The Historical Medical Equipment Society

2022

Bulletin No. 37

ISSN 1366–4719

GOOD NEWS

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A Note on the Stethometer

Noel Snell

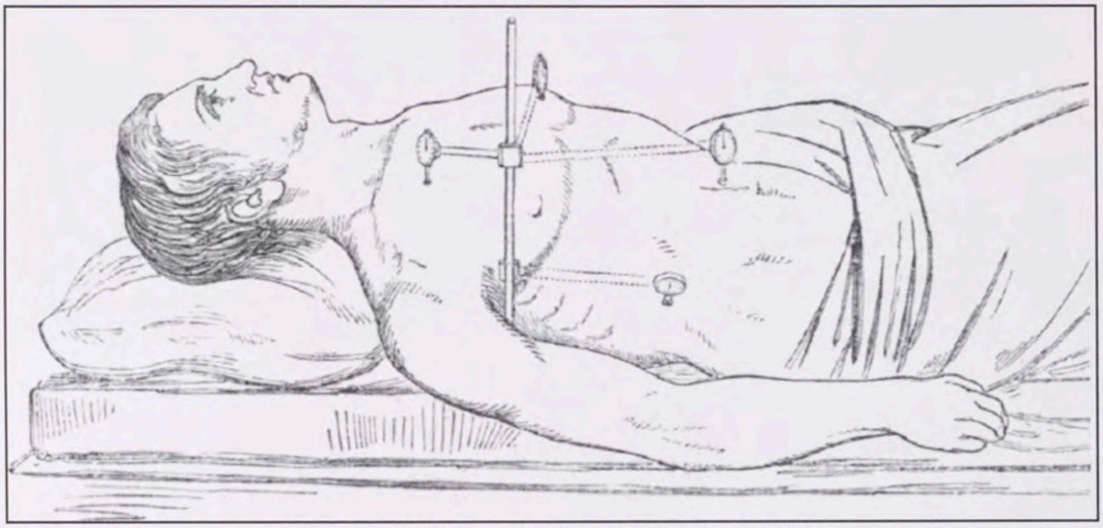

Figure 1. The Sibson 'chest-measurer' in use. (8)

In a recent article in the HMES Bulletin (1), I described the Cyrtometer (an instrument for delineating the shape of the chest), and mentioned a related instrument, the Stethometer. Here I give more detail on the history, design, and uses of this device.

Definition and purpose

The dictionary definition of a stethometer is 'an instrument for measuring the expansion of the chest and abdomen during respiration' (2). Confusingly, the name has also been applied to devices which are clearly cyrtometers, not stethometers; and in recent times it has also been used to refer to a modified electronic stethoscope (3).

One could use a tape measure to quantify chest expansion (as employed, for example, in school and military medical examinations), but this would not evaluate differential movements of different parts of the chest wall. In the era before thoracic radiology and computed tomography were available, physicians were keen to employ novel non-invasive methods which might give insights into lung physiology, and into pathology within the thoracic cavity. Hutchison's seminal work of 1852 on the measurement of vital capacity of the lungs in over 4000 subjects using his spirometer (4) lent an impetus to the study of respiratory physiology in general and the measurement of lung volumes in particular.

History

Rosenblatt, in two papers on the history of pulmonary emphysema (5, 6) implies that a Dr Richard Quain introduced the stethometer into clinical practice, in 1850. But Quain himself states (7) that his invention was inspired by an apparatus devised and used by Francis Sibson, resident-surgeon to the Nottingham General Hospital; Sibson referred to this as a 'chest-measurer'which could measure any

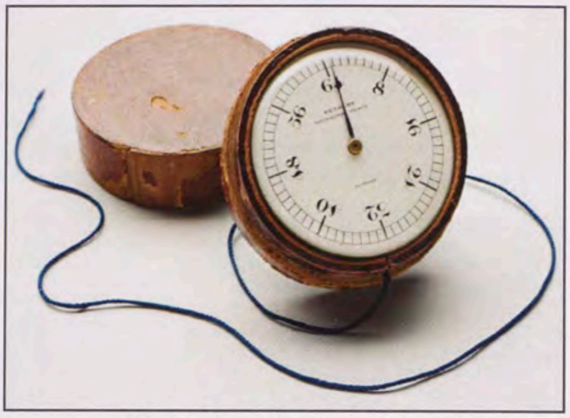

Figure 2. Quain stethometer

Figure 3. Stethometer by Robert Brettell Bate

respiratory movement to one-hundredth of an inch (**8**). It was clearly a stethometer in all but name, so it appears that Sibson was the first to invent the instrument, whereas Quain was first to call it a 'stethometer'.

Sibson's device consisted of a brass plate on which the patient laid, with an upright rod at one end bearing another, moveable, rod at right angles, at the end of which was fixed a dial with rack-and-pinion; when this was set onto the chest wall, movements thereof registered on the dial, one revolution of the hand corresponding to an inch of motion of the chest. The device is seen in use in figure 1.

The Quain stethometer (fig. 2) is similar but simpler, consisting of a cord attached to a dial; pulling the cord one quarter of an inch causes the pointer to make one circuit of the dial. Holding the cord over, say, the sternum, and the dial over the spine, one could measure movements of one or other side of the chest (hemithorax).

The Science Museum, in addition to the Quain stethometer, has another variety in store, made between 1808 and 1847 by Robert Brettell Bate of London (fig.3). More devices can be found in contemporary instrument catalogues, such as the 'Edwards' callipers for ascertaining the movements of the chest' of 1863 (**9**) (fig 4).

Stethometry appears to have been popularised by a Manchester physician, Dr Arthur Ransome, who published a series of communications, articles, and books on the subject in the 1870s and 1880s. He seems to have introduced his stethometer in a presentation to the Royal Society in June 1872, entitled 'On the mechanical conditions of the respiratory movements in man'; this was elaborated on in a paper of 1873 (**10**), and in subsequent publications.

Ransome appreciated that movements of the chest wall occurred in more than one plane ('owing to the shape and mode of articulation of the ribs, the movements of any point on either side of the sternum may take place in three planes at right angles to one another, and need each to be recorded separately; and, owing to the variations in healthy breathing, it is further important that all these movements should be measured during one act of breathing'). His 1882 book (**11**) summarises his

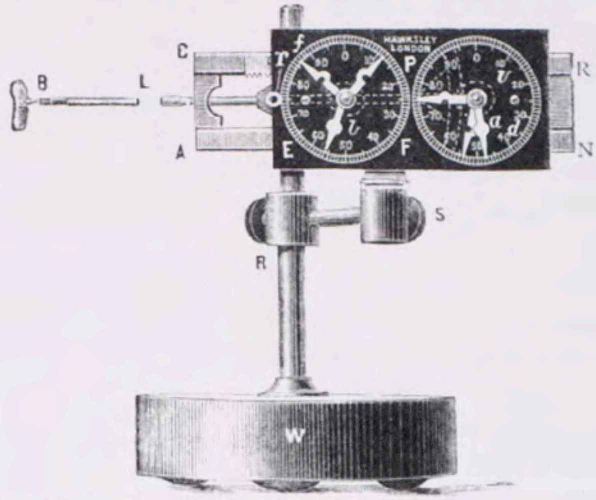

Figure 5. Ransome's two-plane stethometer. (**11**)

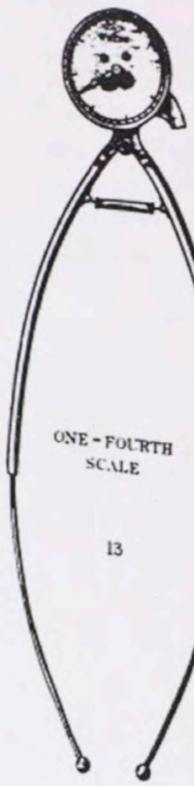

Figure 4. Edwards' callipers
for ascertaining the movements of the chest. (**9**)
(Size reduced from original print)

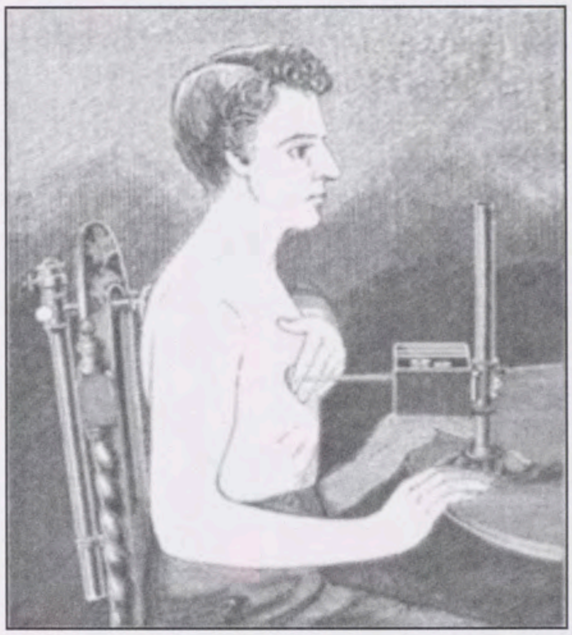

Figure 6.
Ransome's three-plane stethometer in use. (**11**)

work and includes details of both a two-plane stethometer (measuring both forward and upward movements of the chest wall, fig.5), and a three-plane version (measuring lateral outward motion in addition: pictured in use in figure 6).

