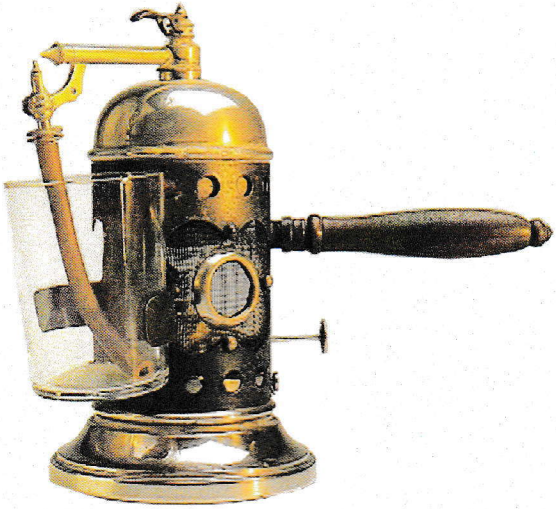
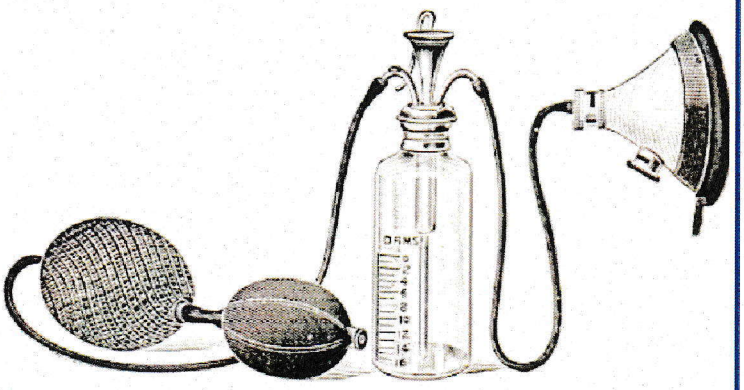
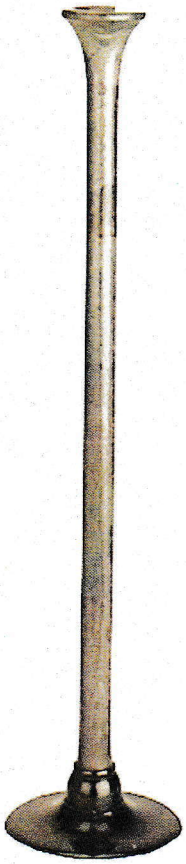
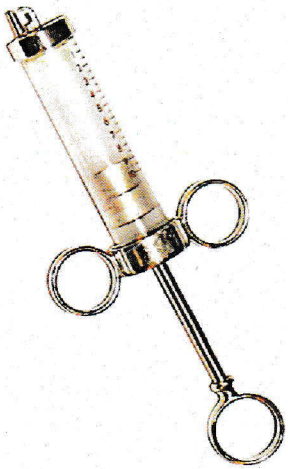






The Historical Medical Equipment Society



2021

Bulletin No. 36

ISSN 1366–4719

MEETINGS ARE BACK!

Does a visit to the Science Museum in London, for a guided tour of the new medical section, sound good?

Probably in April 2022

If you are interested and likely to attend, please let Peter Mohr know: Peter.Mohr@manchester.ac.uk

CONTENTS

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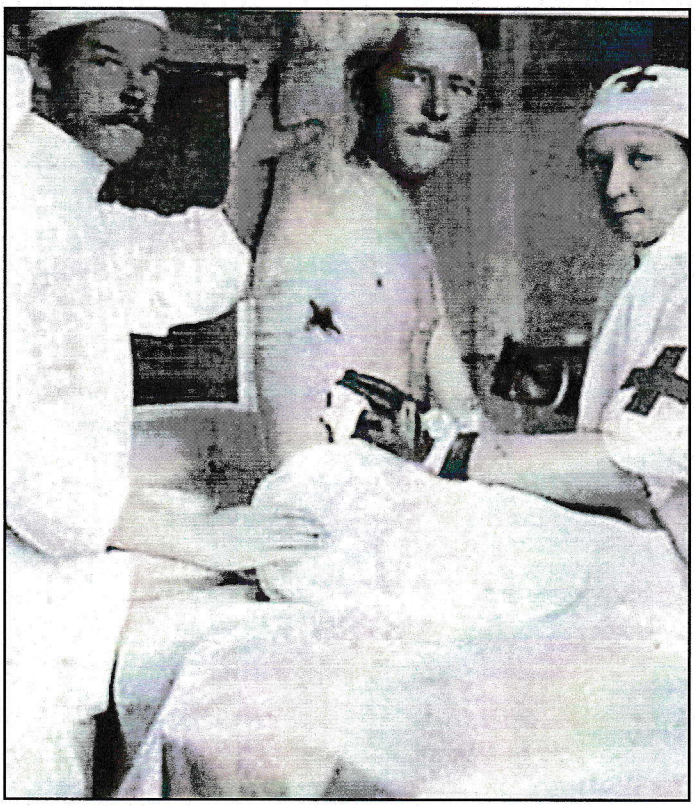
Where Angels Fear to Tread - Early Surgery for Penetrating Abdominal Wounds

Michael Crumplin



Vera Gedroits (right) -
the first female military surgeon, who was the first to perform surgery on a series of penetrating abdominal injuries.

During the Great War surgeons learned that surgical intervention for penetrating abdominal wounds was both feasible and often life-preserving. Surgical success with such wounds of the abdominal cavity mandates early intervention, the safest method of anaesthesia, management of sepsis, good analgesia and an understanding and management of the *milieu interieur* in response to trauma and infection. Ideally, abdominal wall relaxation, the safest, simplest surgical procedure and transfusion of blood and electrolytes are also crucial to success.

Until the mid-19th century, there was no effective anaesthesia or even an inkling of a perception of bacteriology. During and after the Franco-Prussian War (1870-1) the increased use of high explosives, scattering shards of hot metal, and high-energy-transfer bullets produced an unimaginable number of mutilating wounds. Before long, over the four dreadful years of the 1914-18 War such a plethora of severe injuries launched a wealth of new medical and surgical strategies to improve survival. Mounting success with the management of various

injuries such as soft tissue mutilation, compound femoral fractures and faciomaxillary wounds are well-known examples.

Less well known were the gradually improving efforts to intervene in the body cavities with penetrating injuries. Over time, there had been rare examples of post traumatic surgical intervention in the abdomen in Roman and Arabic texts (**1**). Mostly these would have referred to closing abdominal wall wounds, reducing intact bowel, suturing damaged exteriorised gut, or establishing an 'artificial anus' (stoma). Early works referred to occasional stented anastomoses from the 13th to the 19th century in Europe (**2**). However, after early occasional attempts at enterorrhaphy, significant purposeful laparotomy for the management of gunshot wounds was largely unrecorded until the early 20th century. This was despite several giants of American and European surgery (e.g. Agnew, Kocher, Billroth and Lawson Tait) evolving abdominal procedures in civilian practice during the last few decades of the 19th century.

The incidence and mortality of penetrating abdominal injuries was recorded in Greek times as being around 14.5% and 96%, respectively (**3**) and in modern warfare (in concert with the incidence of thoracic penetrating wounds) as around 5-10%. Most early deaths from penetrating abdominal wounds are due to blood loss and later from the sequelae of peritonitis, a term coined in the late 18th century by William Cullen. An understandable reluctance to intervene surgically was derived from the delayed arrival of moribund patients, surgical failures and the survival of 10-20% of patients without operation (some of whom had no visceral injury). Thus, these injuries sustained during the American Civil War, the Franco-Prussian War and the 2nd Boer War were largely treated with an expectant policy. Following the Boer War, with less sepsis associated with the 'cleaner' contaminated wounds of the dry veldt, this conservative policy was used in the early part of the Great War.

We have to recall that, with delay in evacuation, shock and evolving sepsis, also surgeons inexperienced in abdominal diagnosis and surgery, a high mortality with surgical intervention at these times was inevitable. Conservatism and an expectant policy were emphasised by the influential Sir William McCormack, who served in the Franco-Prussian conflict and also in the 2nd Boer War. Although dismissing evidence of civilian surgical successes in the abdominal cavity, as not being relevant to the different exigencies of war, he later agreed that early laparotomy might be successful. Perhaps the 2nd Boer War was a missed opportunity for surgical intervention. Although Makins and Treves added caveats, MacCormack's aphorism that, 'in this war [NB not 'in war'!] a man wounded in the abdomen dies if he is operated upon and remains alive if he is left in peace' prevailed.

There were, however, scattered successes with abdominal intervention in conflict that were largely ignored in Europe, much to the disadvantage of many patients in France, during 1914-15. The first was an American surgeon, George Goodfellow, who succeeded with surgical intervention in the Spanish-American War of 1898. He had also operated on two victims of the Gunfight at the OK Corral who had received belly shots! His nation ignored his achievements.

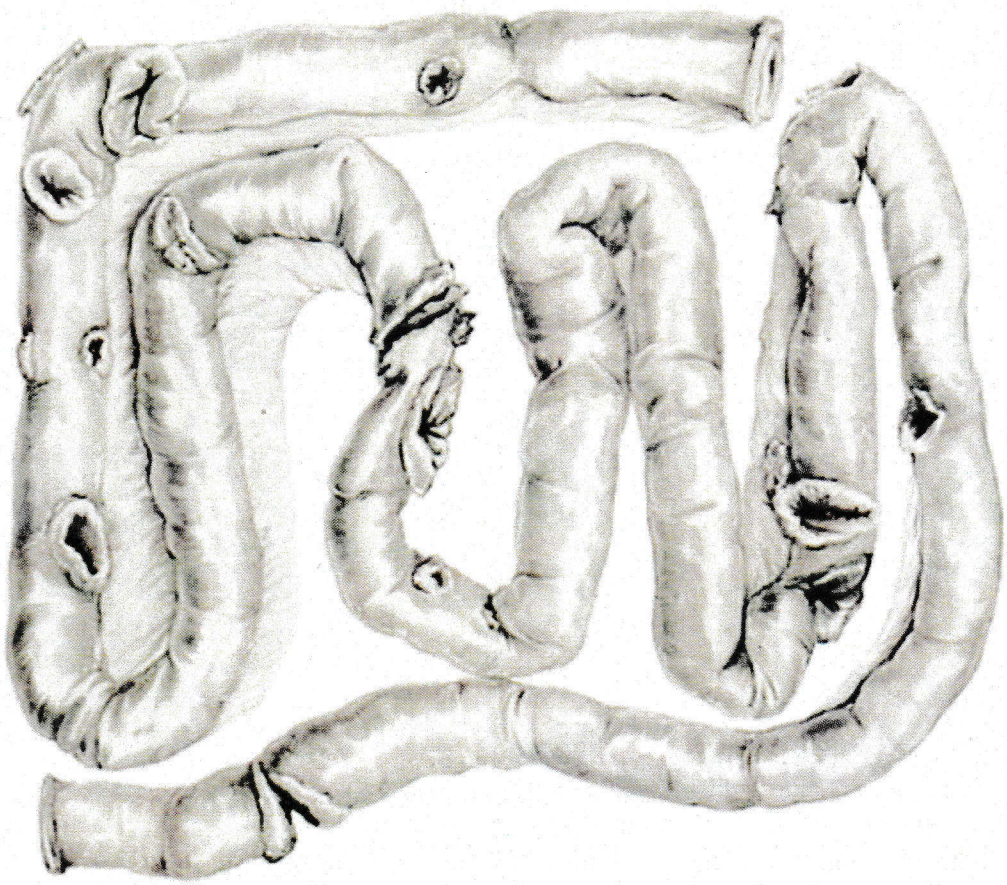
The other masterly pioneer for appropriate abdominal surgical intervention in war, was a woman, Vera Ignatievna Gedroits (sy. Giedroyc), openly lesbian, an author, poet and surgeon of Russian and Lithuanian descent. She was the first female military surgeon and professor of surgery in Russia. She trained in Switzerland under Cesar Roux and obtained a fine reputation.

Gedroits served in the Russo-Japanese war (1904-5). She believed in operating on wounded soldiers near to the front line and actively intervened in penetrating head and abdominal wounds. She worked from a dedicated hospital train (one of 78 used by the Russians), consisting of 14 rail carriages one of which was used as an operating theatre. She opted to operate only on casualties who had been injured less than three hours previously, fully recognising the fatal consequences of delay. In her first six days on her train, she carried out 56 major procedures and during the subsequent six months,

she performed 183 laparotomies for penetrating wounds. Her procedures and mortality rates have not yet been found, but they were said to be impressive. She created a 57-page report, which managed to convince the Russian Society of Military Doctors to adopt her policies for the management of abdominal trauma. Her work was largely ignored by European surgeons. (**4**)

Following the Boer War, European surgeons persisted in their conservative views. They believed that the sealing off of small intestinal perforations, with mucosal protrusion and omental adherence would account for such survivors of non-interventional therapy. Patients were kept warm and nursed in the Fowler semi-reclining position. Nil by mouth was kept up for some days and rectal fluids and analgesia were administered. The hope was that survivors might localise off septic foci in the pelvis, which could be drained.

At the outset of the First World War, therefore, with a surge of patients suffering abdominal wounds, things had to change. Although penetrating abdominal wounds were only a small proportion of all wounds presenting (c. 1-2%), the proportion who died on the field was more than 60%. One author estimates that around half a million men in the opposing powers sustained abdominal injury on the battlefield. Around 60-70% of wounds were caused by high explosive damage and many injuries came from the large number of heavy machine guns used by the Germans. In the abdomen, small and large bowel wounds accounted for around 50% of the total (small bowel wounds proved more fatal than those of the large gut). Multiple and thoraco-abdominal injuries were not uncommon.



Small bowel length excised by Owen Richards on 18 March 1915 – the first such successful case treated on the British Front in France.

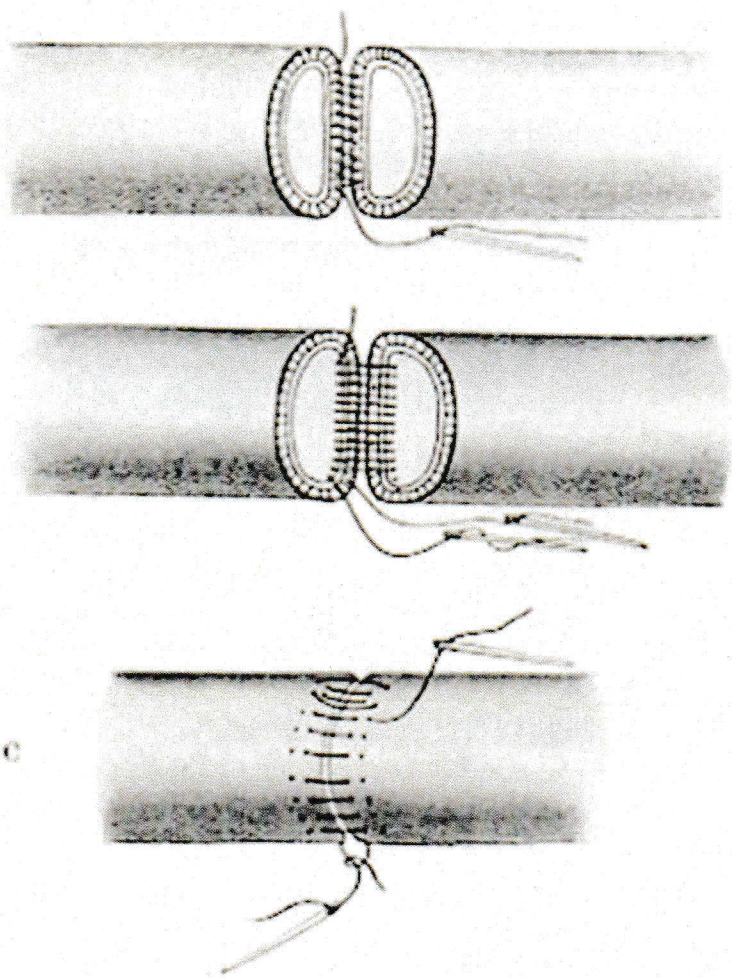
The evacuation chain in this war evolved over the first two years of the war – regimental aid posts, the field ambulance advanced and main dressing stations, casualty clearing stations and then stationary or main base hospitals. Delay in casualty evacuation of over six hours was a definite outcome determinant. Other factors improving survival and avoiding morbidity were: warming the patient, adequate analgesia, fluid and blood transfusion, safe enough anaesthesia, good surgical timing and techniques and the prevention of sepsis. A few examples of French surgeons performing successful laparotomies are known to have taken place towards the end of 1914. However, in 1915, British surgeons triumphed over conservative dogma.

