthy, but not too informative obituary notice in the 'Bath and Cheltenham Gazette'.<sup>22</sup>

Empson's estate was sold at auction; the sale lasted five days. According to a newspaper report 3000 people turned up, and the property fetched excellent prices. The Bath Record Library still has a copy of the sale catalogue. This lists a number of gold artefacts from South America, which would be those exhibited in 1828. Several of these, according to Professor Warwick Bray, are now in the possession of the British Museum. There was also a silver dish and stand, said to have been presented to Empson by General Bolivar. There were many books on South America, including those by Cochrane, Hamilton and Waterton, many paintings and much antique furniture, and a copy of John Snow's 'On Cholera', and one described as 'Snow on Anaesthetics', which I take to have been his 'On Chloroform'. Also in the Bath Reference Library there are several of Empson's minor writings, poems and his original sketchbook, with the pencil drawings, presumably made in Colombia, from which the published plates were prepared. They show evidence of considerable artistic skill.

One can get some idea of the regard in which Empson was held, from the fact that his friends set up a fund to provide a memorial window in the Abbey, and this was installed about a year after his death. It is located immediately over the north-west door, which is the usual entrance to the Abbey. The inscription, at the base of the window, with a disconcerting disregard of the subjunctive, reads: 'In affectionate remembrance of Charles Empson, of this city, born 1795, died 1861. Erected by public subscription, that the memory of a good and estimable citizen is perpetuated.'

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## ADDENDUM

Continuing research has filled in certain gaps in the above narrative. Charles Empson set sail from Liverpool, on board the 'Sir William Congreve', bound for South America, on June 18th 1824. He was accompanying Robert Stephenson, son of George Stephenson, who had signed a three year contract with the Colombian Mining Association, with the purpose of reopening the silver mines at Mariquita. Empson was Stephenson's constant associate during his time in South America.

They left Colombia for home towards the end of July 1827; yellow fever was raging in Cartagena, and since no suitable ship was leaving for England they took a passage for New York, and suffered ship wreck almost at the end of the voyage. Nearly all their luggage was lost. The name of the ship and the exact dates are not known, but it is recorded that Stephenson was inducted as a freemason in the St Andrew's Lodge, New York, on 21st September 1827. After this he and Empson went on a walking tour of New York State, visiting the Niagara Falls, and crossing into Canada as far as Montreal.

They arrived back in Liverpool towards the end of November 1827. Hence Empson spent three years, not four, in South America. He settled in Newcastle, where he started a business as a fine art bookseller in Collingwood Street. His shop was the resort of artists, scientists and literary men. It is said that at Christmas 1833 he printed on the back of his address cards the message: 'To wish you a Happy Christmas', and this is thought to be the origin of Christmas cards. In 1834 he was 'driven from Newcastle by a foul slander, which is said to have had no foundation', and went to reside in Bath.<sup>2</sup> Shortly before his death he made available to Robert Stephenson's biographer, Jeaffreson, Stephenson's early journals, and nearly all his correspondence during his stay in South America.

Obviously, further questions remain, including the present whereabouts of Stephenson's South American log.

## ACKNOWLEDGEMENTS

I am grateful to Professor Warwick Bray and to Mr B B Bird, Honorary Secretary of the Society of Antiquaries of Newcastle-upon-Tyne, for supplying me with a xerox of my second reference, and for suggestions for further research.

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## SOME INTERESTING THEATRICAL EXPLOSIONS

Dr A G MacDonald

The first known report of a fire related to anaesthesia was in the 'Boston Medical Intelligencer' of 1850, under the small heading 'Caution in the use of ether and chloroform'. It is brief but interesting.

'A very serious accident happened in surgical practice in this city, not long since, by the taking fire of the vapor of ether. The circumstances under which the accident occurred are these. The patient had an operation upon the face near the mouth. There being some considerable haemorrhage, the cautery was applied, and it was by contact with the hot iron that the ether was set on fire. Too much caution cannot be used in the application of ether, and this one instance of its inflammability in actual practice should serve as a caution to all. No lighted body should be placed near a patient, while he is under the influence of ether.' There is no mention at all of whether anyone was injured, even though it is described as a 'very serious accident'.