Whereas earlier workers were more interested in measuring chest movements in a variety of lung conditions, often with a view to establishing reference values, Ransome put his observations to practical use by correlating his measurements in different diseases with individual prognosis, thus establishing a use in the life assurance industry.

With the advent of chest radiography circa 1900, the intra-thoracic organs could be visualised; chest screening allowed viewing of the motion of the ribcage, the heart and the diaphragm. Interest in stethometry began to diminish, although occasional papers still appeared (**12**). When I researched this article only two relevant papers appeared on Embase and Medline, and one on PubMed.

Few stethometers seem to have survived; apart from the examples in the Science Museum store I have not seen any in UK medical museums nor at auction or carboot sales.

Acknowledgments

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I am indebted to the staff of the Wellcome Library, London, for their assistance.

References

1 Snell N. The Cyrtometer: a forgotten diagnostic instrument in thoracic medicine.
HMES Bulletin 2020; No.**35** 3-6.

2 Collins English Dictionary. Online.
www.collinsdictionary.com/dictionary/english/stethometer

3 Abelson D., Kamens E. Bedside measurement of systolic and diastolic time intervals using the stethometer.
Cardiovascular Research 1977, **11** 270-4.

4 Hutchinson J. The spirometer, the stethoscope, and scale-balance; their use in discriminating diseases of the chest, and their value in life offices; with remarks on the selection of lives for life assurance companies.
London: John Churchill, Princes Street, Soho, 1852.

5 Rosenblatt M. Emphysema in the nineteenth century.
Bulletin of History of Medicine 1969. **43** 533-52.

6 Rosenblatt M. Emphysema: historical perspective.
Bulletin of NewYork Academy of Medicine 1972 **48** 823-41.

7 Quain R. The stethometer: an instrument for facilitating diagnosis, by measuring the difference in the mobility of opposite sides of the chest.
London Journal of Medicine 1850. **2** 923-7.

8 Sibson F. On the movements of respiration in disease, and on the use of a chest-measurer.
Medical Chirurgical Transactions 1848. **31** 353-498.

9 A catalogue of surgical instruments, apparatus, appliances etc. manufactured and sold by John Weiss and Son, 62 Strand, London: 1863.
Fig.3, plate XLII.

10 Ransome A. On the respiratory movements in man, with an account of a new instrument for measuring the movements of the chest.
Medical Chirurgical Transactions 1873. **56** 61-102.

11 Ransome A. On the relation of the chest-movements to prognosis in lung-disease and on the application of stethometry to examinations for life assurance.
London: MacMillan & Co., 1882.

12 West S. The respiratory movements in hemiplegia: a case with tracings showing the movements of the two sides and the peculiar effects of coughing, and a cyrtometer tracing showing peculiar changes in the shape of the paralysed side of the thorax.
Quarterly Journal of Medicine 1908. **1** 448-53.

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Evacuate!

Accessories Intrinsically Linked to the History of Urology

Ihab Hany Yassa Barsoum and Jonathan Charles Goddard

Figure 1.
Ellik Evacuator
20th century
Author's collection

Introduction

The Ellik evacuator (fig.1) is a frequent sight in the urology theatre. The history of this elegant accessory to Transurethral Resection of the Prostate (TURP) is a well-known and enjoyable story (*vide infra*), but it has its origins in a much earlier tale of urology.

Lithotrity

The bladder evacuator was a child of the lithotrite. Lithotrity was introduced in the 1820s and was the first minimally invasive surgery. Bladder stones, the bane of mankind since antiquity, were cut out, usually via the perineum (**1**), even in this pre-anaesthetic age. Needless to say, there had been a long hoped-for desire to treat bladder stones through the natural orifice of the urethra, without cutting. A variety of instruments were devised in an attempt to do this (itself a fascinating story) but it was Jean Civiale (1796–1867) who first demonstrated a reasonably practical instrument, in Paris in 1824, and Civiale has been named inventor of the lithotrite and lithotrity.

Essentially, the instruments (and there was a frenzy of design and re-invention after Civiale) were passed, blindly, into the bladder, the stone was grasped (by feel alone) and broken up by filing, sawing or crushing (depending upon the particular instrument). The fragments of stone then had to be passed by the patient 'naturally'.

As you may imagine, this procedure, albeit not requiring the agony of a thrust of the knife through the perineum, the tearing open of the bladder and prostate and the pulling out of the stone whole, was still painful. The patient would bear only so much manipulation of the steel lithotrite in his urethra and bladder and so lithotrity was carried out in several sessions. In between sittings, the patient would pass the stone shards.

Civiale's first operation, for example, required four sittings, two of twenty minutes each, one of thirty-five minutes, and a final fourth short sitting of unknown duration (2). On 7th May 1834 William Jeaffreson (1790–1865), a Suffolk surgeon, passed his lithotrite into 64-year-old William Kent, a labourer with a debilitating bladder stone. It required, in total, 37 sittings to slowly chip away at the stone. The surgeon must have had a gentle touch and the patient must have been a stoical man as he also walked the three miles each way to visit Jeaffreson's surgery for his treatments (3). In 1863, Sir Henry Thompson (1820 - 1904) successfully crushed the bladder stone of Leopold I, King of the Belgians (and Queen Victoria's favourite uncle). Civiale had already had 13 attempts and the famous German surgeon Bernard von Langenbeck (1810–1887) has also failed. It took Thompson (and the King) three sessions over a period of 10 days to crush and expel the stone (4).

Thus the sittings were limited by both the tolerance of the patient's bladder and the necessity to allow time to pass the stone fragments. Clearly, what was required was a way of removing the crushed stone fragments so the patient did not need to pass them.

Expelling the fragments

Heurteloup's Spoon

There was of course a desire to crush the stone and remove all the fragments in the least number of sittings. Baron Charles Louis Stanislas Heurteloup (1793–1864) one of the great pioneers of lithotrity, soon noted that angular fragments "often caused grave accidents" in the urethra and tried to invent means of removing the fragments including his 'spoon lithotribe' (2) This was similar to a lithotrite having two blades which he used to pick up fragments and withdraw them (Fig 2).

Heurteloup said: " Lithotripsy is the art of crushing stones in the human bladder, in order that the powder and fragments may be expelled with the urine, or that their exit may be provoked by artificial means." To these artificial means he gave the name of lithocenosis, which signifies evacuation of the stone, from λιθος, stone, κευωσις evacuation (2).

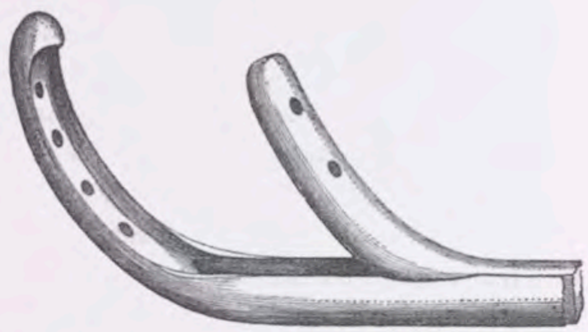

Figure 2. The distal end of Herteloup's Spoon from Henry Belinaye's Compendium on Lithotrity

Jean Civiale continued to use his old trilabe, a three pronged grasper, which formed part of his original apparatus to break stones and was by this time obsolete, to remove fragments. These instruments were designed to pick up small amounts of stone debris and bring them out of the bladder. Thus, multiple passes of the instruments were required in and out of the urethra.

Max Joseph Schleiß von Löwenfeld (1809–1897), of Germany, felt that these methods of repeatedly pulling out stone fragments were no better than allowing them to pass naturally with an equal or higher chance of damaging the urethra. He advocated evacuating catheters, where fluid was injected into the bladder and allowed to drain out through relatively large bore catheters hopefully washing some stone fragments out as well. He published his own design in 1839 (5).

Sir Henry Thompson occasionally used an evacuating catheter. Writing in the first, 1863 edition, of his book on stone surgery, he suggests that although a syringe is connected to this catheter to put fluid into the bladder, it is gravity and not suction which allows it to flow out. He is also critical of Heurteloup's and Civiale's methods of multiple passes and withdrawing fragments (**6**). However, he had used this method himself (**7**) but by the time he published the second edition of the book in 1871, he included the new suction evacuators, which had then been invented (**8**). The difference being that these systems actively sucked out the fragments after injecting fluid rather than relying on passive drainage.

Crampton's Exhausted Ball

On 1st October 1841 Sir Philip Crampton (1777–1858) operated on the 71-year-old Mr W.R. Roger of Limerick. He had been previously operated on by Baron Heurteloup in London, initially with a stone drill in April 1830 and then in September with Heurteloup's hammer and for a final visit in June 1831. He did well for ten years ;however he had a huge prostate and a paralysed bladder, and fragments may have been retained or new stones formed. He returned to Crampton who operated six times between 3rd September and 1st October 1841. On the final occasion, in the presence of Robert Liston (1794–1847) the famous London surgeon, Crampton used his 'Exhausted Ball' to ensure all fragments were removed. (Fig. 3)

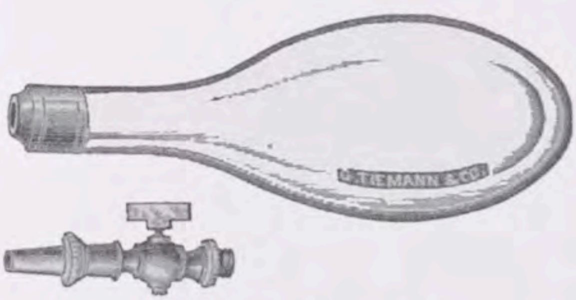

Figure 3. Crampton's Exhausted Ball from Otis' A Simplified Evacuator

A vacuum was first created within the glass evacuator using an exhausting syringe (**9**), it was then attached to a catheter and the contents of the bladder were sucked out. Mr Roger finally died at the age of 76, free of any urinary symptoms, which Crampton puts down to the complete removal of all stone fragments with his ball (**10**) (although of course the Baron had previously given him ten years of ease without one!). Although Crampton had used his exhausted ball at least as early as 1841, this only appeared in the medical press in 1846.
It is frequently quoted as an early evacuator. The requirement to keep re-vacuuming the bottle rendered it impractical and Henry Thompson felt the vacuum too rough and abandoned it (**9**). Writing in 1884, Prof. Edward Andrews called it "hopelessly obsolete" yet still included it in his historical summary (**11**).