One Spring day in 1915, a young soldier was hit by multiple pieces of shrapnel. These caused an open belly wound and the poor man struggled back to his own trench, cradling his wounded gut in his hands, as he wished to die in his own lines.

Fortunately, he was operated on by a certain Owen Richards. A six-foot length of small intestine, with twenty perforations caused by shrapnel, was resected and a primary anastomosis was performed. The patient survived.

Richards, undeterred by a high mortality in a small published series, was supported in his interventional approach by Sir Anthony Bowlby, a Boer War veteran surgeon, soon consulting surgeon to the Second Army in France. Bowlby was a champion of creating specialist work, including abdominal surgery, nearer the front in the casualty clearing stations (CCSs). This allowed earlier intervention rather than waiting for the patient to be sent back to a base hospital.

A Boer War colleague of Bowlby was Sir Cuthbert Wallace, who also encouraged abdominal wounds to be treated at the CCSs. He published a large series of surgical data on surgery carried out on penetrating abdominal wounds. Soon, another prominent surgeon, Sir Gordon Gordon-Taylor 'joined the club'. These and other men gradually evolved criteria and contraindications for surgical intervention.



Circular enterorrhaphy using the Czerny-Lembert technique.
From *The Practice of Surgery* by Spencer and Gask (1910)

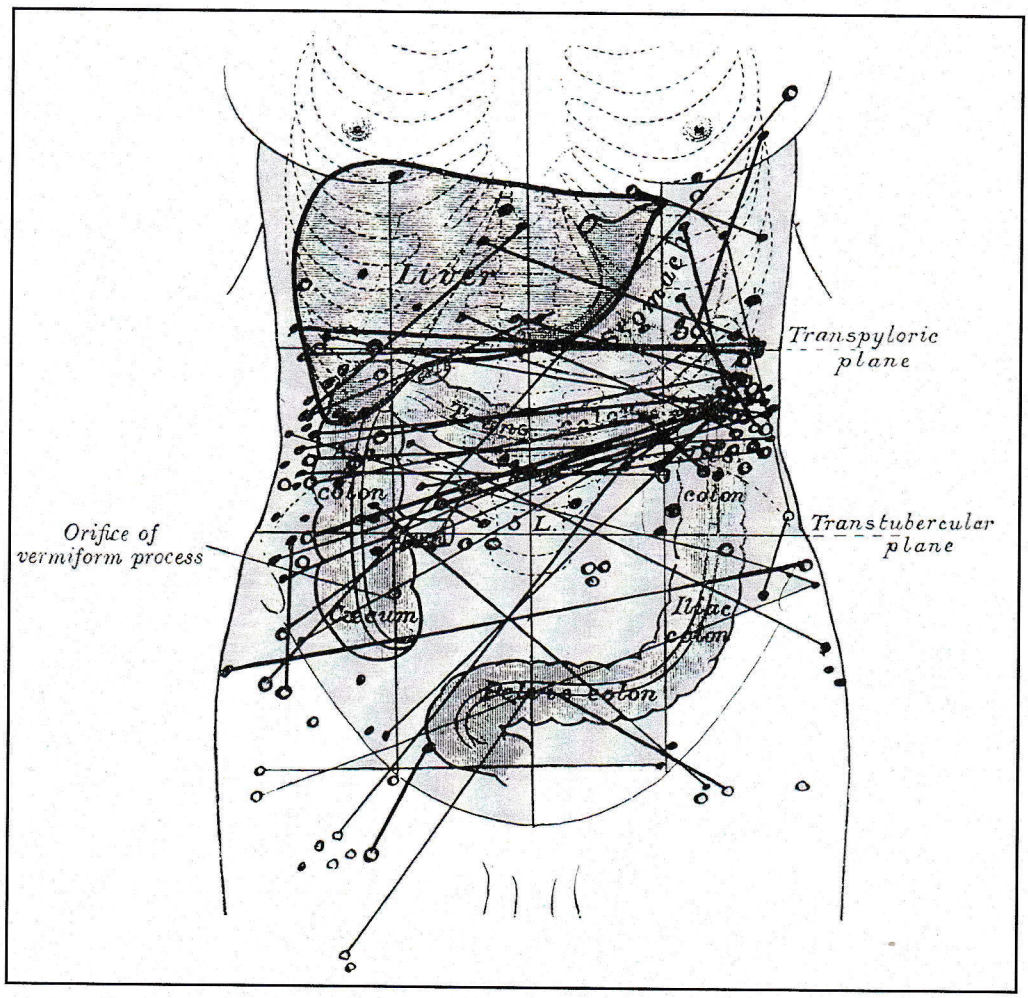


Chart of cases too seriously woundedto be submitted to operation, all being fatal.
A black dot represents an anterior wound, a circle a posterior wound;
the track of the projectile is shown by a line.
From Wallace, 1917 (5)

What about surgical techniques? After anaesthetic induction, using nitrous oxide sometimes with ether (almost never a spinal anaesthetic), a paramedian or midline incision, with a hand-sharpened solid steel scalpel was made. Either self-retaining or hand-held retractors would have to battle with differing degrees of abdominal wall relaxation, depending on the depth of anaesthesia. Thorough examination of the hollow and solid viscera, would determine procedure.

Smaller curved needles gripped by needle holders or larger curved or straight hand-held needles threaded with catgut or silk were used for suture repair of bowel, usually two-layer anastomoses, or stoma construction. Sutured anastomoses were considered superior to using Murphy's button.

If resection was required, suitable artery forceps (e.g. Tait's, Spencer Wells or Wallace's) controlled the mesenteric vasculature prior to ligature.

In his large series of 1,288 cases of gunshot wounds of the abdomen, Wallace reported 364 sutured gut repairs, 154 bowel resections with 158 anastomoses and the creation of 4 stomas. Thirteen kidneys and 16 spleens were excised. Amongst a miscellany of other operations, 122 patients were found to have no hollow viscus injury. Two hundred and fifty soldiers were considered too moribund for surgery. Interventional mortality in this large series was 51%. (5) Later advances (1917) at advanced operating centres reported a drop to 40%.

In a book just preceding the Second World War, written to guide surgeons in abdominal surgery, Gordon-Taylor reported on some complex thoraco-abdominal procedures and, whilst the mortality of these serious injuries was 82% in 1916, by the end of 1917, this rate had fallen to 33%. (6)

All told, by the end of the war, the mortality rate for penetrating abdominal wounds had fallen from around 80% to 50-60%. These signal successes reflect a tough learning curve for the Allies' surgical participants and much forbearance by their long-suffering patients. There remained more to be done.

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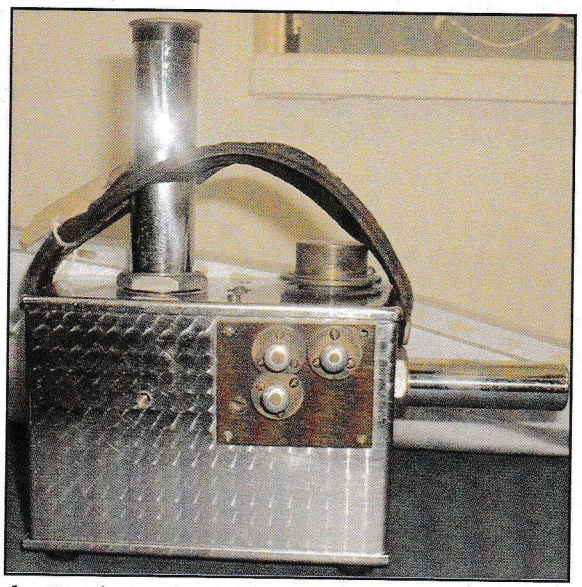


What Is It?

Can you identify this object?
It's quite heavy and about 15cm (6 inches) long.
The answer will be in the next issue of the Bulletin.
No prizes, but if anyone can write a detailed answer they shall have it published.

Answers

We neglected last year to give the answer to the puzzle in the 2019 issue. The object is an 'esthesiometer' – a device to measure the sensation of two-point discrimination.
The answer to last year's Brylcreem puzzle is the Stephens anaesthetic machine – an in-circle vaporiser machine intended to be used as closed-circuit or semi-closed. Apparently when the inventor was devising his prototypes he used Brylcreem jars for vaporisers; as everything else was machined to fit, when it went into production the vaporisers had to continue to be of Brylcreem design.

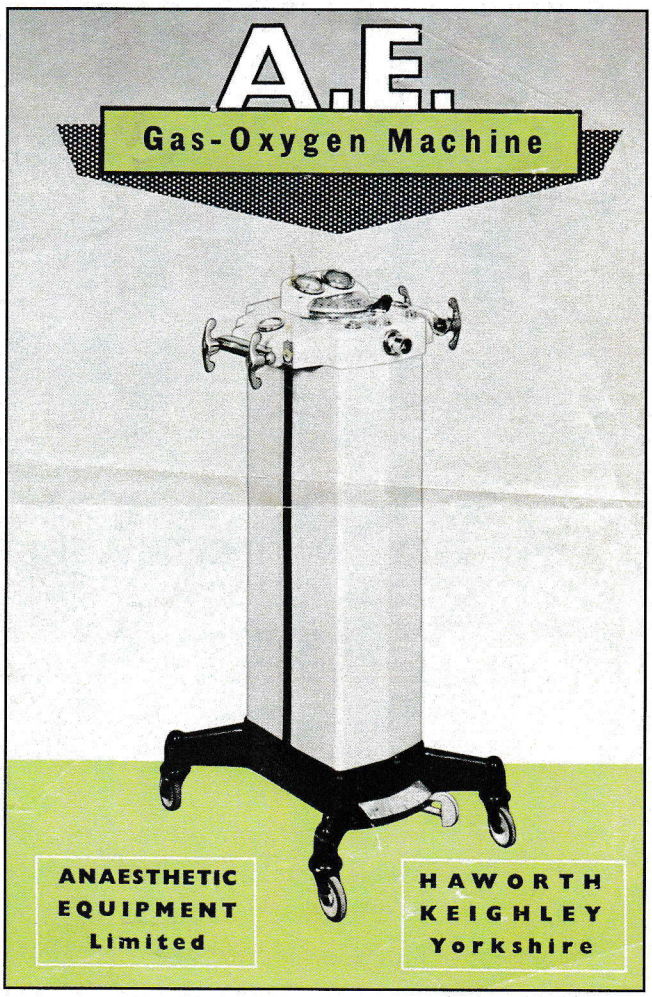
History and Evolution of Inhalation Sedation Equipment: U.K. Development

Janet Pickles

The history of nitrous oxide use for sedation and associated anaesthetic equipment is a fascinating one. Many leading names have played a significant part in the journey and this article will attempt to explore some of the facts associated with nitrous oxide since its discovery. In our modern context, we have much to be grateful for the work of illustrious personages such as Sir Joseph Priestley and Humphrey Davy.

Relatively little has been documented regarding the evolution of the modern-day purpose designed flowmeters for titrating precise doses of oxygen and nitrous oxide for analgesia. Langa is one author who does touch on the subject, including some of the early American units in both Edition 1 (1968) and Edition 2 (1976) of his book *Relative Analgesia in Dental Practice* but this contains nothing of the UK involvement.

It therefore seemed worthwhile to include something of this history, lest it be lost through elapse of time, whilst at the same time paying some form of homage to those men who contributed greatly to the provision of analgesic and anaesthetic equipment from the mid twentieth century onwards. Of course, without the discovery of oxygen and nitrous oxide, machines would not have been needed – interestingly, both gases have a solid record of origin here in England.



History of Use

There have been many contributors to the development of analgesic and anaesthetic gases. Humphrey Davy appears to have been the first to inhale pure nitrous oxide in 1798 and James Watt built a portable gas chamber to facilitate Davy's experiments with nitrous oxide. Davy found it a

very pleasurable experience with thrilling sensations in the chest and extremities. Despite the popularity of the gas among Davy's friends and acquaintances and his copious notes about the ability of the gas to entirely take away the sensation of pain, Davy seems never to have considered the use of nitrous oxide as an anaesthetic, missing a huge opportunity. Anaesthetics would not be regularly used in medicine or dentistry until decades after Davy's death.

A further interesting historical event is the use of nitrous oxide analgesia for cavity preparation, dating to 1889 in Liverpool.(**1**) By this time, gas machines had improved somewhat, with oxygen being delivered alongside nitrous oxide. Moving forward to the twentieth century, dentistry was the primary health discipline to use nitrous oxide. However, due to various factors; unreliable equipment and lack of established technique and training, nitrous oxide use was almost non-existent with only two main periods of interest:1913-1918 and 1932-1938.

The 1940s saw a renewed interest in the use of nitrous oxide sedation. Harry Langa in the USA began postgraduate dental education in 1949, training more than 6000 dentists in nitrous oxide sedation. His first textbook was published in 1968 with a second edition following in 1976. This has become something of a classic reference book and is still quoted today. (**2**)

Dental schools in America began teaching the concepts of inhalation sedation from the late 1950s. In 1962, guidelines for teaching pain and anxiety control in dentistry were established by the American Society of Anaesthesiology.

Dedicated Relative Analgesia Equipment Development

It is widely believed that the first purpose-built machine for delivering inhalation sedation was made by James Watt for Sir Humphrey Davy in 1799. Following on from that, many different types were developed.

History and equipment development timeline in the UK

Langa in his book *Relative Analgesia in Dental Practice; Inhalation Sedation with Nitrous Oxide* (1968), refers to 'development of equipment for administering oxygen and nitrous oxide'. He states that in the United States there are seven types of continuous flow machines: NCG Dental Analgesia unit, McKesson Analor, Ormco, Foregger analgesia machine, Heidbrink analgesia machine Model T, the Dentalgesic and the Quantiflex R A (this is the early Mark I type manufactured by Fraser Sweatman Inc). This last unit was first manufactured in the U.K. towards the late 1960s, under licence from 'Fraser Sweatman, by Cyprane, West Lane, Keighley'.

By the time that a second edition of Lang's book was published in 1976, the list had grown, adding the Sedatron analgesia machine and the Quantiflex RA and MDM flowmeters. The last two types were also manufactured at Cyprane in the period from the late 1960-70's, under licence from Fraser Sweatman. In the UK, the Quantiflex R A (or Fraser RA) was always referred to as the Mark II.

Keighley

Perhaps at this point we should focus on the town of Keighley in West Yorkshire. Events took place there starting in the first half of the twentieth century, which resulted in it eventually being regarded as the 'Anaesthetic Capital of the World'.

On the 5th of August 1947 three men; Bill Edmondson, Wilf Jones and a silent partner, Lord George Wellesley, founded a new company called 'Cyprane', with an initial capital of £2,000. A further company called 'Anaesthetic Equipment Ltd' was also established.

Wilf Jones had joined Coxeter's as a designer in 1938 – the year that Coxeter and Sons celebrated their Centenary of making surgical and anaesthetic equipment and nitrous oxide. They were also the original manufacturers of the Boyles and Walton gas/oxygen machines.