The next recorded incident was in 1863, and happened to a young doctor attending the wounded in the American Civil War at Gettysburg.

'I was trying to secure a large bleeding vessel just above the inner end of the clavicle. The only light was five candles stuck in a block of wood, and held very near the ether cone. Suddenly the ether flashed afire, the etheriser flung the glass bottle of ether in one direction, and the blazing cone fortunately in another. We narrowly escaped a serious conflagration. Why did I not use chloroform, which is non-inflammable? I fear I must admit to gross thoughtlessness. My only consolation is that the patient suffered no harm', etc....

### British reports

The first such incident in this country may be the one I found in a letter to the 'Lancet' in 1866, under the rather uninteresting heading 'Dr Richardson's Apparatus', and signed only with the initials 'S.E.K.' After the introductory preamble, he continues: 'I have used Dr Richardson's Ether-Spray for some little time, both by daylight and by gaslight, with no danger attending till the other evening, when the fright which patient, attendant, and myself experienced, determined me to operate by daylight only.'

'A gentleman calling to have a tooth extracted, I proceeded in the usual way. Having applied a small piece of cotton-wadding over the tongue, with the view of protecting it from the fluid which I was about to direct upon the upper jaw, I began business. I should say that in every preceding instance, I have used a candle, to throw a better light into the mouth. This is held by the assistant not nearer than half a yard from the seat of operation. In this case it was done also. And now comes the terrible scene. I had scarcely used the ether for twenty seconds, when suddenly a volume of flame rushed from the patient's mouth, enveloping the three of us for a single instant. It was so soon over that the patient had not time to rise from his seat. There was no explosion: all was quiet. After regarding each other for a few moments, I ventured to inquire of the patient how he felt. I was happy

to see a rather ghastly smile illumine his pale countenance; but his only answer was 'what a wonderful occurrence'. There was no smell of scorching; the only injury sustained being a slight singeing of the more prominent hairs of his moustache. The patient's complexion had been of a healthy ruddy colour on sitting down for his operation; but this soon gave place to a ghost-like pallor; and when I beheld the flames gushing forth from his mouth, I almost believed it was a veritable fire-demon sitting before me. He certainly did not look ethereal. The only unpleasant feeling he experienced was sense of constriction round his neck. He is nothing the worse for it; in fact better, as he has not felt a twinge of toothache since.'

'Now, Sir, cases like this are not to be made light of. The cause of the mischief might be attributed to the candle. If so, then why did the same effects not ensue in preceding instances, as the same precautions were adopted? I should esteem it a favour to be informed if any rules are laid down for operating in gaslight, as till then I shall be obliged to desist. Yours very truly, S.E.K. October 1866'

Benjamin Ward Richardson's spray was a simple device, producing a steady flow of compressed air, thereby allowing an even spray of atomised ether to be directed from the nozzle on to the area. It had been introduced that same year, and it became extremely popular.

A similar incident is described in another letter to the 'Lancet' a year later, under the more attention-seeking heading 'Danger of the Ether spray'. This was from George Arthur Brown, House Surgeon, Sheffield Royal Infirmary. It relates to a patient with a malignant disease of the mouth, which had begun to bleed. The writer says that he was anxious to try the effect of Dr Richardson's ether spray in trying to stop the bleeding. A candle was held by a nurse at a distance of about two feet from the patient's mouth, and the ether was sprayed for nearly a minute, when 'the vapour suddenly ignited, and a scene presented itself that neither I nor any that witnessed it are likely to forget. The man appeared literally to vomit forth fire, while his head seemed, and indeed was, completely enveloped in brilliant flame. The fire was however rapidly extinguished, and although the patient was terribly alarmed, and fainted, no further harm resulted to him than having his face slightly scorched.' etc.... He finishes: 'I may say that the bleeding was completely arrested, and has not since returned.'! These were some of the earliest incidents. Ether soon began to cause more serious explosions. The Proceedings of the RSM have several reports and by 1930 it was estimated that over 100 were occurring every year, in this country alone.