Cornay and his hydraulic-pneumatic lithéreteur

It was Joseph Emile Cornay (fl. 1840) of Rochefort, France, who first published a device to actively suck out the fragments. In his 1845 book, *De la lithéretie ou Extraction des concretions urinaires* (**12**), the idea, he says, came to him in 1840. His hydraulic-pneumatic lithéreteur consisted of a catheter, a glass receptacle and a suction device, initially a syringe. He worked on the idea for five years trying it at first in a vase of water containing brick fragments; it worked.

On March 12, 1843 he presented his lithéreteur to the Académie des Sciences. He also tried his aspirator on a 45-year-old man from, rue S-Honoré: a stricture patient. Cornay aspirated some mucus from the bladder and confirmed the device could be used in a living subject. However, this experiment and a failed attempt on a corpse in the anatomy pavilion of the Academy of Medicine, which was too rotten, persuaded him it could be improved. On 13th September 1843 he tried once again on a cadaver at Beaujon hospital and then on a patient on the 21st. The stone was broken by Dr Laugier using a Heurteloup lithotrite and then Cornay used his lithéreteur to remove fragments. Further debris was removed on 26th.

The device was clumsy however and required three assistants; he continued to work on it. Finally, he used a mouthpiece allowing him to suck and thus create the vacuum required. In all he described five variants of his evacuator (**12**).

Joseph Cornay created and published an early bladder evacuator model. His invention may have not been as effective as his successors' designs but he got the principle correct and his important contribution inspired others. Though often mentioned in some later works, his instrument does not appear to have caught on.

Louis Auguste Mercier (1811–1882), a French surgeon who had a special interested in managing surgical diseases of the urinary organs, wrote about Corney's evacuator in 1872. Although he described it as ingenious, he noted that he was aware the tests made at the Beaujon hospital were not very favourable and damage to the bladder wall had led to bleeding. Mercier presented his own idea, which he had made up by Charrière's son in Paris some 15 year previously (about 1855) designed to only aspirate the same quantity injected. It had a rubber balloon with a copper tube fitted and tap at one end and a small crystal container at the other; allowing, he said, the debris which the apparatus brings to the outside to be seen. Once again, this publication appeared long after Mercier claimed he had invented his evacuator.

Clover's Lithotrite Syringe

The Lithotrite Syringe of Joseph Clover (1825–1882) is also frequently mentioned as an early evacuator; it may have been the first usable instrument of this type. The first mention of Clover's "new instrument" I have been able to establish is in the 24th February 1866 issue of the Lancet. Thompson, a great advocate of the patient naturally expelling the stone pieces admits that in certain cases, for example the atonic bladder and with patients under chloroform, it is an important addition to the apparatus of lithotrity (**13**). Clover worked closely with Thompson, often being his 'Chloroform Clerk', or anaesthetist.

Writing on 2nd May 1866, Clover describes his Lithotrite Syringe as being two inches long and two inches wide with an eight-ounce India rubber ball on one end and a vulcanite mount at the other with a hole, which fits snugly into a catheter (Fig. 4). He states he had used it 54 times with Henry Thompson in the preceding twelve months (**4**). Thus, Clover must have introduced his evacuator at the latest by 1865. Subsequent letters in the Lancet confirm that others were soon using and indeed adapting Clover's instrument (**15**). Andrews, reflecting on its use, had found the rubber ball too weak and the catheters too small, and that the fragment frequently washed back into the bladder; but does state, it was the standard evacuator for a considerable time (**11**).

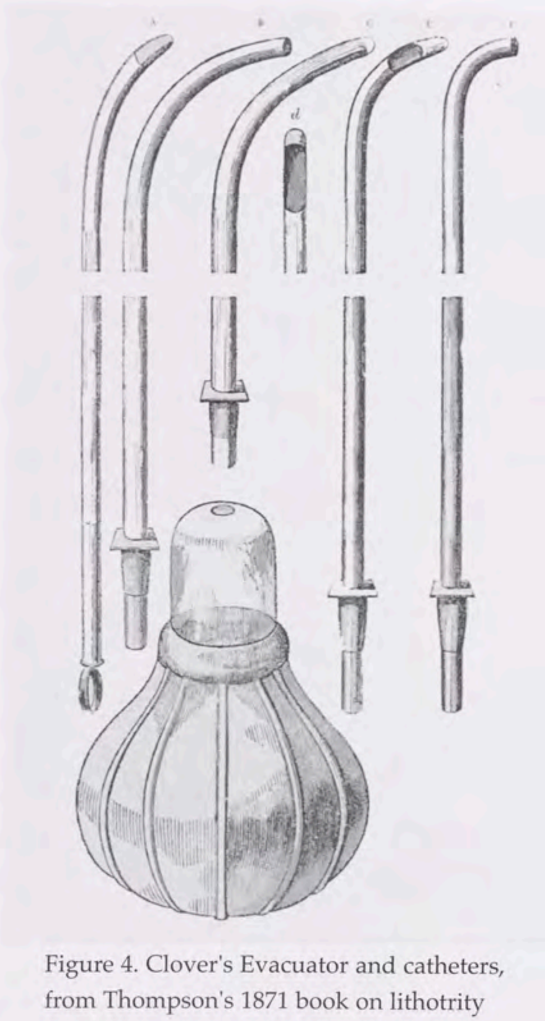

Figure 4. Clover's Evacuator and catheters, from Thompson's 1871 book on lithotrity

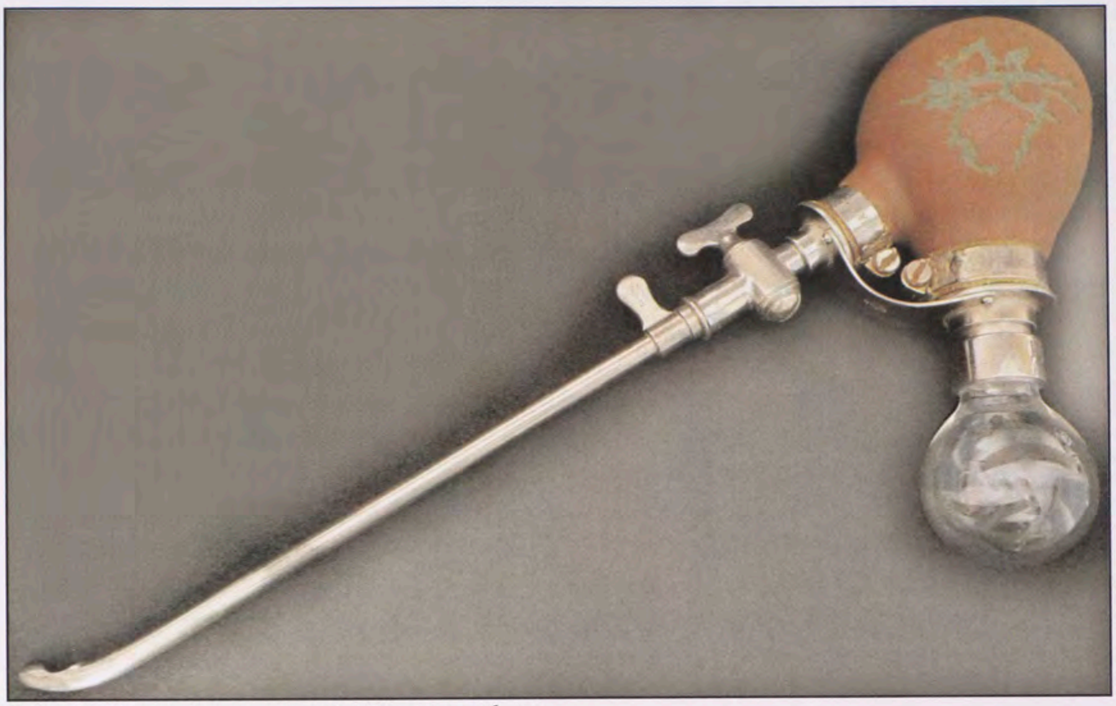

Figure 5. Freyer Evacuator and a Bigelow catheter
Still in use at Leicester General Hospital in the 1980s. *Author's collection.*

Bigelow's new operation

Henry Bigelow (1818–1890) of Boston, USA, combined a bigger, more powerful, lithotrite with a better evacuator and the use of ether anaesthesia to create lithalopaxy; the crushing of the stone and the evacuating of all fragments in a single sitting. (λιθος,lithos, stone; λαπαξις, lapaxis, evacuation). The work of Fessenden N. Otis (1825–1900), had determined the male urethra to be at least 32Ch. in diameter (**16**) which allowed Bigelow to introduce a larger and stronger lithotrite but also a larger evacuating catheter. He used a 32Ch. catheter with his evacuator, while Clover's was at most 25Ch. He also redesigned the tips of the catheters to allow the more efficient pick up of debris (**17**).