Figure 2. The Trilene Inhaler

Cyprane and Anaesthetic Equipment Ltd. were first based in a garage in Jew Lane, Oxenhope (near Keighley), West Yorkshire. Work started immediately on development of a range of equipment including the Tecota, the AE Gas Machine and the temperature compensated vaporizer known as the Tec range - initially for halothane (Fluothane). Their first project was the development of the Cyprane Trilene Inhaler – this was the first item to go into production from the late 1940s and was used for self-administration in obstetric analgesia and in other medical fields including dentistry.

Timeline

1950

Cyprane & Anaesthetic Equipment Ltd moved to larger premises in Oak Street, Haworth.

1954

In August that year, Cyprane received approval for production of the Tecota Trilene Anaesthetic Inhaler, used during childbirth. The liquid Trilene was poured into the vaporising chamber and this converted it to a vapour for the patient to breathe. Wilf Jones eventually wrote, in a document entitled 'Cyprane Ltd' dated 7 March 1989, that 'the work conducted on temperature compensation for this unit was of great assistance in the later development of the Fluotec vaporizer'. The UK retail price for this machine at that time was £8.80! (Fig.2)

1950s

During the latter part of this decade, The Anaesthetic Equipment Company developed the AE Gas Machine. This dental machine was designed to deliver more accurate supply percentages of oxygen and nitrous oxide and incorporated a three-stage pressure reduction. It was an intermittent flow machine, working on a very different principle from the other units available at that time (the Walton V or McKesson's) and proved very popular. The original price was £145.00 It could be used for general anaesthetic with the addition of an anaesthetic vaporizer and remained in constant use until 2001 when general anaesthesia was barred from dental surgery settings. (3) It had proved very reliable and was sadly missed by its faithful owners. (Figs. 1 and 3)

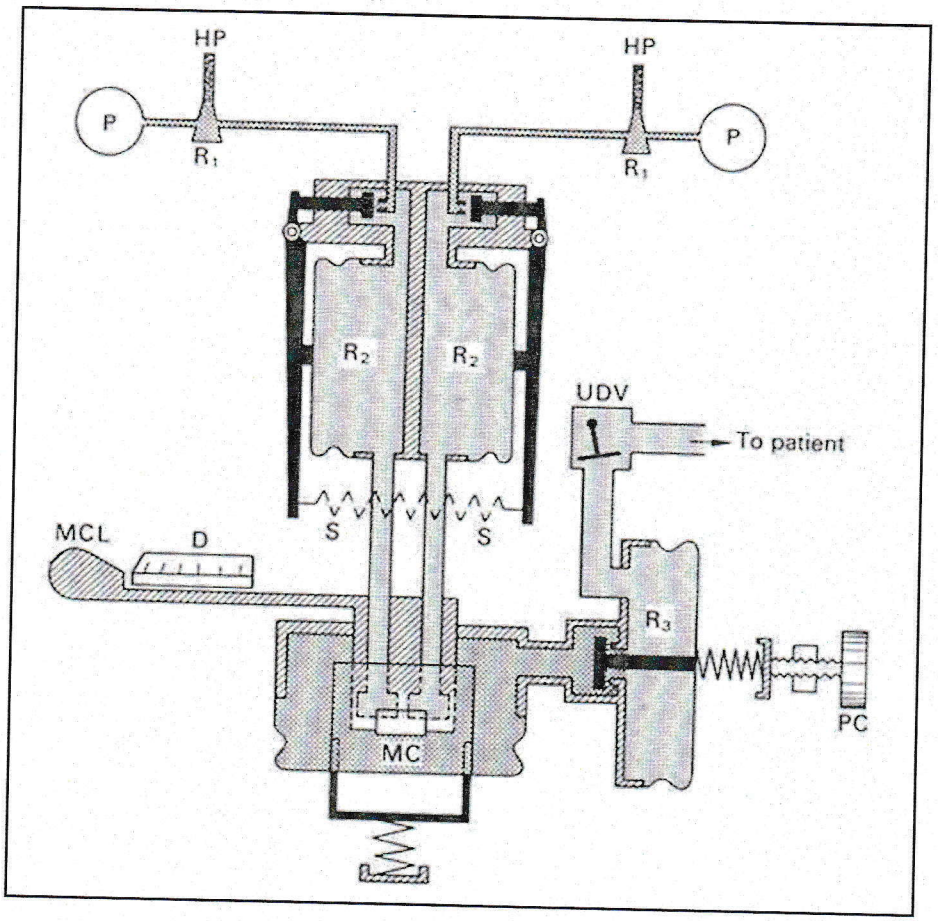


Figure 3
Mechanism of the Cyprane AE Gas Machine

1956

Into the overall picture, now enters some overseas involvement. A Canadian, Fraser Sweatman, started a Corporation –Fraser Sweatman Inc – under the State of New York Laws, with headquarters in Buffalo, NYS. Prior to this, Fraser had already had contact with Cyprane, and their development of the temperature compensated vaporizer programme, and he became the American agent for anaesthetic equipment sales.

Fraser Sweatman worked on developing the (Quantiflex) Gas Machine which incorporated the first twin-series (high/low) flowmeter system with protection against oxygen failure (failsafe) and the now standard position of oxygen downstream of all other gases. A turning point in safe practice came with the development by his engineers - including his then Sales and Design Engineer, Gary Porter, of the MDM (Monitored Dial Mixer) flowmeter. This machine was specifically designed to prevent the delivery of a hypoxic mixture and this hypoxic guard was rapidly adopted by other manufacturers of gas machines. This is the same design which is still manufactured and in wide use today with very minimal changes or alternations. (Fig.4)

The Sales and Design Engineer for Fraser Sweatman Inc, based in Buffalo, NYS, was Gary Porter, who was very instrumental in the Quantiflex development. Porter went on to establish his own business, 'Porter Instruments Inc, Hatfield, Pennsylvania' - this company now manufactures the MDM having purchased the Matrx Nitrous Oxide Division in 2008.

1961

In April, a house with a large garage was purchased in Bird Avenue, Buffalo, NYS, and set up as Cyprane Inc. for servicing of anaesthetic vaporisers.

29th June 1961

A US Federal trademark registration was filed for the name 'Quantiflex'.

16 January 1962

The following entry appeared in the US Patent Office Official Gazette: 'SN 123,396. Fraser Sweatman Inc, Buffalo. N.Y. Filed 29 June 1961. QUANTIFLEX for anaesthetic administering machines. First use Dec 7, 1960'.

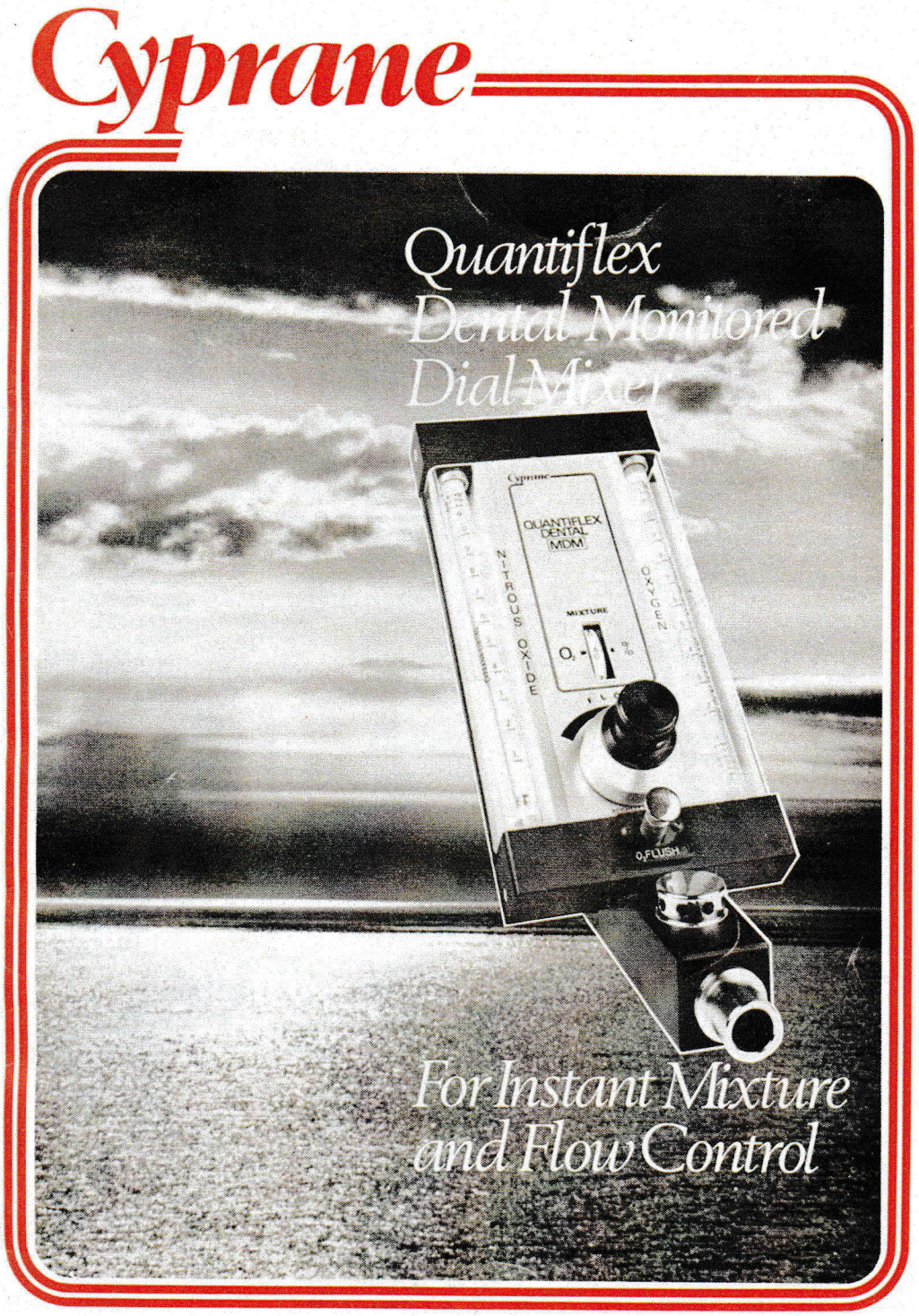


Figure 4

1962

In the UK, the Haworth premises were becoming too cramped, so a larger building was purchased: Joe King's Mill, West Lane, Keighley, amounting to approximately 18000 sq feet, at a cost of £9,000. The Haworth works were retained for some time, but gradually all work transferred to the Keighley site and the Haworth works were sold. Use of the Anaesthetic Equipment Ltd name was also discontinued, with only the name Cyprane remaining in use.

Around this period, quite exciting developments were being made with anaesthetics. In 1956, ICI had started clinical trials of halothane – or Fluothane as it became known. This breakthrough drug can quite rightly be claimed as a product of industry in the Liverpool and Manchester area, with clinical trials being conducted at Manchester Royal Infirmary.

The difficulties of administering Fluothane using available equipment, quickly became apparent, as

much smaller dosages were required. More than a modified Boyles bottle was needed, and a request was made for a vaporizer with a consistent output over the range 0.5–0.3% at continuous flows between 3 and 8 L/min.

The Fluotec Mark 1 gave an accurate output but below flows of 3 L/min the output fell off. This was the first temperature-controlled vaporizer apart from the Tecota and is the forerunner of all modern anaesthetic vaporizers in use today. The Mark II (In 1966 a Fluotec Mk II retailed at £40.00) and Mk III ((1968) followed, with anaesthetic drug variants; Enfluratec, Isotec etc. Many Tec III type vaporizers are still widely in use today in the veterinary sector.

24th November 1964

Cyprane incorporated to a limited company. On the 30th of November 1964, Bill Edmondson retired at the age of 65 and the Company was purchased by Fraser Sweatman. It merged with Canam Surgical Services Ltd of Canada and Fraser Harlake Inc of the US to form one larger company. Wilf Jones was appointed as first Managing Director in England.

1964

A UK manufacturing licence was granted and production of the Quantiflex Mark 1 RA Flowmeter commenced by Cyprane. Later, the Quantiflex MDM and Quantiflex Mark II (also known as the Fraser RA) started. The Quantiflex range was manufactured in both the USA and UK simultaneously, the main difference being the medical gases colour coding i.e. oxygen: USA –green, UK – white.

1965

On the 6th of July the US Patent Office issued a patent for a Volatile Anaesthetic Vaporizing Apparatus - the Drawover Vaporizer. The inventors were named as William Edmondson and Wilfred Jones. This vaporiser was commonly used in conjunction with an MDM Flowmeter until 31st December 2001, when administering a general anaesthetic in a dental surgery setting was discontinued. It was only to be in a hospital setting from that time forwards. (4)

In the late 1960s, Fraser Sweatman purchased the Harris Lake Company and changed the name to Fraser Harlake. Originally based in Canada, eventually all USA flowmeter manufacturing moved to Orchard Park, Buffalo, NYS where it remained until 2008 when Midmark sold the Matrx Nitrous Oxide Division to Porter Instruments (Parker Hannifin).

In 1972 a Quantiflex RA Head - available finished either in black with wood grain centre panel or silver tone - cost £160.00. A mobile 4 cylinder stand cost £75.00 and a wall plate with 12 inch swing arm cost £20.00. These prices were obtained from a quotation offered to a prospective user dated the 31st of August 1972.

1972

BOC purchased the group of companies. Wilf Jones continued as Managing Director.
Fraser Harlake/Cyprane became part of BOC Medishield.

1974

Bill Edmondson died aged 71.

1975

Cyprane Keighley was manufacturing an estimated 75% of the world's calibrated, temperature compensated vaporizers.