#### Other agents

Even more frightening was the introduction of acetylene as an anaesthetic agent in 1924. A German journal records graphically how one patient having a laparotomy sustained very severe burns when a huge explosion occurred as the surgeon was withdrawing the diathermy out of the peritoneum. This was followed by another explosion 10 seconds later, which resulted in the anaesthetic machine being knocked over. There were flames coming from in and round the mask and face, and the patient's hair was on fire. Then her gown and the drapes caught fire, and then the gas mixture in the reservoir bag exploded. It is a vivid

account of a terrifying incident. The type of Drager machine involved had an awesome cylinder of acetylene dwarfing the machine and probably the anaesthetist as well, like a Polaris missile waiting to set off. Had it broken during this explosion, the whole theatre area would almost certainly have been destroyed.

Ethylene was also the cause of many horrendous explosions and deaths, one of the most tragic being in 1929, which killed a mother during the second stage of labour. She was inhaling 50% ethylene and oxygen from a mask, in the same way as Entonox is administered now. When she removed the mask after one of her pains had subsided, there was an explosion which was heard throughout the four-storey building, and there is a harrowing account of what ensued, with the mother dying, and then the baby being delivered dead.

Cyclopropane too caused some terrible explosions including, in 1964, probably the worst of all time. In a theatre with two operating tables in progress, it killed two patients (both children), two surgeons, two anaesthetists, and resulted in another surgeon having an arm amputated, and two nurses each having a leg amputated. Two other nurses were badly injured.

#### Less tragic - two anecdotes

The chapter on explosions in Professor Macintosh's book describes how the careless disposal of flammable agents down sinks and wash basins can be dangerous. I was told a true story by the late John Young concerning the time when he was an SHO anaesthetist in the early fifties. During an eye list, a very junior nurse was asked to dispose of a half-full bottle of ether which had been on the machine. Not knowing quite what she should do with it, but knowing only that it was fairly dangerous stuff, she decided to get rid of it for good. She tipped it down the lavatory, pulled the chain, and went back into theatre. Now the surgeon that day was a particularly quiet man who absolutely hated any fuss or noise in his theatre, and after doing his first cataract, he went out to have a quiet smoke, and before going back into theatre he went to the toilet. Here he made his one mistake ... not fatal, but unforgettable. He discarded his cigarette between his legs into the pan. There was a very big bang, followed by a sheet of flame and, as they say nowadays, he had lift-off. He was propelled upwards and forwards, hitting his head against the door, and breaking his spectacles. He did no more operating that day. In fact, he wasn't badly burned, because ether burns with a coolish flame. In any case, as John Young said: 'it was merely a flash in the pan'.

Fatal explosions became more frequent when oxygen was added to anaesthetic gases. Many anaesthetists didn't want to believe that there was much of a risk, and one of these was Dr Andrew Tindall. He was one of the most delightful and endearing members of our specialty, a great personality and a brilliant mind, always bubbling over with original ideas, but ... he was born with a stubborn nature (in Scotland we call it being thrawn), and this occasionally got him into deep trouble. He used to anaesthetise for Sir Charles Illingworth, who was Professor of Surgery at the Western Infirmary in Glasgow and, on one occasion, he was arguing with the Professor about the explosibility of ether, and found himself saying: 'No, no, it's quite safe, the expired gases are well

below the explosive range'. When challenged on this, he unfortunately decided to put it to the test. He fetched a large pail, collected the expired gases from the anaesthetic system into it for a minute or two, and carried it carefully into the corridor outside the Professor's theatre. He then lit a match, and with a great flourish, flung it into the pail. There was the most almighty bang, which cracked all the windows in the corridor, and gave everyone a spectacular fright. He may have been very unlucky in this escapade, as the heavy ether would have concentrated in the bottom of the pail, displacing the air out of it, to the point where the proportions of gases would have approached the stoichiometric mix. Anyway, it was another interesting theatrical explosion, and someone said that it had probably put back the Chair of Anaesthesia in the Western Infirmary by 20 years!