Bigelow's alterations and the use of ether anaesthesia allowed him to truly perform lithotrity in a single sitting including the removal of all stone debris. Unlike previously, when instrumentation usually lasted between one and five minutes, Bigelow described eight cases of lithalopaxy lasting between 45 minutes and one and three quarter hours (**17**).

Bigelow based the design of his evacuator on the original of Clover, but it was Bigelow's, linked with his 'new' single sitting operation, which then formed the model for subsequent re-designs, of which there were many; the 1896 edition of Arnold and sons' instrument catalogue lists ten (**18**).

The great lithotritists such as Thompson and Sir Peter Freyer soon began adapting and reinventing their own evacuators publishing many 'improved' models. Freyer evacuators and Bigelow catheters were still being used at my hospital by senior surgeons into the 1980's (Fig 5).

The Elegant Ellik

In the 1930s, a new operation for enlarged prostates, TURP, began to gain popularity, particularly in America. Slices or chips of prostate were cut off endoscopically; these fell back into the bladder and required removal. The old stone evacuators or bladder syringes were used for this.

In 1937 Milo Ellik (1905–1979), a resident on the Urology Programme at the University of Iowa, published a new type of bladder evacuator, specifically for use during the TURP operation (**19**). The story goes (and it is difficult to be clear how accurate this is, but one biographer (**20**) has certainly been in touch with Ellik's family) that whilst working with Nathan Alcock (1881–1953) and Rubin Flocks (1906 –1975), both early pioneers of TURP, Ellik was instructed to try and come up with a better idea for prostate chip removal than the Bigelow, Young and McCarthy evacuators his bosses were struggling with. Milo, so it is said, went over to the glass blowing shop in the Chemistry Department and came up with the new design (**20-22**).

His evacuator (Fig. 1) could be used with one hand and was less encumbered with pipes and valves. It consists of a three-ounce rubber bulb, a short red rubber tube with a connector to fit the end of the resectoscope and an elegant double chambered blown glass receiver. The extracted chips settle in the lower bowl allowing the clearer upper fluid to be recycled through the bladder again to bring out more debris.

Newer models of evacuators continued to emerge after Ellik's (**23-24**) (Fig. 6), but his 1930s design remains a popular one in urology theatres to this day. It is used to remove prostate chips (during TURP), resected fragments of bladder tumour (during TURBT), blood clots and of course stone fragments.

Summary

The bladder evacuator, typified by the Ellik commonly in use today, combines fluid injection with subsequent and immediate active removal, along with any debris to be extracted. This style of instrument followed passive drainage catheters and was first used as part of lithotrity. The timings of invention, use and publication of early instruments have rendered an accurate timeline difficult in this story. However, it seems likely that Sir Philip Crompton first used an active evacuator in 1831, Joseph Corney was the first to publish a design in 1845 and Joseph Clover introduced the first practical and usable evacuator in 1865-6. It was Henry Bigelow's lithalopaxy operation, which launched multiple redesigns of bladder evacuators and Milo Ellik's remains the last of the old style of glass (now plastic) and rubber instruments. Newer designs, such as the cylinder ('milk bottle') type are preferred by some and perhaps better ideas will emerge, but I suspect the Ellik, with its memories of 19th century pre-anaesthetic frock-coated surgeons, will remain in the urology theatre for some time to come.

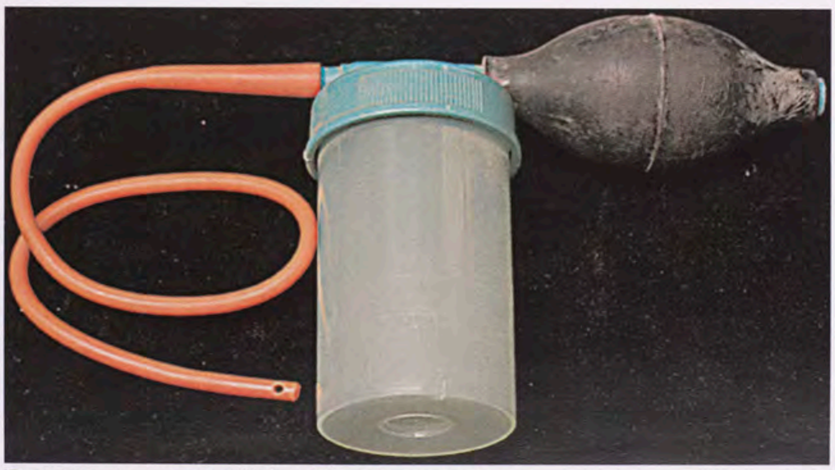

Figure 6. A newer 'milk bottle' style evacuator
Leicester Royal Infirmary museum collection.

References

1 Kunzru KMN, Philp T, Mahadeva V.
Cutting for the Stone in Ancient India. Experimental validation of Susruta's Perineal Lithotomy. HMES bulletin 2016 **31** 9–11
2 Gouley JWS.
Internal Urethrotomy and Lithotripsy at the same sitting. The Medical Record 1879 **16** 363–67
3 Jeaffreson W.
Lithotripsy and Lithotomy.
The Lancet 1834 **23**(581) 122–123
4 Cope Z.
The Versatile Victorian.
London: Harvey & Blythe Ltd, 1951.
5 Schleiß von Löwenfeld MJ.
Die Lithotripsie in Bezug auf Geschichte, Theorie und Praxis derselben unter Benützung der neuesten Erfahrungen. Munich, 1839.
6 Thompson H.
Practical Lithotomy and Lithotrity.
London: John Churchill & Sons, 1863.
7 Thompson H.
Lithotrity at one or more sittings.
The Lancet 1879 **1**(2892) 145–146
8 Thompson H.
Practical Lithotomy and Lithotrity.
London: J & A Churchill, 1871.
9 Otis FN.
A Simplified Evacuator.
New York: Trow's Printing & Bookbinding Co., 1883.
10 Crampton P.
Lithotrity. The Substance of a Lecture delivered at the opening Session of the Meath Hospita! in 1845. Dublin Quarterly Journal of Medical Science
1846 **1**(1) 1–59
11 Andrews E.
Rapid Lithotrity or Litholapaxy, its later improvements and its present condition.
Journal of the American Medical Association
1884 **2**(11) 281–287
12 Cornay JE.
De la litheretie ou Extraction des concretions urinaires. Paris, 1845.
13 Thompson H.
The Proofs that Lithotrity is an eminently Successful Operation.
The Lancet 1866 **87**(2217) 200–201
14 Clover JT.
Lithotrity Syringe. The Lancet 1866 **87**(2228) 515
15 Maunder CF.
Lithotrity Syringe.
The Lancet 1866 **87**(2226) 455–56
16 Otis FN. Urethrotomy, external and internal combined, in cases of multiple and difficult stricture; with remarks on the urethral calibre.
New York Medical Journal 1874 **19**(4) 360–382
17 Bigelow HJ. Lithotrity by a single operation. American Journal of the Medical Sciences
1878 **75** 117–134
18 Arnold & Sons: Catalogue of surgical instruments and appliances. London, 1985.
19 Ellik M.
A Modification of the Evacuator.
The Journal of Urology 1937 **38**(3 327–329
20 Matluck N, Zhang B, Richstone L.
It's pronounced "EE-lick": Milo Ellik, veteran, urologist, and inventor of the evacuator that bears his name.
International Journal of Urologic History
2021 **1**(1) 37–41
21 Tasleem AM, Khan F, Mahmalji W, Madaan S, Dickinson I, Sriprasaad S.
The Ellik Evacuator: Evolution in Emptying. European Urology Supplement 2014 **13** e282
22 Zhang B.
Milo Ellik and his Legacy.
The Scope of Urology Newsletter 2020 (2)
23 Holm J, Holm M, Holm NC, Holm HH.
A new disposable bladder evacuator.
British Journal of Urology 1997 **80**(6) 950–952
24 Fiore AA, Iorio B, Vennarecci G, *et al.*
The Urovac bladder evacuator: comparison with traditionally used devices.
Minerva Urology Nefrology 1995 **47**(2) 97–98
25 Belinaye H.
Compendium on Lithotripsy.
London: J. B. Bailliere, 1837.