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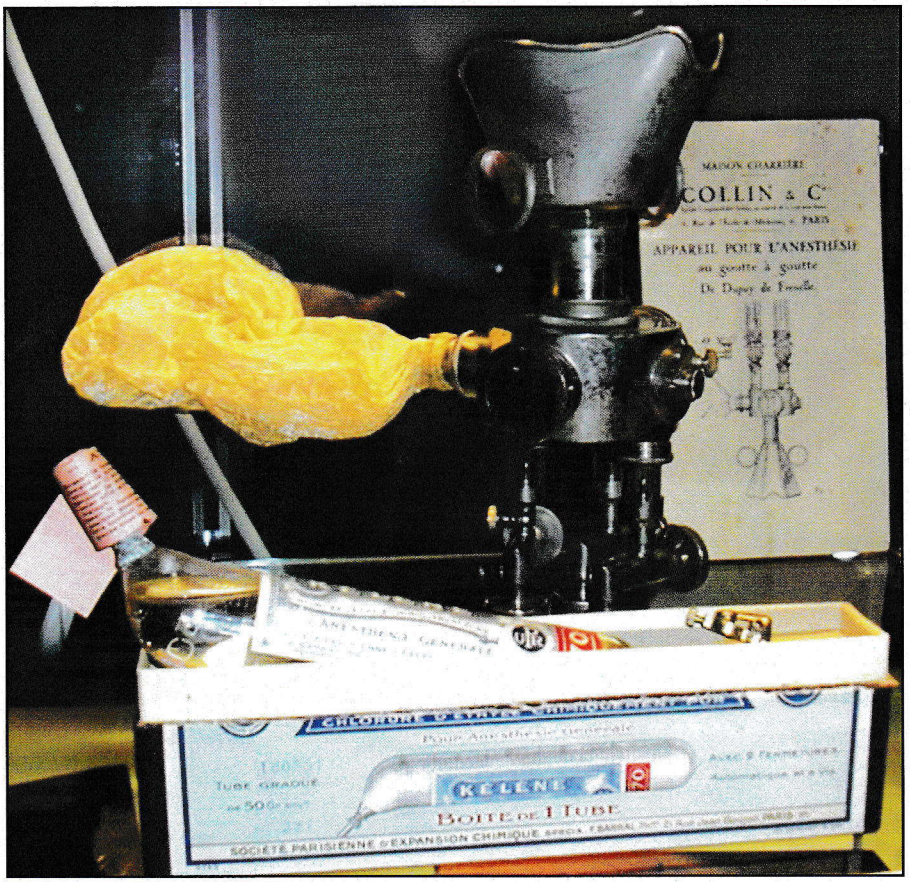
The Apparatus of Dupuy de Frenelle

Adrian Padfield

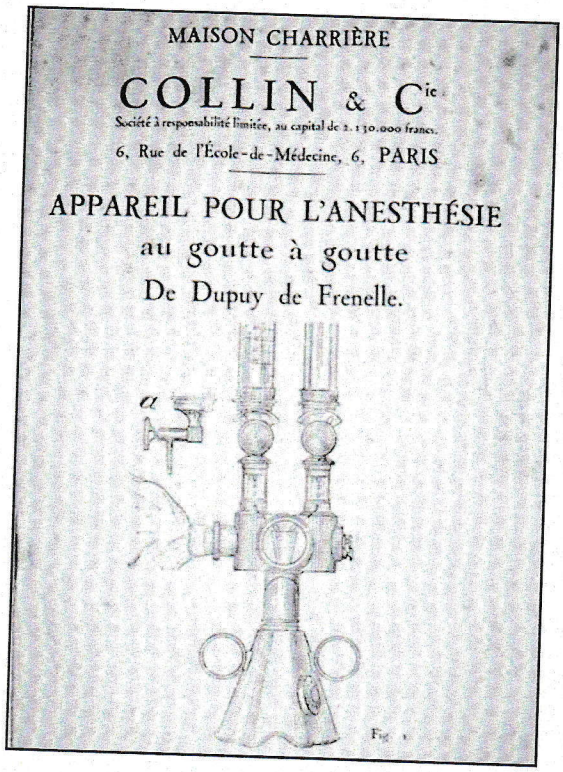


Mention in the last Bulletin of the medieval hospital at Lessines reminded me of a visit there in 2005 on the way to a tour of the Waterloo battlefield with Mick Crumplin. Within the hospital there is a museum with more recent medical equipment and a particular item caught my eye. I managed to persuade the curator to open the cabinet and then allow me to photograph the Instruction Booklet. (Figure 2)

I had some difficulties translating the booklet. Having talked to a French anaesthetist, Jean-Bernard Cazalaà at an international meeting in Cambridge, I visited him in Paris and he was very helpful with references and images that included a book by Dupuy de Frenelle: '*Pour diminuer le* risque *operatoire*.' The book has a fuller description and pictures of the apparatus; and a tribute to 'the ingenious foreman of the Collin company', M. Boucher. Dupuy de Frenelle was a surgeon with orthopaedic leanings.

Jean-Bemard showed me from his private collection a similar apparatus albeit with two needle valves rather than three. It also shows an ampoule in position. (Figure 3)

After translating the booklet, I gave a paper at the History of Anaesthesia meeting in Dundee in 2007. One word for which I couldn't find a satisfactory equivalent was *distributeur*. I asked the audience for suggestions, the most useful of which was 'manifold'. The following is my translation of the first part of the booklet.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APPAREIL POUR L'ANESTHÉSIE

au goutte à goutte

De Dupuy de Frenelle.

'This apparatus delivers pure ethyl chloride or mixtures with chloroform or with ether, drop by drop, onto a gauze pack inside the [metal] mask. It works with ampoules made by Usines de Rhone. Each ampoule contains 30 cc and there are three sorts: Kélène pur (Ethyl Chloride) (tube no. 30 for Dupuy de Frenelle's device) Chloro-kélène, containing 3gms chloroform & 27gms kélène (Dupuy de Frenelle's mixture no. 23) Kélène-ether, containing l0gms ether & 20gms kélène. These tubes screw directly into the device. A special tube is attached to it to deliver pure chloroform or pure ether, drop by drop. Generally, [D de F] I use only two taps; one for kélène, the other for chloroform/kélène mixture. I don't use the ether/kélène mixture. The apparatus consists of two parts: the mask that is applied to the face and the distributeur [manifold].'

Towards the end of the booklet is a heading:
'To avoid asphyxia.
The only accident I have seen in the course of more than 4000 anaesthetics given by my immediate entourage, is blue syncope (Dupuy de Frenelle). Serious asphyxia is characterised by spasm of the constrictors of the jaw and the larynx. To avoid this, it is advisable to put a MAYO airway into the mouth as soon as the patient is asleep. The precursor signs of this alarm are contraction of the masseters, agitation of the hands and feet, spasmodic

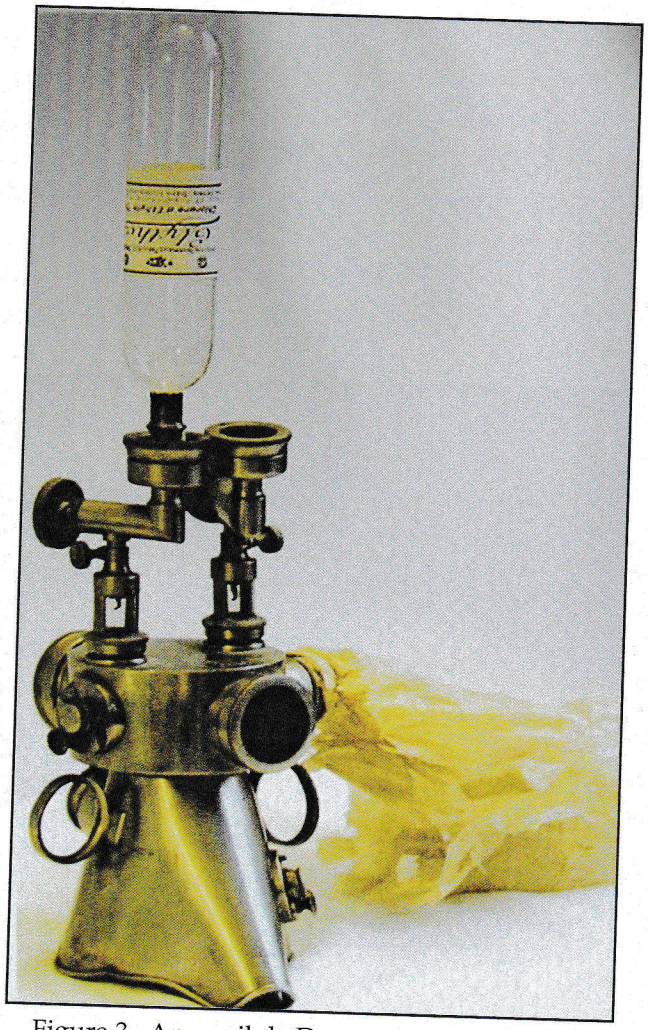
Figure 3. Appareil de Dupuy de Frenelle, 1920

arrest of respiration, which becomes irregular, the raucous noise of laryngeal spasm and blueness of the face.'

I wonder who were 'the immediate entourage'?

My assessment of the apparatus in the history of anaesthesia is rather negative. It seems to me it is an over-elaborate method of dropping an anaesthetic agent onto gauze in a mask. A comment in a contemporary French manual '*Anesthésie en pratique chirurgicale*' also says '*cet appareil est lourd*' (this device is heavy) and this is borne out by the last sentence in the booklet.

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Pour diminuer le risque operatoire
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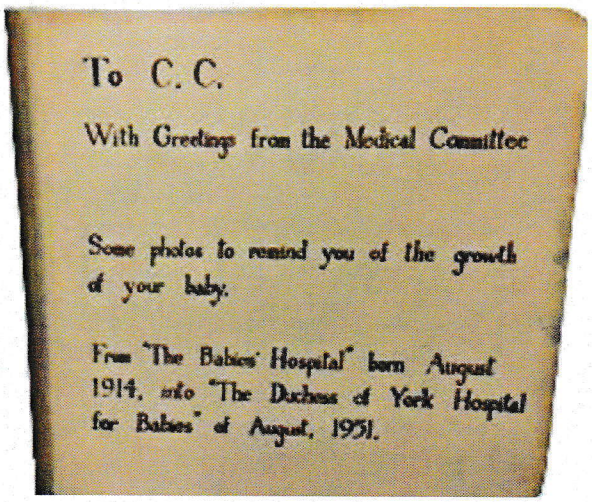
ENT SURGERY and FLORENCE CAVANAGH BSc MB BS DLO FRCSE (1908-1992)

Stephanie Seville

Florence Cavanagh, during a career spanning the mid-20th century, was probably the most experienced paediatric ear, nose and throat surgeon in Britain. Her training began at the University of Manchester and her work touched the lives of thousands of babies and young children attending the Duchess of York Hospital for Babies in Levenshulme. This article explores her story, and casts light on the instruments and equipment that she used in her work.



Born Florence Nightingale, perhaps it was her destiny that she should enter into a medical profession. In the 1920s and 1930s, for most women wanting to work in healthcare, the more common route would have been to become a nurse. Even though women could enter medical school and qualify, it was a struggle for access to post-graduate training and teaching-hospital resident posts and almost impossible to become a hospital consultant or specialist, except in one of the few women-run hospitals. (**1**)

Florence Cavanagh overcame these obstacles, and once established at the women-run Duchess of York Hospital in Manchester (DYH), became one of the most experienced paediatric ENT surgeons in Britain.

Florence was educated at the Blackburn High School for Girls, where she received a well-rounded education, which included a variety of 'extra-curricular' activities, designed to keep pupils healthy both mentally and physically. The school, or at least the building where it started, is an important note in the history of medicine. Spring Mount was once the home of Dr. James Barlow (1767-1839), a surgeon who, in 1793, performed the first recorded successful caesarean section in England. (**2**) (Fig.1)

Academic achievement was consistently good at the school, with several girls each year going on to college or university, including Oxford and Cambridge. Florence was no exception; she enrolled in the pre-medical year, at the Manchester University Medical School and graduated BSc in 1928 in physics and anatomy. Normally she would have continued at the Medical School and later at the Manchester Royal. However, she met Bernard Cavanagh when she was a student and they married and emigrated to Australia, where she continued her medical studies at Melbourne University and qualified MB BS in 1933. After they returned

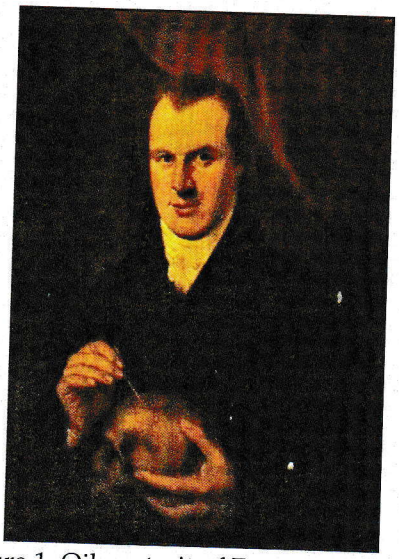


Figure 1. Oil portrait of Dr James Barlow
Artist unknown
(Blackburn Museum and Art Gallery)

from Australia with two small children, she gained her Diploma in Otolaryngology (DLO) and held junior posts at the Manchester Ear Hospital and the Manchester Royal Infirmary Aural Department. She was then appointed at the DYH in 1939 as registrar and later became the Honorary Aural Surgeon; to replace Mrs Edith McCrea BA MB BCh BAO FRCSI (1896-1940), a surgeon who had trained under the German paediatric surgeon, Conrad Ramstedt (1867-1963). Sadly, Mrs. McCrea and her family were killed in an air-raid on Trafford Park in 1940.

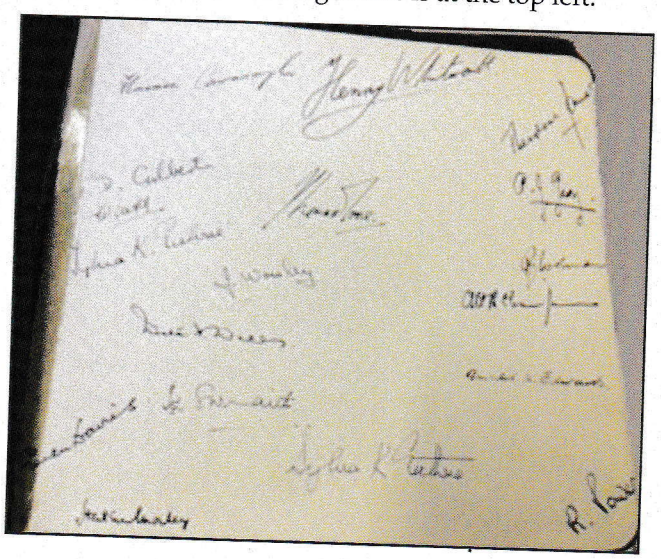
Florence Cavanagh had a long and successful career at the DYH and the Manchester Children's Hospital; she performed hundreds of operations to treat tonsils, adenoids, 'glue ear', laryngeal webs, cleft lip and palate etc. She was married for 55 years and had four children. She retired in the 1960s.

The Photograph Album

To date, the museum has not been able to find a photograph of Florence. However her signature is in a photograph album that was presented to Dr Catherine Chisholm on her retirement in August 1951. Dr Chisholm BA MB ChB MD FRCP CBE (1878-1952) had founded the Manchester Babies Hospital (MBH) in 1914 to treat premature babies and those with malnutrition and gastroenteritis. It was renamed the Duchess of York Hospital in 1935. She had there great success treating children with rickets. The provision of a surgical service run by women doctors completed the 'hospital of her dreams'. Dr Chisholm was the first female student to graduate in medicine from the Manchester Medical School in 1904 and was also the medical officer for the Manchester High School for Girls, lecturer in vaccination, and children's physician for the Manchester Northern Hospital and Hope Hospital in Salford. (3) (Fig. 2, at the head of this article)

The album contains a delightful, nostalgic and yet honest depiction of a hospital treating sick babies and small children. Posed photographs show well-behaved toddlers sitting for meal-time and nurses being warm toward the children, giving them cuddles in the sunshine, to give that all-important Vitamin D. For me personally, it makes my heart ache for the parents who had to leave them there, being cuddled by someone else.

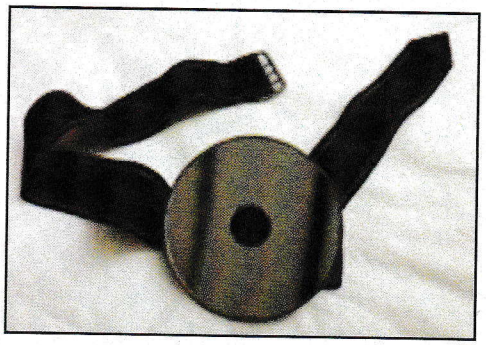
The back page of the album contains signatures from well-wishing colleagues for Dr Chisholm on her retirement. Florence's signature is at the top left.



ENT Instruments

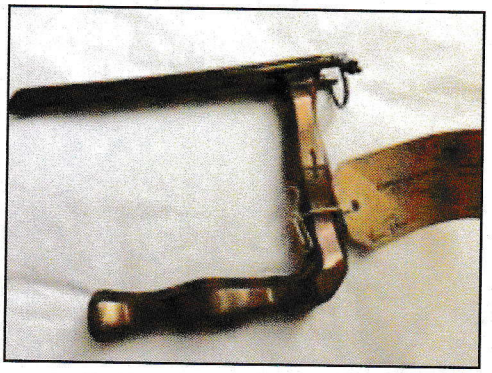
For the purposes of this article, the Museum of Medicine and Health has been in contact with Emma Stapleton FRCS, Consultant Otolaryngologist at Manchester Royal Infirmary, who was able to shed further light on Florence's work and the use of her medical equipment. Florence was an honorary life member, Treasurer, Secretary (1953) and first female President (1962) of the North of England Otolaryngology Society – Emma Stapleton is their current Secretary.