## AN UNUSUAL DOUBLE FLOWMETER: MAGILL 1923

Dr D C White

Water sight flowmeters, usually of the bubble type, were used in anaesthetic machines from their first description by Cotton and Boothby in 1912. Their use in the Boyle's machine continued until the introduction of the Coxeter dry bobbin meter in 1933. A problem with bubble flowmeters is that at high gas flows the excessive 'foaming' prevents accurate reading. This is more of a problem with nitrous oxide than with oxygen because of the higher flows required with this gas. A number of the multigas flowmeters to be seen have overcome this problem by fitting an  $N_2O$  bypass. This, of course, prevents accurate flow measurement.

In 1923 Dr Magill published a description of 'An apparatus for the administration of nitrous oxide, oxygen and ether' (Figure 1). The first bottle contains an oxygen flowmeter of the bubble type and a water depression tube to measure nitrous oxide flow. The bubble tube of the oxygen meter is inclined obliquely to allow easier observation of the bubbles. The water depression tube of the nitrous oxide meter is of 5mm i.d. and has an orifice of 3.5mm above the water level.

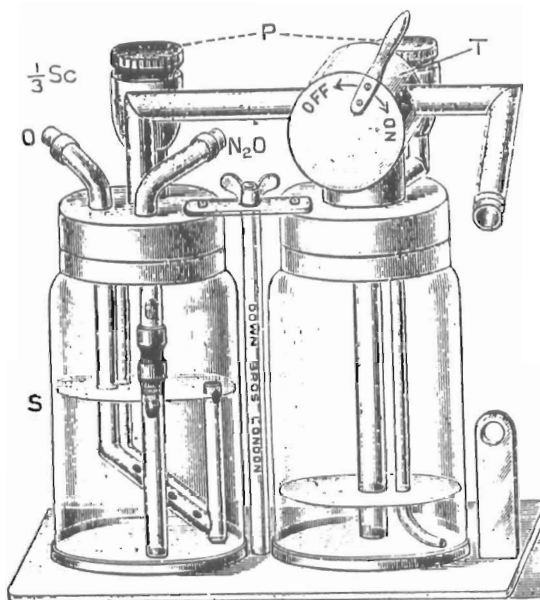


Figure 1. Magill's 1923 Flowmeter

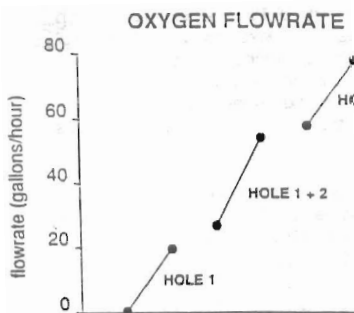


FIGURE 2A.

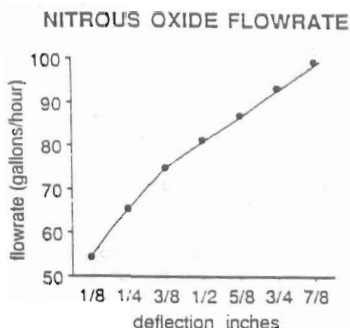


FIGURE 2B.

#### Accuracy of the flowmeters

We have assessed the accuracy of both flowmeters by connecting the outlet of the flowmeter bottle to a calibrated water spirometer and collecting a timed volume of gas. The oxygen flow meter has three holes along the oblique tube from which gas bubbles. Six end points for flow measurement were taken. The first and lowest was when bubbles just appeared from the first hole. The second was when bubbles were streaming from the hole but just before any escaped from the second hole. This was repeated for the other two holes to give the six points shown in Figure 2a.

A scale graduated in 1/8ths of an inch was mounted against the water depression tube and nitrous oxide flow rate was measured as for oxygen. The series of different flow rates used produced water level depressions increasing by increments of 1/8th of an inch. These results are shown in Figure 2b. Flow rates are expressed as gallons per hour.

We found that the dual flowmeter gave reproducible results and clearly the assembly could be used in clinical practice. However, it has to be admitted that there is a discrepancy between our findings and the figures quoted by Dr Magill. He stated that 3/4th of an inch of nitrous oxide depression with 2 holes of oxygen bubbling should give 10% oxygen in the resulting gas mixture. We found this value to be between 24% and 36% oxygen.

#### Acknowledgement

My co-worker in this study was Barbara Royston.