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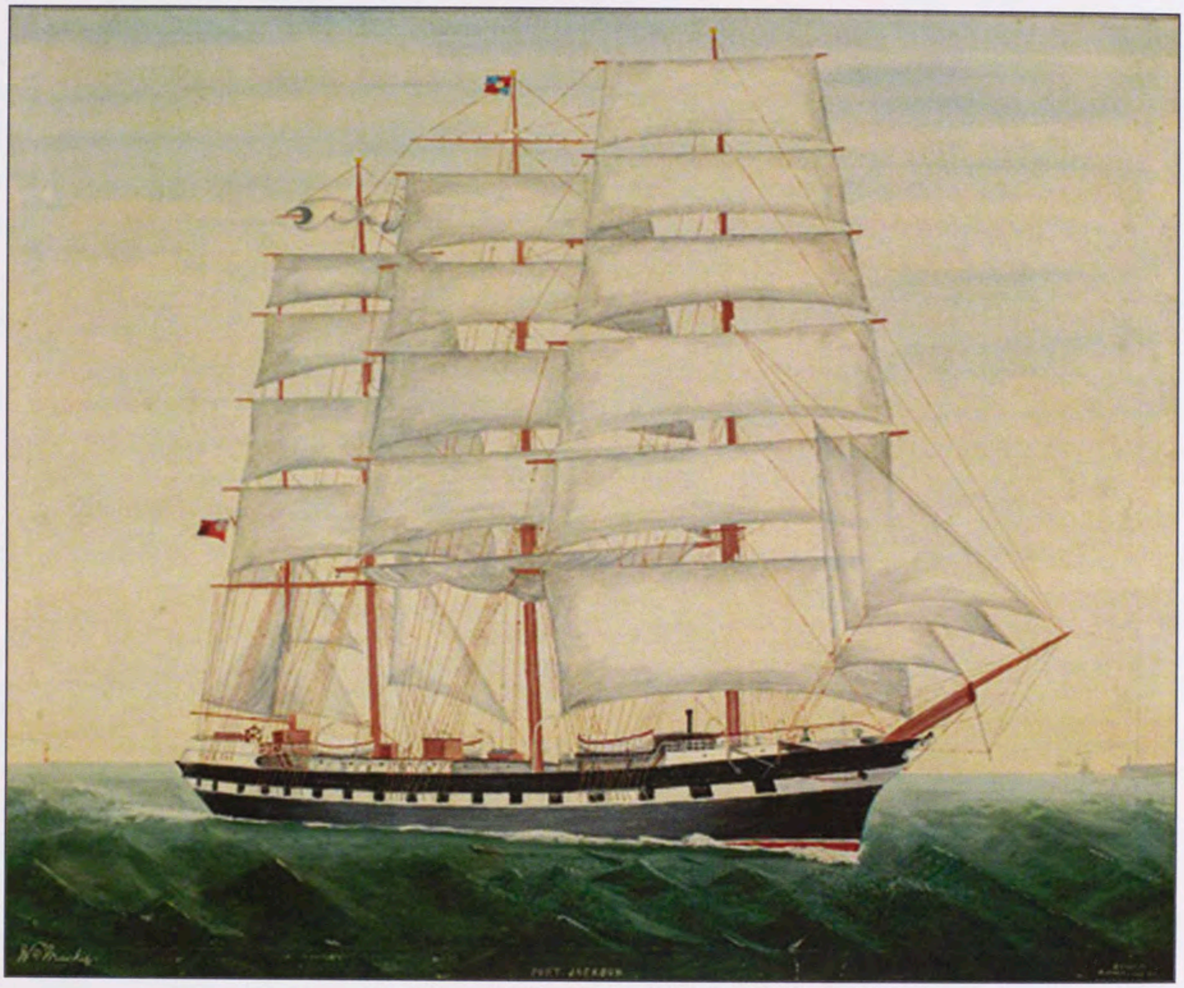
Dr Clifford Hall: A Ship's Surgeon His surgical instruments and the sailing-ship *Port Jackson*

Stephanie Seville



The Clipper Port Jackson by William Mackie

The Beswick Collection in the University of Manchester Museum of Medicine and Health (MMH) holds a number of boxed sets of surgical instruments. This paper focuses on a case of instruments belonging to Dr Clifford Hall (1885–1979), who was the surgeon on board the sailing ship *Port Jackson*, a merchant cadet training ship. The instruments along with photographs and family information were donated to the MMH by his nephew, Dr Albert Geoffrey Hall MRCS LRCP, a public health and factory medical officer in Stoke on Trent. The instruments are a set of amputation and other surgical equipment, which the Board of Trade regulations required a merchant ship to carry. They are a unique link to the close of the era of the great sailing ships, the adventures of a young ship's surgeon and the horrors of First World War sea battles.

The Ship

The *Port Jackson* was designed by Alexander Duthie and built in 1882 by Alexander Hall & Sons Ltd., in Aberdeen (**1**). Under her first commander, Captain Crombie, she produced some fine performances: her best 24-hour run was 345 miles. Between 1907 and 1917 she was owned by Messrs Devitt and Moore and worked as a sea-going cadets training ship (**2**). The archives in the National Maritime Museum hold a journal by Alfred Frank Duprey, a passenger on a journey to Australia in 1913. (**3**)
His entry for Saturday, 13 September 1913, testifies:

"The *Port Jackson* has fine lines, as those who have seen her in dock in Sydney assure me, is very different to the modern tanks now built. Speed was a consideration in 1882 and she moves along at 5 knots with hardly any breeze."

In 1917, the *Port Jackson* was sold to provide funds to form the Pangbourne Nautical College, founded the same year. Not a military school today, the college still pays tribute to its naval roots with a focus on rowing and sailing (**4**). Not long after this, the *Port Jackson*, caught up in the world conflict, was torpedoed and sunk by a German submarine in the English Channel on 28 April 1917. The Captain and thirteen of her crew were killed.

Dr Clifford Hall MRCS LRCP (1885–1979)

The instruments and photographs were taken into the MMH in 1980, by the Honorary Curator, Charlotte Beswick (1926–2013), wife of the Medical School's Dean, Dr F.B. Beswick (1925–2019). (**5**)

Clifford Hall, aged 19, entered the Manchester Medical School qualifying in 1910. Before joining the *Port Jackson* he had worked as an Assistant Medical Officer at the Camberwell Union Infirmary and as a Senior House Officer at the South Shields Infirmary. During the First World War he was Assistant Superintendent at Hope Hospital in Salford. His father and grandfather were general practioners in Stoke and after the War Clifford settled into the practice and later became County Medical Officer for Staffordshire.

Clifford's nephew, Geoffrey Hall, who also trained at Manchester, joined the practice in 1940. He had inherited the case of instruments in 1979; he exchanged correspondence with Mrs Beswick – in one letter he writes: "My aged Auntie tells me that my uncle went to sea for the sole purpose of seeing the world before settling down to routine work as a County Medical Officer."

Clifford Hall was Medical Officer on board the *Port Jackson* between August 1913 and July 1914, under Captain Maitland (Fig. 2). Mr Duprey's journal

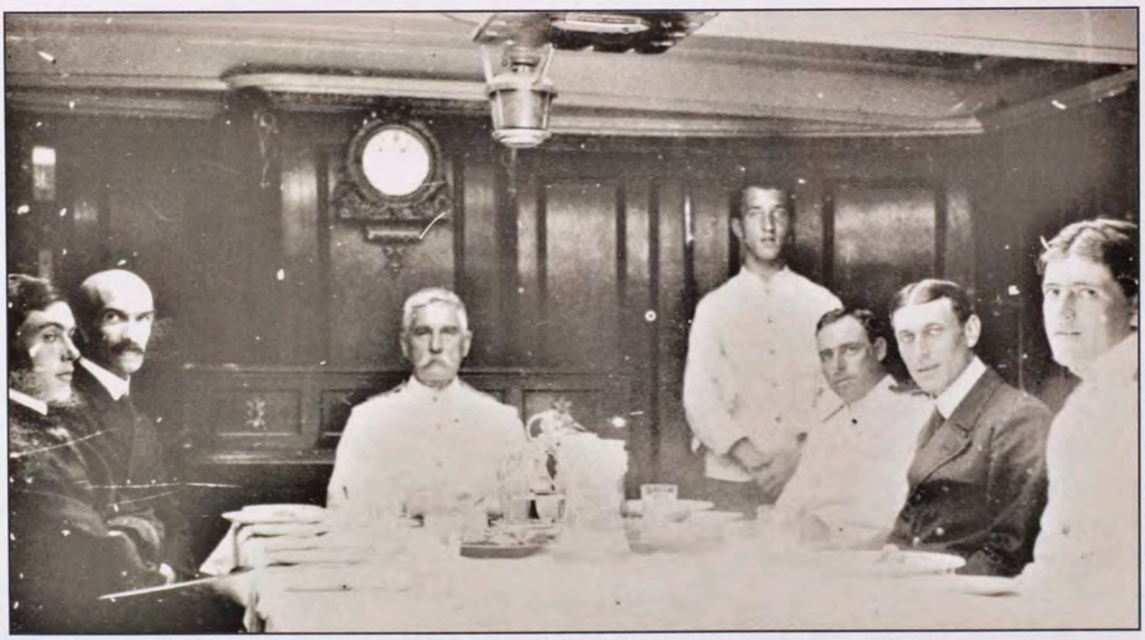


Figure 2. The Captain's Table. Clifford is seated second from the right.

noted that on November 22nd 'the doctor performs operation on Wingrove's knee and gave chloroform.' Duprey himself, was also attended to by the doctor. "I cut my head open on the companion clock, running down to breakfast. Not much damage. The Dr shoved on a little iodine, and I soon forgot all about it."

Duprey also records that the doctor was involved in teaching the cadets First Aid and bandaging. The *Port Jackson* arrived back home on 10 July 1914 and the War began two weeks later.