The Museum of Medicine and Health (MMH) holds a collection of more than 40 ENT surgical instruments that were used by Florence Cavanagh at the DYH. Over the years, paediatric surgeons and manufacturers have developed a range of surgical instruments and equipment for babies and children, but little has been written about the history of paediatric equipment. The design of surgical equipment has adapted to new surgical techniques and new materials - stronger, more durable, easier and easier to clean; some, for example, umbilical cord scissors, are now disposable or 'use once and recycle'. The question is, are Florence's instruments still recognisable to a modern day ENT surgeon? Emma Stapleton helps us unlock the answers.



Head Mirror

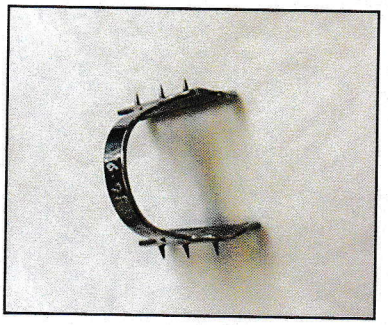
Emma comments: "The head mirror is the iconic diagnostic instrument of the ENT surgeon! Though largely replaced by head-worn light sources, it is still used by some ENT surgeons in 2021. Its concavity allows a beam of light to be focussed, and the surgeon looks through the centre of the mirror, in line with the beam of light. Given the choice, I prefer a head mirror to a head-worn light source, but they are becoming scarcer in outpatient clinics and have been superseded on ward rounds due to the portability of a battery-powered headlight."



Negus laryngoscope

Mrs Cavendish used it to diagnose 200 reported cases of stridor, a high-pitched, wheezing sound caused by disrupted airflow.

Emma: "The Negus laryngoscope is still very much in use in 2021! Whilst disposable lightweight laryngoscopes (often with a tiny video screen attached) are used for intubation, the Negus laryngoscope's handle allows it to be suspended on a stand. It has a slotted light source which can be connected to a fibreoptic cable. This means the surgeon can use both hands to operate on the larynx using long slender instruments, either by looking directly down the laryngoscope or (more commonly in 2021) using a microscope."



Logan's traction bow

Cleft lip and/or palate are one of the commonest congenital abnormalities and require complicated plastic surgery at an early age. This piece of equipment was used to keep the dressings pulled tight across the corrected cleft lip repair (the spikes attach to the dressing, not the skin!).

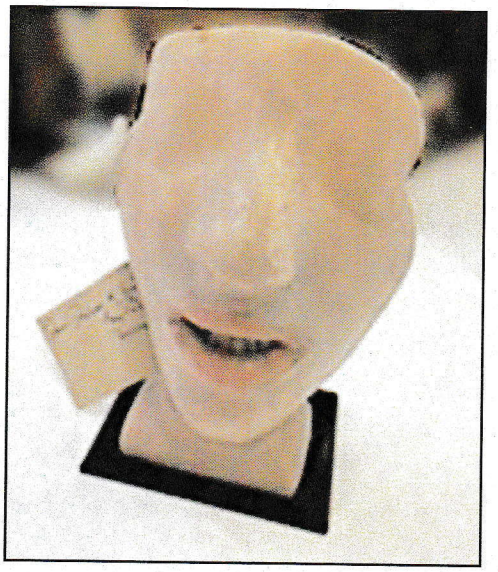
Emma: "I've not seen one of these before! These days cleft lip and palate repair is carried out by specialised multidisciplinary teams, the surgery itself most often performed by plastic surgeons or maxillofacial surgeons. ENT surgeons are most often

involved, with children who have a cleft, because of their hearing - they are prone to glue ear because of the anatomy of their cleft palate."

Mouth gag

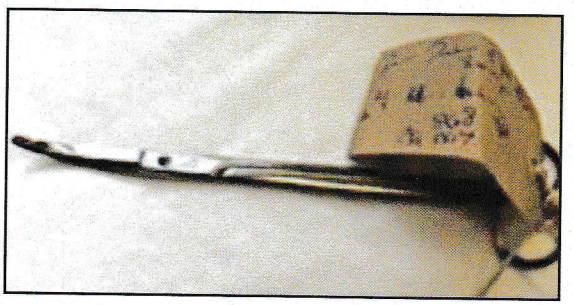
This type of stainless steel Sydenham's mouth gag for 'general use' was designed in 1914 and used throughout the 20th century. They have to allow for access of anaesthetic tubes as well as various surgical instruments and present-day mouth gags tend be designed for specific operations. Cleft lip and palate surgery uses a specially designed adjustable one for small babies.

Emma: "Instruments like this are very much still in use. They have smooth edges to minimise trauma to lips, teeth and gums. They are used on anaesthetised patients to access the mouth or throat when operating on the inside of the mouth, the tongue or the throat and tonsils. Anaesthetised patients can still bite down, so it's essential to hold the mouth open to keep surgeons' fingers safe."



Teaching model

Emma: "It's nice to know that our predecessors were using models to practice examination techniques! We think of simulation training as being fairly modern, and this is a lovely example of simulation training several generations ago. This one looks like it's been well used. Simulation is an ideal way to get a feel for examining the throat, because touching the back of the throat, tongue, tonsils or uvula can elicit a powerful gag reflex which is not at all pleasant for the patient."



Tonsil Scissors

Mrs Cavanagh performed more than 200 tonsillectomies a year at the DYH.

Emma: "Tonsillectomy has an interesting history. Fewer tonsils are removed these days than in the past, largely because it is on operation which has a risk of major blood loss and should therefore not be taken lightly. Also, because there is increasing evidence that removing children's' tonsils is of limited clinical benefit, though this topic is hotly debated by paediatric ENT surgeons and public health specialists!

Secondly, surgical techniques for tonsillectomy have evolved over time. There was a vogue for using diathermy in the late 20th century, followed by a move back to 'cold steel' techniques which were proven to be safer. The scissors in the picture look like McIndoe scissors, designed by Archibald McIndoe of Guinea Pig Club fame. They are still currently used for tonsillectomy, though there is currently a move towards alternative techniques including intracapsular 'coblation'. I have a tonsillectomy guillotine in my office which belonged to Alan Gibb (1919-2020) who was an ENT surgeon in Dundee. It looks quite brutal and none of my students ever correctly guess what it is!"

Thanks to Emma Stapleton.

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James Barlow (1767-1839): 'Operation of the first successful caesarean section in England',
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ACCOUNTS of the HISTORICAL MEDICAL EQUIPMENT SOCIETY 2020/21

Opening Balance (Barclays)	25th July 2020	£2074.21	*25th July 2019*	*£2015.07*
		2020-21		*2019-20*
	INCOME			
Subscriptions (by Standing Order)*		£25.00		*£415.00*
No meeting fees for two years		£0.00		*£0.00*
Total income		£25.00		*£415.00*
EXPENDITURE				
Bulletin costs		£225.48		*£286.90*
Website costs		£280.63		*£29.96*
(includes 3-year hosting charge £226.97)				
BSHM subscription		£42.00		*£42.00*
Total expenditure		£580.31		*£355.86*
Closing Balance	25th July 2021	£1550.90		

* Members were asked to pay no subscription for 20/21. However some Standing Order payments were received.
Total membership: 43

Adrian Padfield Hon Treasurer

ANOTHER POLITE REMINDER
that subscriptions for 21-22 are due now
In a normal year they are due on September 1st!
£10 individual. £15 joint Bank transfer much preferred.

Jung's Giant Microtome Blade

Peter and Julie Mohr

The University of Manchester Museum of Medicine and Health (MMH) holds a good collection of microtomes and a large number of microtome blades. Most of these microtome knives are 4-8 cms. long and fit onto the traditional type of bench-mounted 'rocking' or 'sliding' microtomes. However, one of the knives is exceptionally large, 60 cms long, stored in a custom-made, velvet-lined wooden case. A small label in the lid reveals its maker as 'R. Jung, Heidelberg' (fig.1).

It originally belonged to the Anatomy Department and could have been in in the Department from the1900s. In 1973 it was transferred with hundreds of other items from the old Medical School to a storage area in the new Stopford Building Medical School, where it lay forgotten until 2010 when the stored objects were relocated to the MMH for cataloguing. The giant blade finally saw daylight again in 2019 during a review of the collection of microtomes. It clearly did not fit any of the bench-mounted machines; the question was: what sort of microtome used a blade this large?

Alan Crossman, professor of anatomy, identified it as from a 'whole-body microtome', exclaiming, 'Where is it, I want it back!' The term 'whole-body' is misleading, there are no microtomes that big; it refers to microtomes large enough for small laboratory animals or whole organs - for example a brain, cerebral hemisphere, prostate, eye or kidney.

A clue was provided by an archive photograph of the histology preparation room taken in the 1930s: it shows a large free-standing apparatus with a hand-wheel. Unidentified at the time, it was not recognised as a large floor-mounted microtome until a later date (fig.2).

A note on the evolution of microtomes

Brian Bracegirdle's (1933-2015) *History of Microtechniques* (1978) (**1**) provides a detailed history of microtomes and other histological equipment. From the 1770s simple hand-held or bench-mounted frames were used to firmly hold a specimen block which was sectioned by hand using a blade or razor; a screw mechanism would advance the block

Figure 2. Manchester Medical School, Anatomy Department histology preparation room in the 1930s The Jung-Reichert microtome is in the left lower corner. (Archive photograph)

up a fraction for the next section. During the early 19th century, the apparatus became more complicated with several competing models; they all included heavy bases for stability with complex mechanisms to firmly hold the block and advance it upward for the next sections. The sections were cut by custom-made very sharp microtome knives held in a sturdy frame which slid across the block to make the cut - 'sledge microtomes'. From the 1880s larger models were fitted with a crank and gears or chain-drive, which automatically advance the block and return the knife, ready for the next slice.

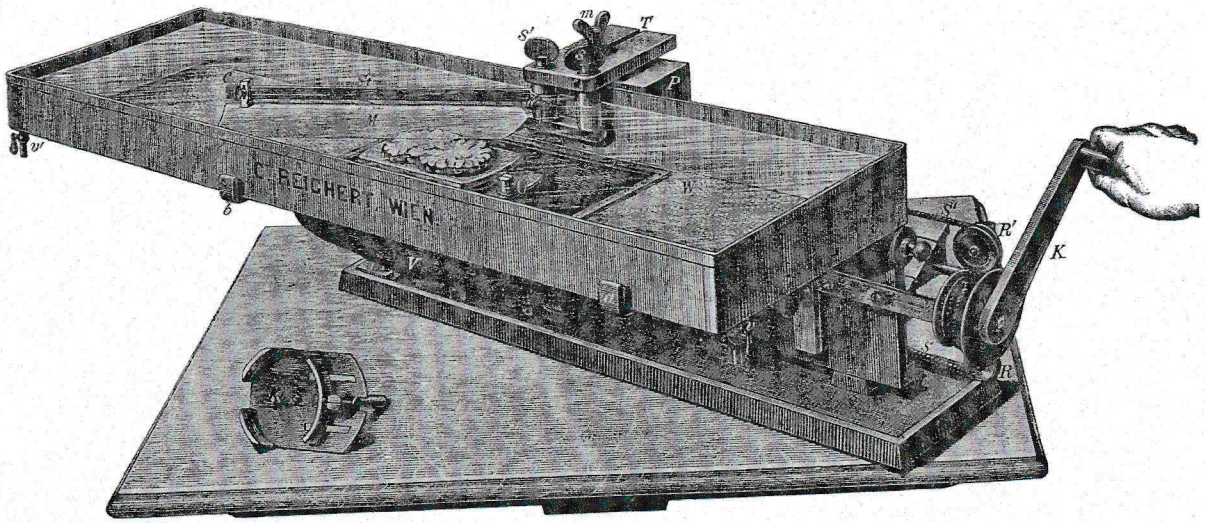
One problem was that only the middle section of the microtome blade was being used in the cut. This was overcome by the ingenious invention by G. Rivet in 1868 of the 'moveable knife inclined feed'; the horizontal knife blade approaches the block at an angle so the whole blade gradually slices through the block.

Other advances included freezing techniques, and for large sections, cutting the tissue block under water or in spirit. From the 1880s microtomes and microtome knives became increasingly sophisticated, able to cut intact thin sections from larger tissue blocks. Several successful models were developed in Germany and the USA.

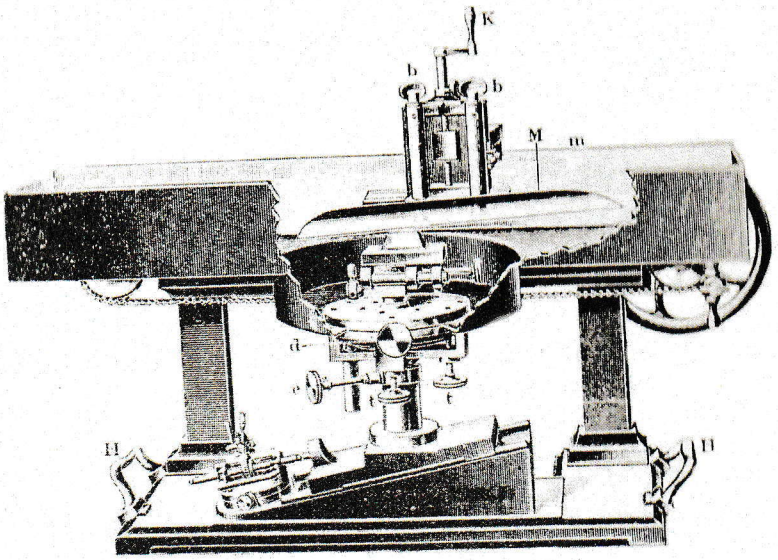
R. Jung, C. Reichert and Leica

Rudolph Jung (1845-1900) established an engineering firm in 1872 specialising in microtome knives, and with Heidelberg pathologist, Richard Thoma (1847-1923), developed the first commercial microtome with an inclined-feed knife (1881). (**2**) In 1886 they made a complex microtome with automatic advance and a lubricated 36 cms. incline feed knife. During the 1870s the business was merged with two other companies, C Reichert and Ernst Leitz (an optical company). Carl Reichert (1851-1922) of Vienna manufactured microscopes and in 1893 also constructed a large microtome which cut sections under water in a cast-iron 'bath,' using a 36cms, knife (fig. 3). It could cut whole-brain sections up to 12 cms. diameter. Dr Jakob Pál (1863-1936), a clinician and pathologist at the University of Vienna, described it use at the Vienna Insane Hospital, for research into psychiatric and neurological disorders. (**3**)

A later model (1900) used a newly designed 60 cms. knife made by Jung. This new 'Jung-Reichert' model had an inclined cutting knife and an automatic advance operated by a turn-wheel and chain system. (fig.4)(**4**) The reliability of the mechanism was much improved, and the large knife cut faultless sections from blocks up to 11 cms, square.



Above – Figure 3.
Reichert's 1893 submerged microtome with 36 cms. knife (© J. Pál, **3**).



Right – Figure 4.
Jung-Reichert's 1900 submerged microtome with 60 cms. knife (© *History of Microtechniques* **1**).

In retrospect, the large microtome in the old laboratory photograph (fig. 2) is most likely the same model and would have used the giant Jung knife in the MMH collection.