The Surgical Instruments (Fig. 3)

The set of instruments is in a wooden case which-measures L43cm x W19cm x D11cm. It was donated along with a copy of a page from a Down Bros. catalogue (1908), for a set of 'Amputation and General Operation Instruments in accordance with the Board of Trade Regulations for Passenger and Emigrant ships' (Fig. 4). However, the box-set of instruments does not match those in the Down Bros. catalogue illustration. None of the instruments are marked as 'Down Bros.', and most bear no makers mark at all. The compartments in the case do not match those in the Down illustration. The tenon amputation saw has a metal handle and lifting back, clearly different from the nineteenth-century-style Down saw with an ebony handle and fixed back. Also, the all-metal Liston amputation knives are different from those in the Down advert; indeed Clifford's set doesn't match any of the 'standard' sets. He may have acquired an older, incomplete set and added instruments to it. Some instruments such as the trephine, tourniquet and scissors are missing; those remaining in the case are listed below. In addition to his surgical set he would have had a stethoscope, thermometers, chloroform, bandages etc.

Amputation saw with lifting back
Director
Two Liston amputation knives
Two scalpels
Two probes
Tracheosotomy tube
Tracheal dilating forceps
Probang
Trocar and cannula
Three catheters
Eye spud
Wooden-handle gouge
Three artery forceps
Two double-hook retractors
Aneurysm curved needle

The Board of Trade regulations were part of the Merchant Shipping Act (1906) to protect the safety of passengers and crew. For Dr Hall, apart from the knee operation, most medical problems would have been minor, perhaps requiring sutures, a plaster cast for a fracture, or dental treatment. However, he would have been prepared to deal with a serious accident such as a head injury or crushed limb. Clifford kept the case of instruments throughout his career. It is unlikely that he would have had reason to use them in the family practice, but they would have been a souvenir and reminder of his maritime experience.

Discussion

Jonathan Goddard 'unlocked' the contents of the navy surgeon's chest in his paper on their training and practice during the eighteenth century (**6**).

The College of Surgeons (Royal College after 1800) sealed and stamped a surgeon's chest before it went on board a ship.

DOWN BROS., St. Thomas's Street, London, S.E.

Amputation and General Operation Instruments, *continued,*—

5.

Set in accordance with Board of Trade Regulations for Passenger and Emigrant Ships, in mahogany case, consisting of,—
Amputation Saw, Long and Short Amputation Knives, Bone Forceps, Hernia Bistoury, 2 Scalpels, Aneurism Needle, Fergusson's Small Saw, Trephine, Trephine Brush, Elevator, Hernia Director, Abdominal Trocar, Hydrocele Trocar. 2 pairs Spencer Wells' Artery Forceps, Dissecting Forceps, 1 each Nos. 4 and 8 Plated Catheters, 1 No. 12 Plated Prostatic Catheter, 2 each Nos. 3, 5, 9, and 12 Bulbous Catheters, Esmarc's India-rubber Tourniquet with Hook and Chain, Reel Plated Wire, Hank Chromic Catgut.

	£	s.	d.
The Knives, etc., with ebony handles, and the blunt instruments nickel plated	7	12	6
If with the Knives, etc., forged entirely of solid steel, handles nickel plated, all other instruments metal handles and nickel plated	9	2	0

The following are also required,—

	£	s.	d.
Pocket Case (No. 792, *page* 151) . .	2	2	0
Clinical Thermometer	0	2	0
Hypodermic Syringe.	0	7	3
1 doz. Tubes Vaccine Calf Lymph . .	0	15	0
1 Bristle Probang .	0	2	3
1 Set Midwifery Instruments (No. 2641, *page* 527), nickel plated . . .	3	8	6
3 Tracheotomy Tubes .	1	2	6
Tracheotomy Dilating Forceps . . .	0	6	0
Wood's Aspirator . .	1	10	0
Stethoscope . . .	0	2	6
Set of 7 Pairs Druitt's Tooth Instruments (No. 3563, *page* 724) . .	2	12	0
(If nickel plated, 5*s*. 3*d*. extra.)			

Figure 4. Page from Down Bros. catalogue

The surgeon was a vital member of a naval vessel from the earliest times. The *Mary Rose* (1511) had a small barber-surgeon's cabin with instruments for amputation, bleeding, dental extraction and treating gonorrhoea. Samuel Fuller (1580–1633), the physician on the *Mayflower's* voyage to the Plymouth Colony in America (1620), had to cope with diseases on the ship and epidemics during the early years of the settlement. Benjamin Bynoe (1803–1865) was the surgeon that accompanied Darwin's epic voyage of the *Beagle* (1831–36), also helping with the collection of botanical and zoological specimens. William Beatty (1773–1843), surgeon on HMS *Victory* during the battle of Trafalgar, made the brave decision not to operate on the fatally wounded Admiral Nelson. All are well-studied characters in history, literature and art.

Clifford Hall went to sea for adventure, before settling into a steady, well-established family practice. Amongst the papers with the donation was a copy of a well-known sea-shanty, often called 'Away Susanna', 'New York Girls', or 'Seafarers', handwritten on the back of a Medical Officer's report, perhaps copied so that he would know the words and join in with the sing-song. As Duprey recorded in his journal on April 13, 1914: "We celebrated the Doctor's birthday after dinner and had the last two bottles of port they have got left in the ship. Our musical party afterwards was a rather merry one!" (**7**).

During the twentieth century, it was not uncommon for a young doctor to sign up for a year or so as a ship's doctor on a passenger or cruise vessel – a well-paid post and a chance to see the world. World medicine and humanitarian causes can still offer opportunities for experience: UK-Med was founded in 1988 by Tony Redmond OBE, Professor of International Emergency Medicine, to respond to natural disasters and medical crisis: for example, when Ebola hit West Africa in 2014, 150 NHS clinicians were deployed alongside local health workers to deal with the outbreak. UK-Med is now a global asset that has responded to disasters and medical emergencies in over twenty countries (**8**). If alive today, Dr. Hall might have considered humanitarian work as a worthwhile cause during his early career. Professor Redmond comments:

"Doctors who work in other health systems can gain enormously from seeing how people live in other countries and the different ways that healthcare can be delivered. This expands their general and medical experiences and increases their capacity to understand a broader range of patients and conditions when working back home in the NHS. This can be done at any age but for professional and personal convenience is often done at the start of their career." (**9**)

The case of instruments is an interesting museum object and for many years it was on display in a previous exhibition space in the Manchester Medical School (1980–2011). It is not a pristine, valuable antique set nor did it belong to some famous surgeon; its value and interest (as with many museum objects) lies in its link to the 'back-story': the experiences of a young doctor's voyage to Australia on one of the last iron sailing ships - a great adventure and a snapshot of the colonial, medical and nautical world, just before the Great War.

References

1 See the painting, *The Clipper 'Port Jackson'*
Art UK

2 Aberdeen Ship Builders
www.aberdeenships.com/single.asp?index=100229

3 Journal of Alfred Frank Duprey on the Devitt & Moore cadet training ship *PORT JACKSON*, 1913–1914.
Royal Museums Greenwich (rmg.co.uk)

4 Pangbourne College,
www.pangbourne.com

5 Beswick C.
University of Manchester Museum of Medicine and Health records 1980. 007, F2 D4.

6 Goddard J C.
The navy surgeon's chest: surgical instruments of the Royal Navy during the Napoleonic War
Journal of the Royal Society of Medicine
2004 Apr; **97**(4) 191–197.

7 The Bulletin, 18 July 1918, p. 14.
https://nla.gov.au/nla.obj659849001

8 UK-Med.
https://www.uk-med.org

9 Redmond T.
Personal communication
May 2022; The Humanitarian Archive. https://www.library.manchester.ac.uk/rylands

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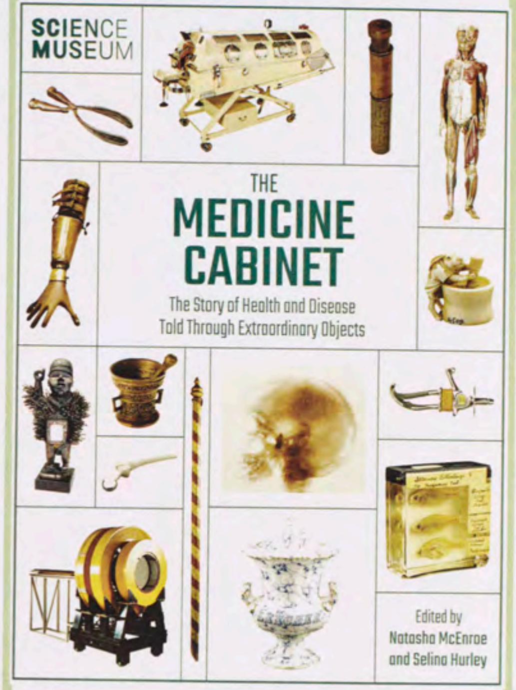
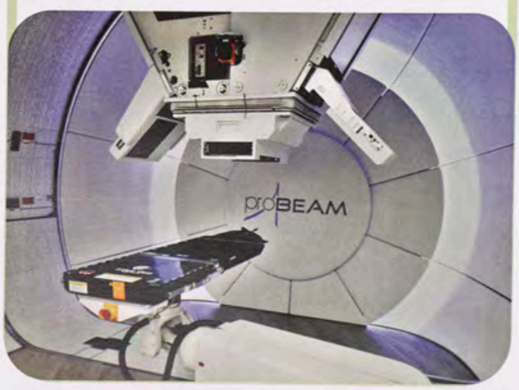
The Science Museum

As readers may know, the new **Medical Gallery** at the Science Museum in South Kensington has been established. We hope to have a full review article about it in the next issue of this journal. In the meantime, this is the cover of an official guide



Also currently at the Science Museum is an exhibition:
Cancer Revolution:
Science,Innovation and Hope
Find more about this on page 22 of this issue.



Twining's 'Dynamic' Lantern Slides of Air Encephalography

Peter and Julie Mohr


Edward Wing Twining

The University of Manchester Museum of Medicine and Health (MMH) holds a unique set of four 'dynamic' lantern slides illustrating the principles of air encephalography (AEG), which belonged to Edward Wing Twining MRCS LRCP DMRE (1887–1939), one of the pioneers of British neuro-radiology (fig. 1).

Dr. Twining qualified at University College Hospital in 1913 but unfortunately developed osteomyelitis from an infected needle stick injury, which left him with a life-long handicap. During the Great War he was a surgeon on an ambulance train in France and later in charge of the X-ray department at Netley Hospital. After the War he worked as the radiologist for the Ministry of Pensions, and studied at St. Thomas' Hospital for the Cambridge Diploma in Medical Radiology and Electrotherapeutics (DMRE 1923). Dr Alfred Barclay (1876–1949), radiologist at the Manchester Royal Infirmary (MRI), appointed Twining as his assistant. In 1928 Twining joined the honorary staff of the MRI and was appointed lecturer in radiology at the Manchester Medical School. He died in 1939, aged 52, from an infection, a complication of his chronic osteomyelitis.(**1**)

Twining made original contributions to radiology of the chest and stomach, however during the 1930s his main interest focused on neuroradiology, encouraged by Manchester neurosurgeon Geoffrey Jefferson (1886–1961). In 1936 he was awarded a Fellowship by the Royal College of Surgeons for his work on AEG and ventriculography - he illustrated his Hunterian Lecture with his 'dynamic' lantern slides to demonstrated how air (or contrast media) could be used to outline the cerebral ventricles on a skull radiograph.(**2**)

AEG and ventriculography (1920s–70s)

The brain is not visible on a plain skull X-ray, but it can be outlined by air or gas in the ventricles and subarachnoid spaces. AEG (also called 'pneumoencephalography') needs to be distinguished from a ventriculogram. A ventriculogram is a special radiograph to show the ventricular cavities in the brain. It was first performed by neurosurgeon Walter Dandy in 1918; he injected air via a burr hole directly into the ventricles followed by X-rays of the skull in various positions. The ventricles are clearly outlined and show the size and position of any brain tumours inside or pressing onto the ventricles. Ventriculograms were always done by a neurosurgeon, often prior to craniotomy.

Figure 2
Details of one slide.
The mercury is still visible.

Figure 3
The three intact slides

AEG is a less invasive technique done via a lumbar puncture and was performed by a neuroradiologist or neurologist. The patient is in a sitting position. A sample of cerebrospinal fluid (CSF) is taken for analysis; then 10–20ml. of air is slowly injected into the spinal CSF and travels to the ventricles (you can hear the air bubbling up!). X-rays show a clear demarcation between the CSF and the air, which can be directed into different parts of the brain by changing the position of the head. However, AEG is contra-indicated by any suspicion of raised intra-cranial pressure; a suspected brain tumour causing RICP would have required a ventriculogram, done by the neurosurgeon.(**3**)

The 'Dynamic' lantern slides used in his Hunterian Lecture, 1936

Twining's special slides were not the usual square glass lantern slides (2½" by 2½") used for home viewing or lectures. They are a set of four roundels made of transparent celluloid (6 cm diameter), which have small central cavities etched out to represent views of the cerebral ventricles. The cavities are partially filled with tiny quantities of mercury. Each roundel is held in a metal rim, supported in a wooden frame (11x6 cm), which fit onto the projector (figs. 2&3). The roundels could be rotated by turning the handle. When viewed from a lantern projector the mercury represents the CSF under the air bubble and the rotation showed the relative movement of the 'air bubble' as the head position changes (fig. 4). Unfortunately, only three of the slides are intact. One is loose and doesn't rotate. One roundel is missing its frame (fig. 5). The roundels and the mercury have deteriorated over time. 'Dynamic' or 'lively' lantern slides were usually made for 'magic lantern' entertainment shows - animals, tricks, jokes etc. An academic topic is

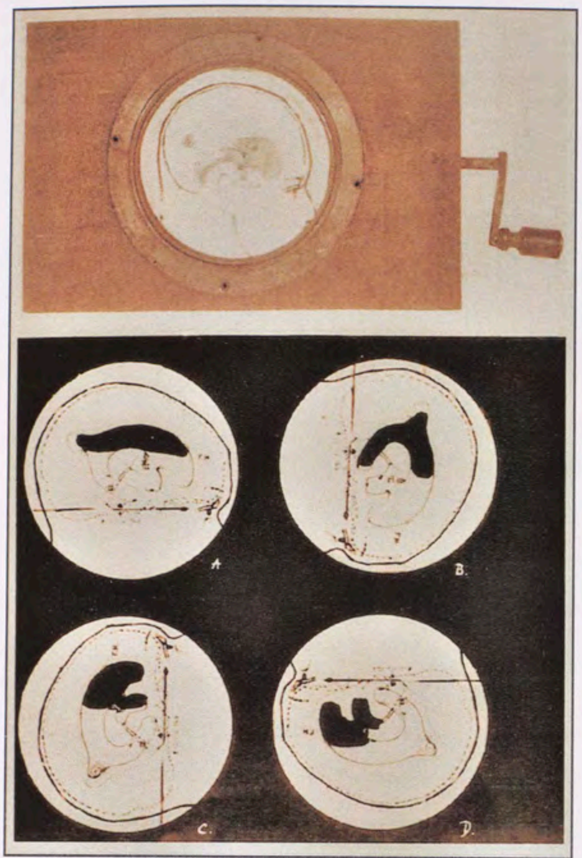


Figure 4. Twining's explanation of the slides

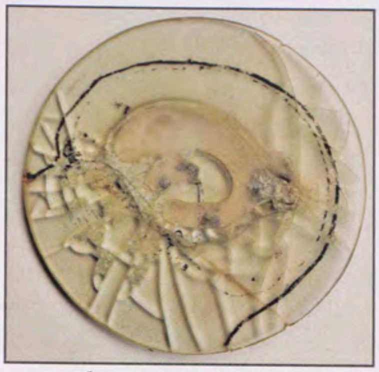


Figure 5. The loose and damaged roundel


Figure 6. Cast of the cerebral ventricles

Figure 7. Twining's orbital guide. How was this used?

unusual, and Twining's slides are unique. They were designed by Twining and made by Newton & Co., Optician, Fleet Street., London. The slides were donated to the MMH by neuroradiologist Professor Ian Isherwood (1931–2018) in 2004.(**4**)

Discussion

It was a report of a skull X-ray in 1913, showing air in the cerebral ventricles following a skull fracture, that inspired Dandy to inject air into the ventricles. Ventriculography proved to be a valuable diagnostic tool for neurosurgeons – well within their skill-set and relatively safe. The procedure was totally under their control, although it became usual practice for the radiologist to review the films for a later report. It should be remembered that safe, direct carotid angiography was not available until the 1940s and the Seldinger technique in 1953.

AEG by lumbar puncture was a useful diagnostic technique for neuroradiologists and neuro-physicians, but of limited use for brain tumours. Angiography, AEGs, and ventriculography were the bedrock of neurological diagnosis for decades (patients were routinely admitted for 2-5 days for these investigations). It was not until after the late 1970s that out-patient CT, and later MR scanning, confined these invasive techniques to history.

Apart from neuroradiology, Twinning made many contributions to tomography, chest and stomach radiology. His 'dynamic' slides testify to his original thinking. He is also remembered for two eponymous 'Twining's lines'! One is a fissure in the lower lung lobe, seen on some chest X-rays, and the other is a line drawn on a lateral skull X-ray to locate the middle of the 4th ventricle. The MMH also hold other items belonging to Twining including a cast of the cerebral ventricles, also used in his Hunterian Lecture, and a metal guide for X-rays of the optic foramina (figs. 6&7). Twining's dynamic slides are rare historic objects, sadly now in need in need of some restoration.

References

1 Isherwood I.
Edward Twining (1887–1939)
American Journal of Neuroradiology
1995 **16** 2077–2080.

2 Twining EW.
Radiology of the Third and Fourth Ventricles
Parts I and 2.
British Journal of Radiology
1939 **12** 385-418, 569-598.

3 Mosely IF.
Pneumoencephalography, in
Du Boulay GH. Textbook of Radiology, volume 1.
London: HK Lewis & Co. (1984) 227-254.

4 Jackson A.
Obituary for Ian Isherwood
European Radiology 2019 **29** 2727

Cancer Revolution was a superb exhibition at the Manchester MSI and has now transferred to the **Science Museum** in London. This large, ground-breaking display was not the usual triumphal march of 'medical science' – much thought and planning had gone into its complex layout. As a history of oncology, it certainly covers recent advances in the diagnosis, therapeutics and pathology of cancer, but what makes it special is that it recognises that cancer affects not only the lives of its victims but also their relatives, carers, therapists, medical staff, lab technicians and researchers. Their narratives (often verbatim) are not only at the heart of the exhibition but are also used in the texts to describe and explain the physical exhibits.