The Leitz, Jung and Reichert company expanded and modernised, and were incorporated with the Leica Group and Cambridge Instruments in 1990. We contacted Claudia Dorenkamp, Technical Product Manager at Leica Biosystems in Germany; she was able to provide futher details and emailed copies of catalogues and a price list from the 1920s-40s (fig. 5). Leica do not have a museum, but they do hold a reference collection of their products and instruments, which includes a pristine Jung-Reichert microtome! (fig. 6)(**5**)

A final comment

The old Medical School microtome was probably discarded after a refurbishment in the 1930s or perhaps sent for scrap metal in the 1940s. There were other types of large microtomes, for example, Salvador Gil Vernet (1892-1987), a Spanish urologist, used a giant 'Sartorius Werke' microtome to study the anatomy of the pelvis.(**6**) The compact bench-mounted Cambridge rocking microtome, familiar to all medical students, was adequate for most projects. It worked on a different principal from the sledge microtomes –- the knife was firmly fixed, and the specimen block moved up and down across the blade, producing a nice ribbon of serial sections. Modern microtomes are automated, often totally enclosed and designed with health and

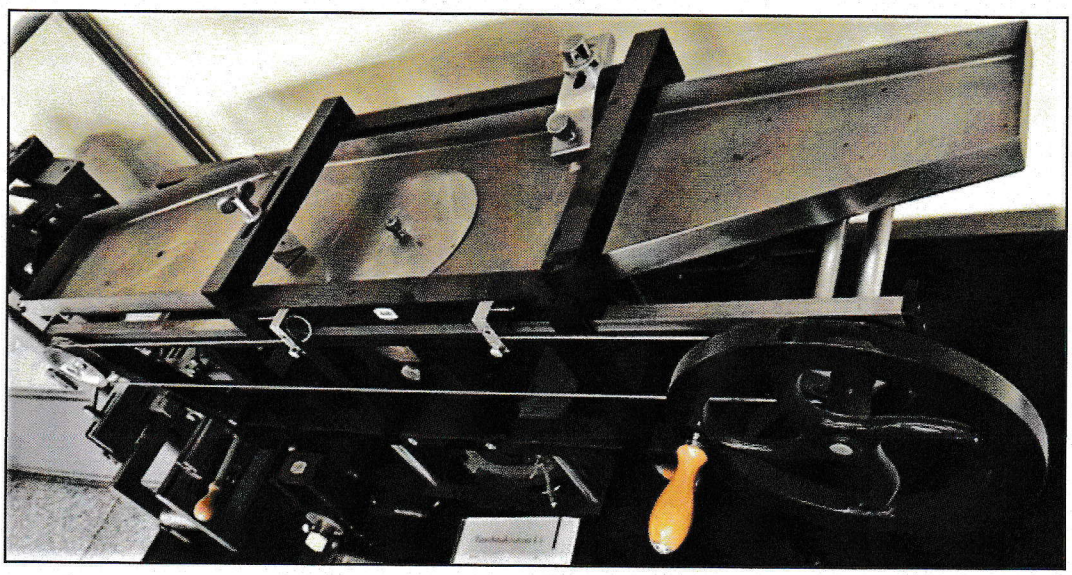


Figure 6. The Jung-Reichert microtome in the Leica reference collection. The Jung knife is not attached. (© Leica).

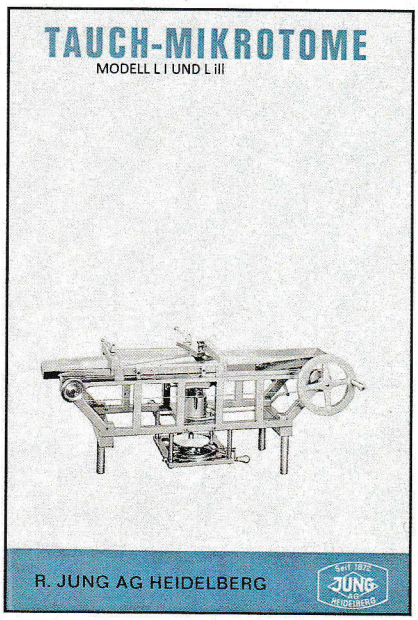


Figure 5. Catalogue for Jung-Reichert microtome (© Leica) Undated, but c.1924-48.

safety in mind. (7) Photo-imaging of whole-organ sections can be computerised and correlated with MR and other imaging techniques. (8)

The identification of the Jung blade and its link it to the old photograph was only completed in 2019. Sometimes it can be years before an object is properly identified, and in this case the use of the Internet was essential for tracing the link to Leica. It is still not known who used the Manchester Jung-Reichert microtome or for what purpose; a review of publication by past members of the anatomy staff has so far drawn a blank. It is surprising that often the 'materials and methods' section of a paper makes no reference to specific equipment - the search continues!

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2 Rudolph Jung (1845-1900). Collection of Scientific Instruments, Harvard University
Rudolph Jung/People/The Collection of Historical Scientific Instruments
After 1900 the company continued under the name 'R. Jung Heidelberg'.
Rudolph Jung (1845-1900) should not be confused with the railway engineer, Rudolf Jung (1882 -1945).

3 Pál J. A novel large microtome for making brain sections, constructed by C Reichert of Vienna. Off-print from an unknown journal, published by Genossenschafts Buchdruckerei Wien, 4 August 1893.

4 Bracegirdle, note 1 pp. 243-249

5 Dorenkamp C, personal communication, email 1 Feb.2019.
The Catalogues were undated, but the prices were in Reichsmarks which were used during 1924-48.

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7 Bancroft DA, et al. (Eds) *Theory and practice of histological techniques.* E-book. Elsevier Limited (2019).

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A Cartoon Instrument

Lucy Brooks and Jonathan Charles Goddard

This cartoon, published in Punch magazine in 1881 (**1**), has just been acquired and will be used in the BAUS virtual Museum of Urology to further illustrate the story of Sir Henry Thompson. We thought HMES members might be amused by Sir Henry's 'knife-paintbrush' instrument. This is of course an invention of the cartoonist and is purely an artistic device to help narrate the visual story. It does however allow us to examine other historical aspects of this picture.

Sir Henry Thompson

Sir Henry Thompson (1820-1904) was a polymath, having many interests and excelling at all. He was widely regarded as an excellent surgeon, having gained fame for removing the bladder stone of Leopold I, King of Belgium; and although the field of Urology was still not considered a speciality in its own right, he is sometimes described as the first British 'Urologist'.

Henry's grandfather Samuel Medley was a well-known artist and when Thompson embarked on a career in medicine, he found his drawing ability to be very useful. He met a young artist called Jerry Barrett (1824-1906), who showed him how to make his rough sketches more suitable for the illustration of dissection study. Thompson was recognised for his essays and illustrations by the Royal College of Surgeons with two Jacksonian prizes.

Thompson also studied under Lawrence Alma-Tadema (1836-1912) and Alfred Elmore (1815-1881). Alma-Tadema, a pre- Raphaelite artist, was formerly his patient but later they became firm friends. He frequently travelled with artists on sketching holidays, from whom he gained a good understanding of structure, colour, proportion and composition. He was also a great friend of John Everett Millais (1829-1896), who was a founder of the pre-Raphaelite Brotherhood and was considered a child prodigy, being accepted by the Royal Academy at the age of 11. Millais later produced a fine portrait

of Thompson, depicted as a distinguished man of science. When the painting was presented to the Academy in 1882, it was said to be 'an absolute likeness'. The gesture was reciprocated by Thompson, who skilfully painted Millais whilst on holiday in Essex. Thompson's first submission to the Royal Academy in 1865, 'The Crysalis', was of a skull. He went on to exhibit another twelve paintings, and demonstrated a shift in focus over time as he branched into landscape pieces (**2**).

The Cartoon

The drawing shows Sir Henry Thompson in a velvet collared frock coat (the standard attire of a Victorian professional) leaning casually on a table in what looks like an artist's studio. There is an easel in the background with a picture of a water pump and the humorous caption, 'Water Colour' (a reference to both urology and painting), several tubes of paint scattered about and an artist's manikin in the background. An articulated skeleton stands next to the manikin; the skeleton of course was used by both artists and doctors. The Dinner Menu is a reference to both Henry Thompson's writings on diet (**3**, **4**) and his famous society dinners.

The fictitious double-ended scalpel/paintbrush is the main reference to his surgery and major hobby of art. The top shows a paintbrush, with black ink or paint on its tip. The lower end shows two blades. These are typical of folding pocket scalpels (fig.2). The large blade has a curve and is often called a bistoury.

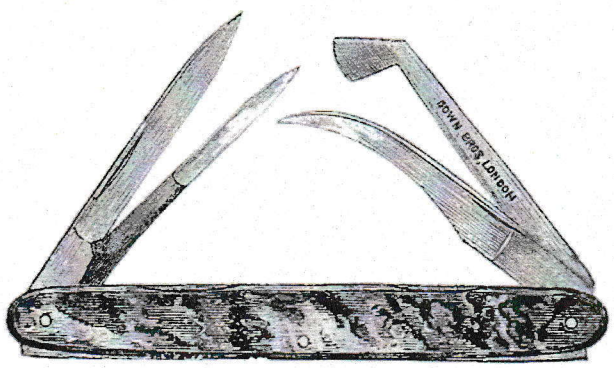

Figure 2
4 bladed Pocket knife
Down Bros. Catalogue, 1902

The Artist

Edward Linley Sambourne (1844 - 1910), a talented cartoonist and illustrator, grew up in Pentonville, London, and began working for Punch at the tender age of 23. His parents would have no doubt doted upon Edward, as he was an only child. In his early years Edward attended numerous schools, although it was at Chester Training College where his talent for drawing was noticed. In 1875, 18 Stafford Terrace became his family home, with his wife Marion and subsequently their two children. The house is now a museum, where many fine examples of Sambourne's work can be viewed. Edward was a very skilful artist, illustrating books such as Kingsley's 'The Water Babies' and Hans Christian Andersen's fairy tales. He was also a keen photographer; perhaps this is where he studied his Victorian subjects. His family archive can be searched and over 1000 cartoons, drawings and sketches can be viewed. Edward continued working and contributing to Punch until a year before his death.

Punch Magazine and the Fancy Portraits

Punch was a satirical magazine published from 1841 until 2002. It combined humorous and topical stories and rhymes with many cartoons and illustrations. The 'Fancy Portraits' were a series of cartoons of well-known personalities, many published between 1880 and 1885 with a few more up to 1889. Politicians, aristocrats, scientists and businessmen, the Victorian equivalent of modern celebrities were depicted. Some were treated more kindly than others and there were a few who were not very happy at all. The series may have been stopped after one caused political embarrassment to Lord Gladstone. All by Sambourne, the series ran to nearly 200 images (**5**).

The other instruments

Scattered about Sir Henry are a variety of other surgical instruments. On the right two saws can clearly be seen, a tenon saw on the table and a small bow saw on the floor. These are of course associated with amputations and surgery in general. There are however, several other instruments, which are associated with genitourinary surgery, Sir Henry's speciality.

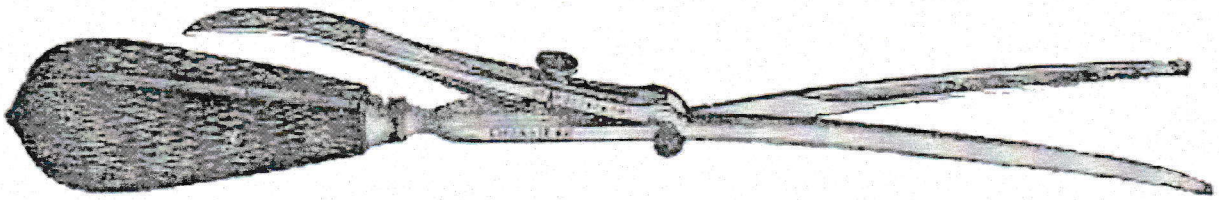

Figure 3. Concealed lithotomy bistoury. Thompson's book on lithotomy and lithotrity, 1871

On the floor on the right hand side is a concealed bistoury. This instrument was used to open the perineal wound during lithotomy: as the lever is closed, the blade opens (to a pre-determined diameter) and the wound is enlarged as it is withdrawn (fig.3). Below the jaws of the bistoury is a urethral sound, or possibly a director. This curved instrument was passed down the male urethra to feel for bladder stones, and indeed listen for the 'sound' of the metal hitting the stone. A director, which looks very similar, has a groove running down the convex side and is held in the urethra during lithotomy as a point to aim the knife, the blade of which slides down the groove (fig. 4). A little to the left and balancing on the bar of the table leg, is a gorget. Again, for use in lithotomy, it is pushed into the wound to hold it open as the stones are extracted, acting as both a guide and dilator (fig. 5). On the table next to Thompson's right hand are curved bladder stone forceps with their classical open handle design (fig. 6).

Finally, on the right side of the table above the tenon saw is what appears to be a spoon, and indeed it could well be that, however, another instrument used during lithotomy was a scoop, to remove stone fragments. Although lithotomy scoops often have a more elongated bowl, the Science Museum does have one similar to this in its collection(**6**). To the left of Thompson's feet there are angled forceps; although these could theoretically be used to remove small stones, they are more typical of ENT forceps.

It would appear that Sambourne gave a lot of thought to the instruments he depicted in this cartoon. Thompson was of course trained in all aspects of surgery and at that time surgeons were expected to deal with diseases of all areas. Sir Henry did however, specialise in genitourinary diseases and certainly in his later career, his practice was almost exclusively urological. His fame increased after he treated the bladder stone of King Leopold of Belgium by lithotrity (minimally invasive rather than open surgery). There is no lithotrite in the cartoon. This suggests that Sambourne had perhaps researched instruments for stone surgery but not in any great depth, as lithotrity was very much the modern trend.

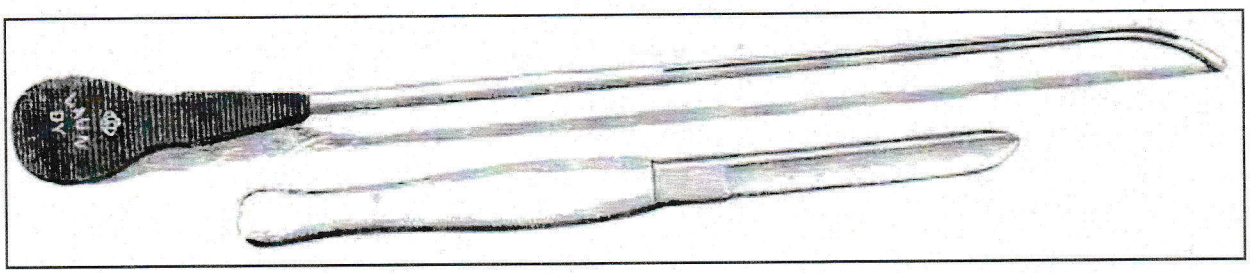

Figure 4. Lithotomy director and knife. Thompson's book on lithotomy and lithotrity, 1871

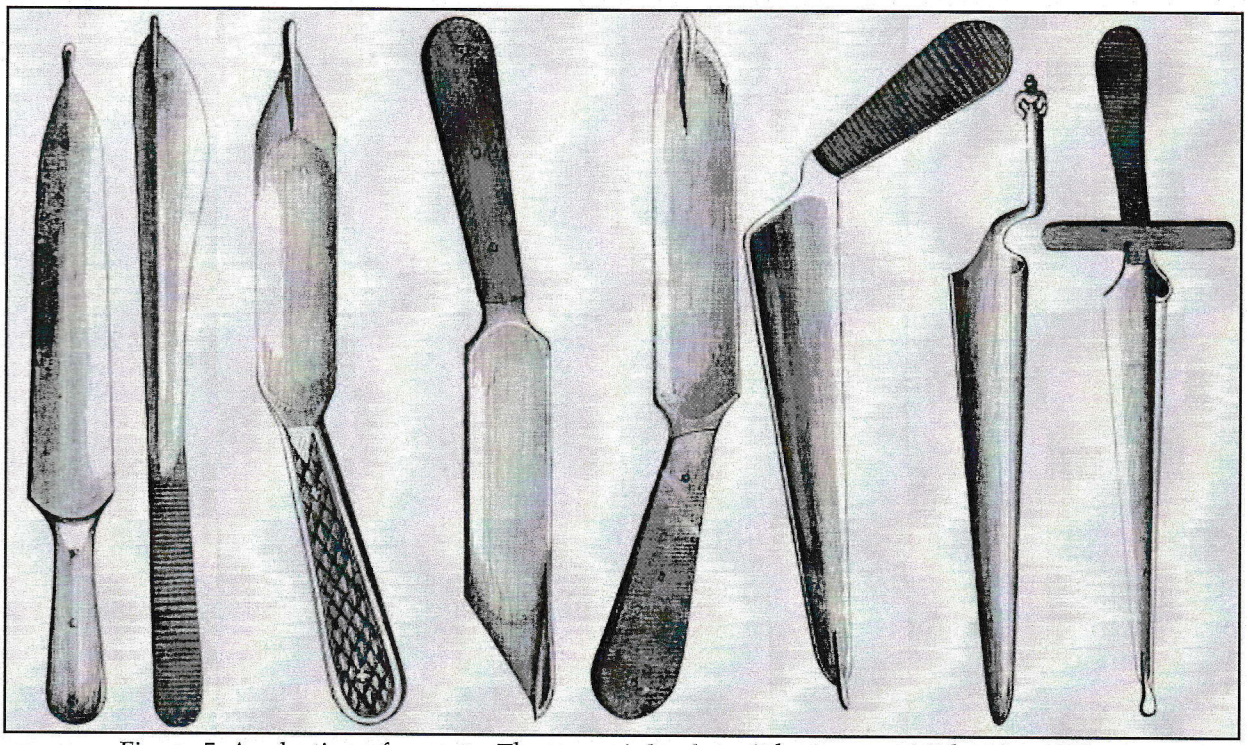

Figure 5. A selection of gorgets. Thompson's book on lithotomy and lithotrity, 1871

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2 Cope Z. *The Versatile Victorian*
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3 Thompson H. *Diet in Relation to Age and Activity*
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5 Martin G. Punch's Fancy Portraits: A Handlist. Secondary Punch's Fancy Portraits: A Handlist 2019.
https://www.gedmartin.net/martinalia-main-menu-3/154-punchs-fancy-portraits-a-handlist.

6 Anon. Science Museum Group.
Lithotomy scoop with spoon-shaped blade and cylind.
A610124Science Museum Group Collection Online.
Secondary Science Museum Group.
Lithotomy scoop with spoon-shaped blade and cylind.
A610124Science Museum Group Collection Online.
https://collection.sciencemuseumgroup.org.uk/objects/co167926/lithotomy-scoop-with-spoon-shaped-blade-and-cylind-lithotomy-scoops.

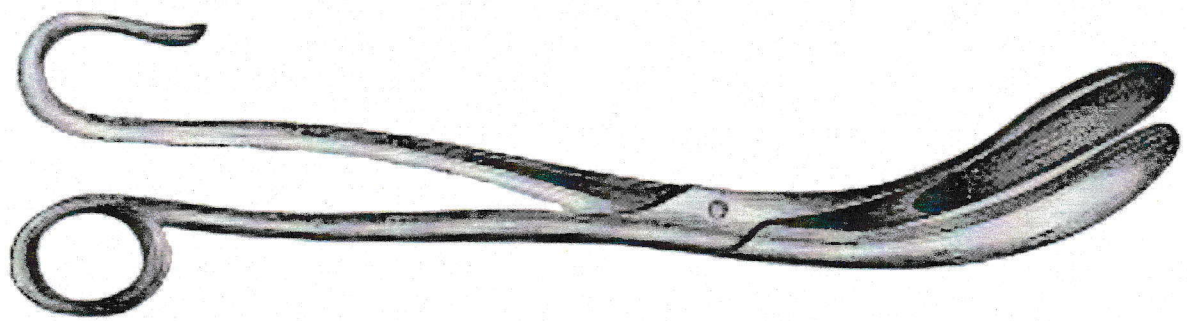

Figure 6. Curved stone forceps. Thompson's book on lithotomy and lithotrity, 1871

DIY Catheters

Adrian Thomas

We are now so used to having a wide variety of catheters all prepared in sterile packaging that it is difficult to imagine a previous generation who had to shape their own catheters for selective arterial catheterization. In 1962 David Sutton (1917-2002), a radiologist from St. Mary's Hospital in London, reviewed the current state of arteriography in his highly influential book *Arteriography*.

When Sutton was a senior registrar at the Middlesex Hospital he developed his techniques for peripheral and placental angiography. Placental angiography was needed to identify the location of the placenta in this period prior to ultrasound. In his book Sutton described the insertion of a catheter into an artery over a wire using Seldinger's Technique, and bending the catheter into any required shape using hot water. A curved catheter was required for selective arteriography.

In 1963 William 'Bill' Cook (1931-2011), with his wife Gale, started what became Cook Group in a spare bedroom in their apartment. Cook Medical are now a major supplier of sterilized and packaged wires and catheters for radiological intervention. In the November of 1962 Bill Cook and the pioneer interventional radiologist Charles Dotter (1920-1985) met for the first time at the Cook's rather low budget booth at the convention of the Radiological Society of North America in Chicago. Cook's company was then only four months old, and on the stand Cook had wire guides, needles and a blowtorch, and was making catheters in front of his fascinated visitors. Dotter asked to borrow Cook's blowtorch for the night, and he returned the next day with ten perfectly made catheters. Cook recounted that he sold the catheters for $10 each and that this was enough to pay for the booth!

Bill Cook and Charles Dotter developed a lifelong friendship, which was to prove mutually beneficial. Following a discussion about catheter and wire guide manufacture Cook visited Dotter in Oregon. Cook could not afford the air fare and so Dotter paid his expenses. Dotter had his own laboratory where technicians made their own wire guides. Dotter was also producing his own catheters using Cook's Teflon tubing. It cannot be emphasized too much that this was long before the contemporary period with prepackaged and preformed sterile catheters. The catheters were supplied unsterile as a long loop and could be cut and formed as desired. There were a variety of recommended shapes for angiography for selective studies of particular arteries. The fabrication technique was time consuming and required skill and patience.

The stages were:

1. The disposable Öldman-Ledin opaque catheter was supplied in four sizes, and in 17 feet (5.2m) lengths (Fig.1). The sizes were colour coded for identification. The catheter was not to be cut to the required length until the catheter tip had been prepared. If a completely straight length was desired then a section was held in steam from boiling water.

2. Tip forming (Fig.2). A forming wire was placed in the catheter, the catheter was warmed over an alcohol flame, and the catheter was pulled from both ends. A narrowed section was produced corresponding to the diameter of the guide wire.

3. Tip finishing (Fig.3). The tip was tapered and cut with a razor blade with the guide wire still in place. The end was then rounded with emery polishing paper.

4. Side hole forming (Fig.4). This was achieved using a sharpened hole punch cannula. The punch was gently rolled until the wall was punctured. If the central hole was not required it could be closed using the alcohol flame.

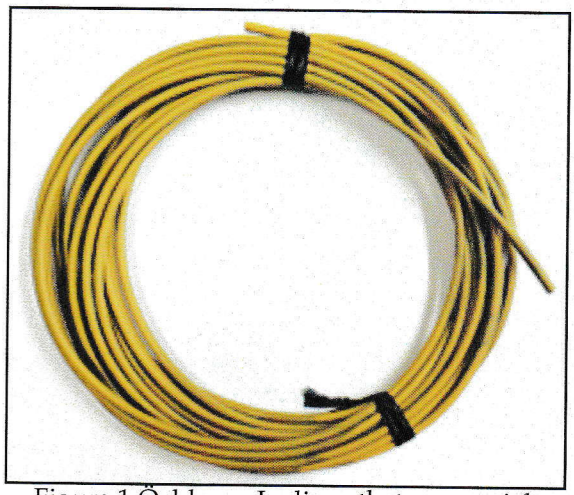

Figure 1 Öeldman-Ledin catheter material

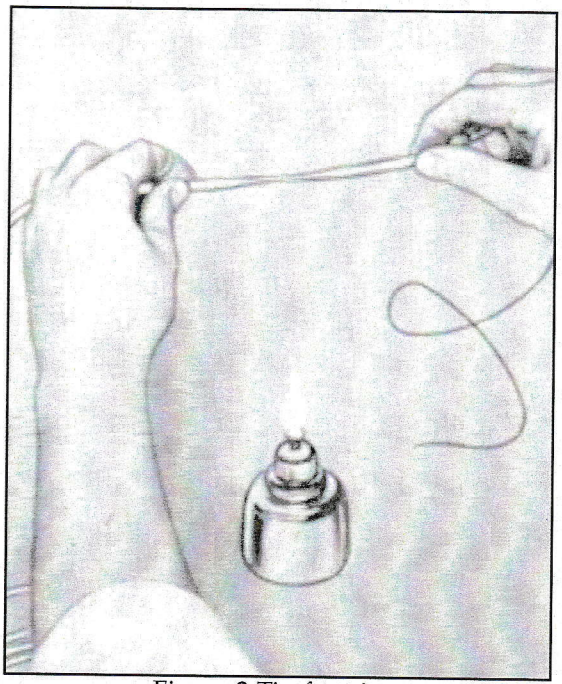

Figure 2 Tip forming

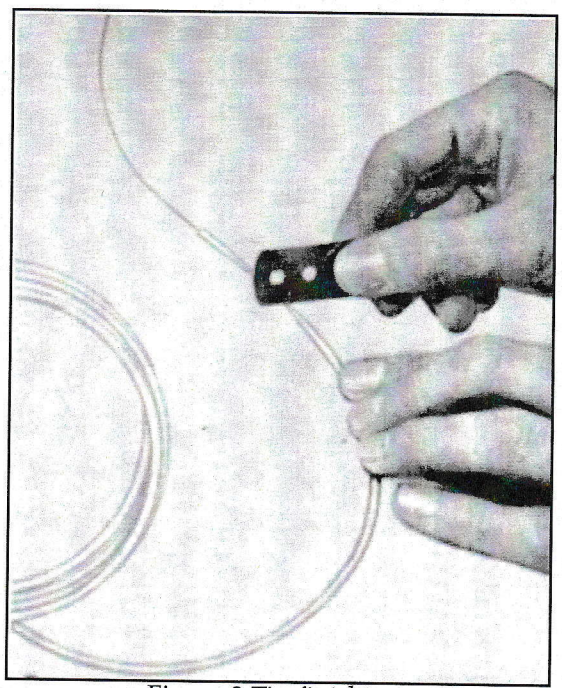

Figure 3 Tip finishing

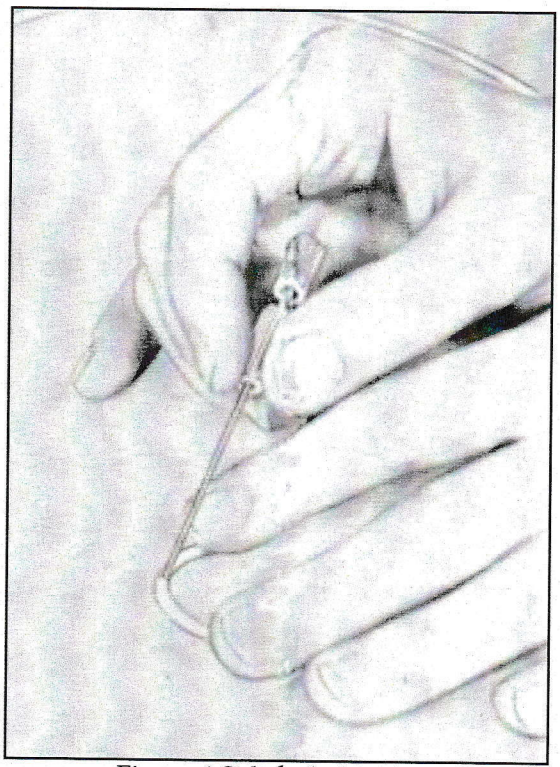

Figure 4 Side hole forming

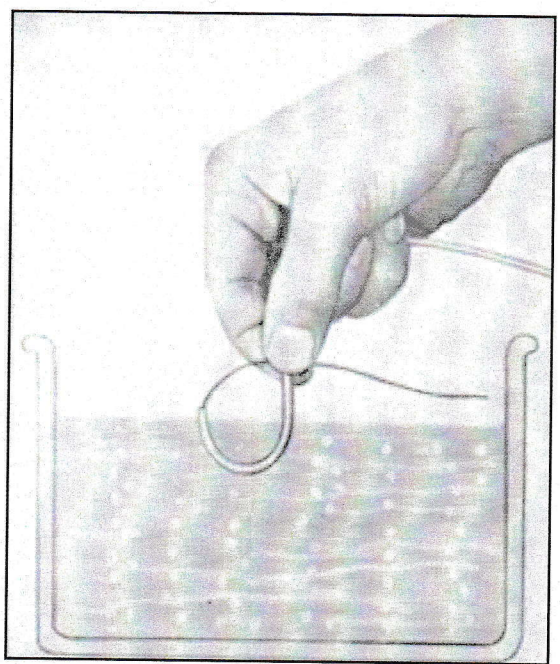

Figure 5 Shaping

5. Shaping (Fig.5). This was performed by inserting a pre-formed wire and placing the tube in hot water. The catheter was than quenched for about one minute in cold running water. The formed catheter would not change shape at body temperature.

6. Flaring (Fig.6). The catheter was cut to a pre-selected length. The tubing would automatically flare when placed near an alcohol lamp. Alternatively, a flanging tool might be used. The tip of the flanging tool would be slightly heated.

7. Sterilizing. The tubing was filled with a cold sterilizing solution and also fully immersed. Gas sterilization could also be used. The tubing was not to be autoclaved. Following use the catheter was to be discarded to avoid the risk of re-infection, however the metal catheter adaptor could be boiled and reused.

8. A completed catheter (Fig.7), in this case made by William Cook. An early French-8 gauge 'pig-tail' catheter with a metal adaptor, and used for aortography.

The company Kifa of Sweden illustrated recommended different catheter shapes (Fig.8), and these were illustrated by David Sutton in his book and were also shown on the packet containing the catheter. The whole process of angiography during this period was difficult and time consuming. Skills were required to perform the procedures; however, skills were also required to make the catheters.
In the 1960s the numbers of angiograms were relatively small, and the technique was mainly used for diagnostic procedures. Angiography as a diagnostic procedure has now been replaced by non-invasive techniques such as ultrasound, however the growth of interventional radiology has confirmed the essential role of the manufacturers of sterile and packaged needles, guidewires and a complex variety of catheters.

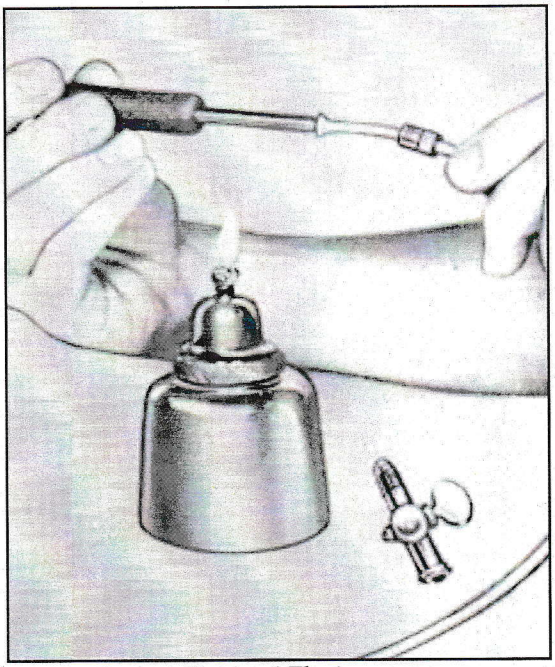

Figure 6 Flaring

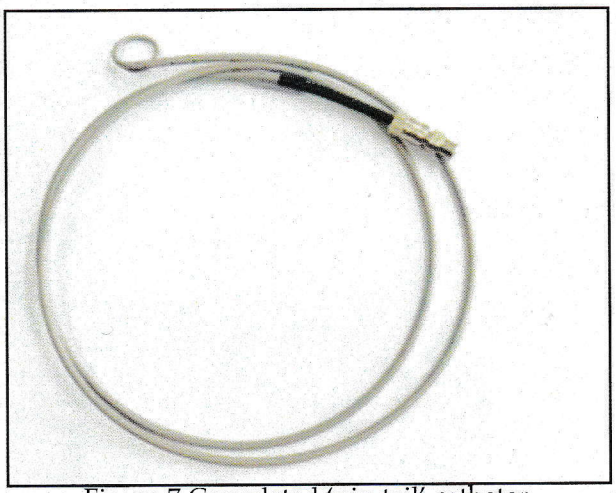

Figure 7 Completed 'pig-tail' catheter

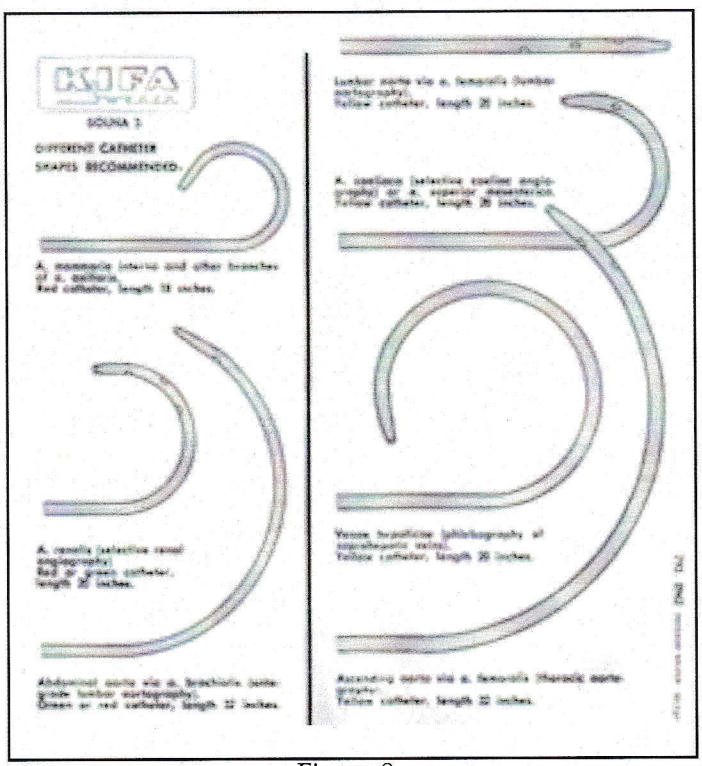

Figure 8

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Belinda Heathcote (1927-2020)

It is with sadness that we report the death of Belinda who was a founder-member of the Historical Medical Equipment Society and was also a Fellow of the Faculty of History of Medicine in the Society of Apothecaries. She was brought up in Hampshire and later attended the Royal Merchant Navy School in Berkshire. She trained as a librarian but had a love of travel and for a time worked in Africa. Belinda qualified with BSc (hons) in linguistics & regional studies and later gained an MSc in Science, Technology & Medicine from Imperial College and the Diploma in the History of Medicine of the Society of Apothecaries; her thesis on the Health of Merchant Seamen from the 18th Century (1986) is held in the library of the National Maritime Museum. She was also a member of the Society for the History of Medicine and representative to the International Society for the History of Medicine.

Belinda rarely missed a HMES meeting and always had a lively and amusing comment to add at the discussion of the papers. During one meeting at the Royal College of Physicians (2017) she mentioned that she had worked in Rhodesia (Zimbabwe), helping in a family planning clinic for village tribespeople - a unique experience, full of interesting events. Belinda agreed to give a paper about it at the Thackray meeting in 2018 but had to call it off a few weeks before the meeting because of ill health. During the planning of her presentation, we exchanged 16 pages of emails. It is a matter of regret that Belinda never had the opportunity to present her paper; she described her experiences in Africa as 'a completely crazy adventure'. The selected extracts below are taken from her draft paper - they give a hint of Belinda in action.

PDM

The Other Side of The Bush (Extracts)

Belinda Heathcoate

I lived in Africa for twelve years in various places. The Family Planning years were roughly 1963-9. In 1962 I married and went to live in a small dorp on the main Salisbury (Harare)- Bulawayo road, now called Chegutu, where my husband was the Town Clerk. In the beginning I just joined in with a group of European women from the local 'European' Anglican church who organised literacy classes, house care, baby clinics and so on – really anything that would help the women get more control of their lives. There was, in Rhodesia a pretty good spread of medical services for Africans. The country was divided into 'areas', each of which had a simple but quite efficient hospital which dealt with many routine problems. Each area was supervised by a government MO, at that time almost all whites, but the actual hospitals were run by African orderlies; the Head Orderly having quite a bit of authority, and not too badly paid for those days. I know they had to have a basic standard of education and were then trained, I suppose, probably to something like SEN level. All those services were free. but it was then that one started to run into cultural problems. Africans, at least those around that area, had a firm belief that you never get something for nothing and, poor as they were, they would queue round the block to attend a clinic run by a European doctor who charged a flat 10/- a time, which she stuffed into a jam jar sitting on her table for all to see, to give advice that they could have got free at the hospital a few hundred yards away!

The Family Planning Clinic was organised by the Family Planning Association from Salisbury (Harare). It was under the charge of [Jenny] a nursing sister trained at Guy's Hospital who had been specially trained to do just about anything a doctor would do in the field of family planning, contraception etc. I just did my best to sort out some sort of the family history and keep the records. It was sometimes a bit difficult: I would

ask 'How many children do you have?' (through an interpreter) and be told maybe 'three'. When I asked for names and ages, I was completely thrown when I was presented with perhaps, six or eight names. It took some time before I managed to sort out that my question 'How many children do you have?' went through the interpreter as 'How many times have you given birth?'; simple, having triplets was one birth, but one still had to report three children. 'When did you have your last period?' Careful thought, 'When the moon was that big'! 'How old is that child?' 'He was born the last time the water came over the bridge'; who remembers the last time the Umfuli flooded? Sterilisation equipment was done in a good old 'cannibal' pot, over a wood fire.

Examination couches: on one farm a very co-operative farmer had arranged for one of his tobacco barns to be used as a 'clinic'. A certain amount of privacy had been provided by building a 'room' with bales of tobacco ready for market – a couple of them with a sheet thrown over it made a reasonably effective examination couch. On another occasion the farmer made us a 'clinic' out of a disused pig pen (he had given up keeping pigs!); the outside pen made a reasonable waiting room, the slaughter room quite a good clinic with the slaughtering slab serving as the examination couch.

I cannot remember exactly when Jenny arrived. Her husband was in the British South African Police who were transferred around the country whenever it was needed. Also, I am not sure if the whole thing was directed from London or if there was a 'Rhodesian' FPA. Someone was supplying us with pills, IUDs and condoms. I also think Jenny was paid something, but all the rest of us were just volunteers. No training or qualifications, just a knowledge of the local African scene, what they needed was lots of patience and a mighty sense of humour. It was my job just to see that things were organised so Jenny could work.

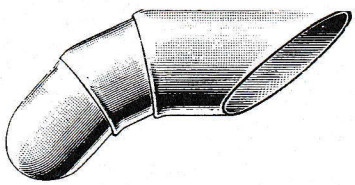
Obviously, Jenny gave the women some sort of medical examination, but it was of necessity rather skimped, however we did what we could to encourage good hygiene and general health practices. Three types of contraceptive were offered, the pill, condoms and IUDs. The pill was sometimes problematic even though we sold it at cost price and often gave it free because of poverty. This made things very difficult because we met women who thought they could save money by taking a pill every other day, or similar, and were then disappointed. [The condoms] brought us bang up against cultural attitudes. An African woman explained to me that the men did not like using condoms because they said it was like 'eating a sweet with the wrapper on!' Other men would claim the 'tail' of an IUD interfered with their 'pleasure' (no way of commenting on that!) I think the IUD was really the best recommendation because once fitted it just needed regular checks, cost nothing more and was not the bother of condoms. Many of the women were just against small families because big families, especially girls (lobola) were an investment for old age. We dealt with that one by explaining to them that they could have as many babies as they wanted, but when it best suited them. That idea was very attractive.

The Baby Clinic was great fun. As long as the mother was healthy, African babies are gorgeous because they are all breast-fed and until approx. 18-24 months are often more advanced than European babies on bottles. After that they often deteriorate because the mother is pregnant again and they are immediately fed on little more than mealie meal (sadza). I was told once, although I cannot say this is true, that the word 'Kwashiorkor', the protein deficiency disease, is actually a West African word which means 'the illness the baby gets when the next baby is coming'. I personally never had any contact with a Nganga [native practitioner] but we always knew they might be putting their penn'orth in anything – we just let the women know we knew about them but did not criticise unless it was something blatant.

We often found that both in the baby clinic as well as the FPC there would be things like 'bracelets' or little belts round babies' tummies and would be told they were magic to make sure what we said

was true, but there was no way they would explain to us exactly how these things worked, so as long as we felt reasonably sure there was no harm being done, we just let it be. Jenny and I were very pleased when we received news that the FPA in Salisbury considered we had 'won the battle' in our district. They used to send 'spies' (educated African women) out to the farms and villages to pick up the real attitudes and thoughts of the women in the remoter areas and even though we had plenty of evidence that many of them thought the 'white madams' were mad, but they liked us and realised we could help them change their lives for the better.

(Extracts taken from emails 2017-2018)



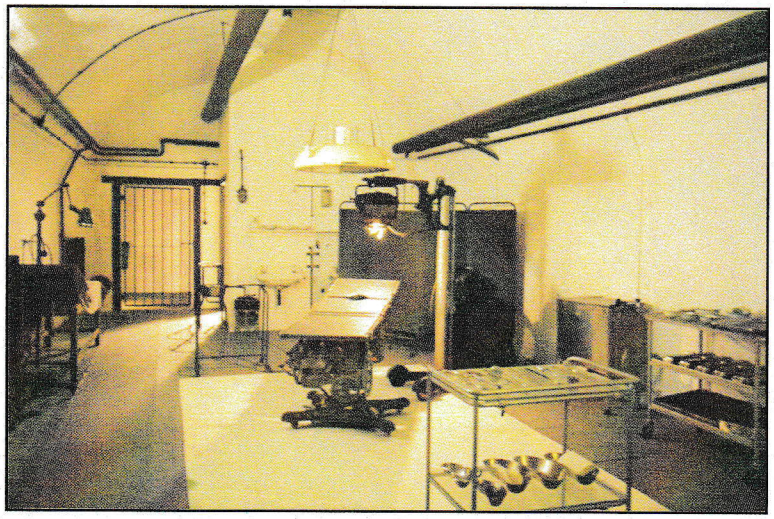
R835.* **Perry's Jointed metal Finger Protector,** 3 sizes .. .. each **7/6**

Mr. Middleton Perry writes :—

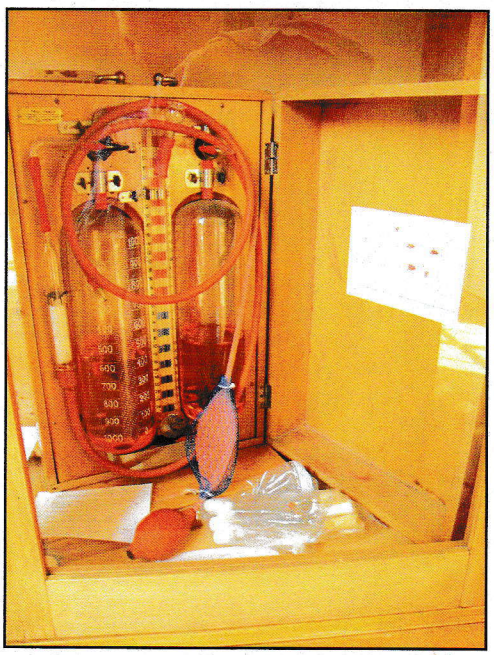
"The Holborn Co. have made for me at my suggestion a finger protector which I find very useful as a mouth gag for small and medium-sized dogs, for use when attending to the teeth. It is worn on the first finger of the left hand, which is placed in the dog's mouth, the remaining fingers and thumb being around the lower and upper jaw, thus keeping the mouth closed on the fingerstall. It is found to be extremely useful for all minor operations, such as scaling the teeth, dressing the mouth etc."

The Holborn Surgical Instrument Co. Ltd
Catalogue of Veterinary Instruments 1937

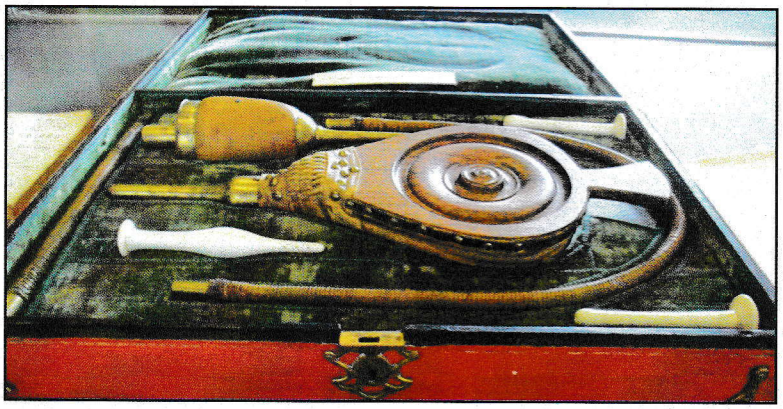
Medical Museum Tour



Jersey



Vienna



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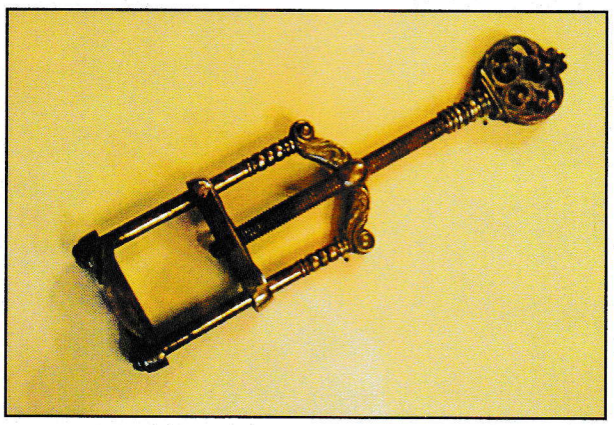

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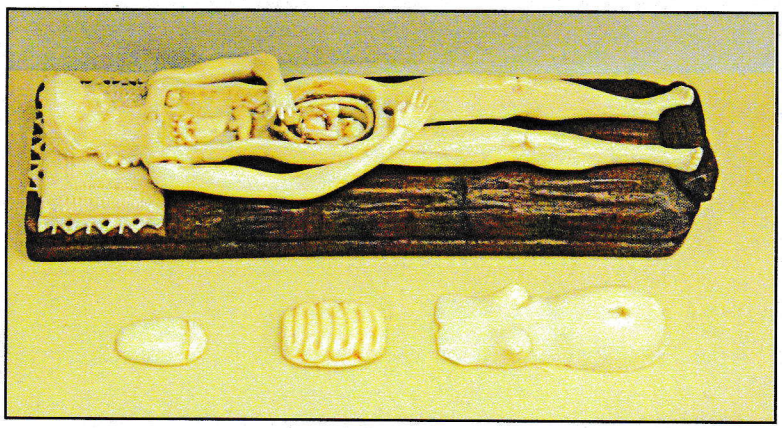

Budapest