The exhibition is divided into zones displaying objects alongside text captions, images, videos, audio and interactives. The zones 'new horizons in cancer research' and 'outsmarting cancer evolution' surround an amazing large sculpture of a tumour. Two zones, 'living with advanced cancer' and 'experiences at the end of life' are in quieter, small rooms.

Of special interest I noted: the sections on cancer of animals and plants including a cactus; the use of 3D printing to plan surgical treatment, and also for modelling oncogenic viruses; a history of the surgery of breast cancer; Dr Doll's long and fraught campaign to reduce cigarette smoking; the promise of proton beam therapy at the Manchester Christie Hospital; the use of genomics; the computerised search for new chemotherapeutic drugs, and the use of apheresis for leukaemia.

However, it is the moving personal accounts (written and audio) of the experiences of cancer patients and their relatives, which presents a rare perspective on medical treatment, which I will remember.

PDM

A French Resuscitator

Adrian Padfield

Introduction

Nine years ago I was sent a document from the eighteenth century by a Belgian member of the History of Anaesthesia Society. It is a description and illustration of a comprehensive boxed kit of apparatus for resuscitation.

The whole document is illustrated on page 26 and following pages.

This is my translation of the text. A few words or phrases of which I cannot determine the best translation are shown in red.

ACCOUNT OF FAVOURABLE OUTCOMES
OF THE SETTING UP [of the Institution]
WHICH THE CITY OF PARIS HAS MADE
IN AID OF DROWNED PEOPLE
& which has been adopted in diverse Provinces of France

THIRD PART *1774*
Attached many well proven examples of reviving people that noxious fumes and other accidents of a different nature, caused apparent death; with the Report of death of the Sr [Sieur] & D[a]me the Mayor, suffocated in Paris by the fumes of burning coal.
By M. PIA (&c....)

Description of the BoÎte-Entrepôt. [cabinet, storage box, or transport box?]
CONTAINING the equipment [secours] that is used to administer to the DROWNED after the Établissement, which the City of PARIS has set up for their assistance.
THIS BOX is made of the fine wood of Holland [*beau bois d'Hollande* = Oak] and its dimensions are:
12 pouces* high, 18 pouces wide and 9 pouces deep and made of wood with a thickness of 5 lignes.*
All parts of it are solidly & neatly assembled with dovetail joints. There is contained within this Box different divisions of which two each take/contain a pinte* bottle filled with camphorated Eau de vie, animated with spirit of Sal-Ammoniac. A third section is designed to take the *bonnet* [cap] and the two rubbing cloths of rolled wool in which is thrust (the manner of which will be seen when the Box is opened) the two shanks of the fumigating cannula & the mouth cannula.
Below the *bonnet* & the two cloths, in the bottom of the Box are two bandages for bleeding, rolled in their compress. These are the only essential articles that cannot be shown in detail: seen when using the Box.
A fourth area is a shelf made for the Machine fumigator, in the bowl of which is lodged the plugged bottle containing the volatile spirit of Sal-Ammoniac.
A fifth area is another shelf seen when opening the Box & on its internal surface fixed above the Fumigator. It is enclosed on all sides, & forms almost a square, 1½ *pouces* high in which will be seen four rolls, each of ½ once*, of smoking tobacco and a small box containing several packets of Emetic, each of three grains.
At the bottom of this Box & below the Fumigator, is seen the bellows.

Also seen, in this Box, a small steel [eye] bolt, from where hangs, by means of a string, a sachet of sulphur & of camphor which are not used for the Drowned, but for the conservation of the blanket & other woollen items is always put in the centre.
Above the blanket, is seen the fumigating cannula, the plated iron spoon & the Booklets with details of successes achieved since the Establishment; these booklets have been omitted as unsuitable for reproduction.
For the knowledge & ease of administering the aid to be given, it is thought that it will be useful to paste inside the lid of this Box, the usage of the different items required for first aid mentioned above.
Finally, a printed sheet is stuck on the front of the Box which presents precisely and in order the aids that are to be administered to the Drowned & the conditions made to first aiders.
The lock of the Box is sturdy and well made; & to stop it getting rusty, two layers of varnish are applied.
One avoids locking it because possibly the lock may jam, or the key lost; & when you want make use of the kit in a hurry (if there is an accident) to break open the Box [*en faisant sauter la serrure*.].
It will be seen from this account that as much as possible, all expectations/eventualities are prepared for.

FIRST PLATE

Indicative & diagrammatic inventory of the Box, of which the lid and the front is omitted in a way of being able easily to see, in its place, each of the objects indicated by the relevant letters.

(A) Four rolls, each of ½ once of smoking tobacco.
(B) A small box containing several packets of Emetic each of three grains.
(C) A pinte bottle of camphorated Eau de vie animated with volatile spirit of Sal Ammoniac (only part of the neck of this bottle is seen, the rest is hidden in the depths of the Box behind the woollen tunic or shirt).
(D) Glass flask containing volatile spirit of Sal Ammoniac (it's not visible in the Box because its place is in the bowl of the Fumigator, where it lies).
(E) Fumigatory pipe or cannula.
(F) Plated iron spoon.
(G) Sachet of sulphur & camphor.
(H-H) A woollen blanket in the form of a tunic.
(I-I) Two shanks of the fumigatory pipe to get tobacco smoke into the bowel: one a supplement to the other, when it is blocked.
(K) Cannula for the mouth.
(L-M) A bonnet of rolled wool with two woollen cloths.
(N) Second pinte bottle of Eau de vie (&c., &c.)
(O) Single action[? *à une seule ame*] bellows .
(P) The Fumigator sits on a specially made shelf: it holds in its bowl, the Flask of volatile Sal Ammoniac.
(Q) The Body of the Boîte-Entrepôt with the front and lid omitted.
Nota. It is not possible to show the two bandages for bleeding; the two feathers for tickling the nose & throat, and the Pages that indicate the way to use all the things in the Boîte-Entrepôt.

SECOND PLATE

Deployment of the Box

FIRST FIGURE.

The Machine (Fumigator) sitting with its bellows (A), fixed (B) by an iron pin which passes through the shaft/ inlet (C) of the Machine(D) by means of a hole in made in the shaft (C) & in the outlet(E) of the bellows(A); of [the] way which one can make by the Machine, in this way secure, for all the possible movements in guiding the bellows; & there is no need to touch the Machine when the tobacco is lit; otherwise, one would be burnt.

(F) Cap or cover of the Machine.
(G) Exhaust or chimney [outlet] of the cap
(H) Cork plug, closing the chimney of the cap, used to judge the point at which the tobacco furnishes smoke.
(I) Beak or tube of the cap which conducts the tobacco fumes into the drowned person's intestines.
(K) Tip of plated iron in the throat of which is inserted the beak (I) to direct the smoke into the bowel.
(L) Fumigatory pipe; it is a spiral spring of brass wire covered by white sheepskin pasted with good Starch.
(M) Boxwood cannula at the end of the pipe (L). This cannula consists of two parts, of which the no. 3 is joined to the pipe (L) and makes a body with it; & the no. 4 is the shank of the ordinary cannula which one can attach or detach at will, so as to be able to substitute another shank in case where during the [resuscitation] operation of the equipment [*secours*] the first becomes blocked, by the matter which is sometimes found retained in the bowel.
The bellows (A) is 5½ pouces long from the circular part (A) up to its muzzle (a-a); the thickest part is 3 pouces, 4 lignes.
The muzzle (a-a) is 16 lignes, reducing to 12 near the tube or socket (E) which is 2½ pouces long, & is pierced/hollow throughout its length to connect with the end of the bellows.
The inlet (C) is 3½ pouces long, & 10 lignes in diameter.
The Machine (A-A), fig. II, without its cap is 3 pouces high, it comprises the throat of brass¶ (B-B), which is only ¾ of a pouce; polished all round, & nearly 2 lignes thick. The Machine body is copper plated¶ & all parts are joined by a strong solder; the manner of which is so strong that the heat made in the Machine is endurable, there is no fear that the soldering will fail, which would interrupt the operation.
The diameter of the throat of the Machine (A-A) is 21 lignes & at the bottom of the furnace/stove 24.
The cover or cap (F) is 2 pouces high, not including the exhaust or chimney which is 7 lignes high with the same diameter.
The beak or tube (I) of the cap (F) is 4 pouces long; it is 6-7 lignes in diameter at the base & it reduces to 2 lignes at the extremity which fits to the throat of the fumigatory pipe (L).
The fumigatory pipe (L) is 14-15 pouces long; it is a spiral spring of brass wire covered by white sheepskin pasted with good starch; the top part, no. 1, is plated copper; it forms the throat into which the beak (I) of the cap (F) is inserted when operating the Machine. This tube (L) no 2, ends in a cannula, no. 4, made of two parts, of which no. 3 is fixed to the fumigatory pipe (L) & forms a body/junction(? *corps*) with it; & no. 4 is the shank of an ordinary cannula which is detachable so it can be changed as necessary as in the case where it is blocked during use *qu'on en seroit* ; & it is for this reason that, in the inventory of the Box, there are two shanks, indicated by the letters (I-I).
It will be seen that the fumigatory pipe (L), fitted to the Machine depicted ready for use, is shown cut so that its full length is not shown twice; but it is shown in its entirety in the upper part of Second Plate, & indicated by the numbers 1,2,3,4, of figure 9.

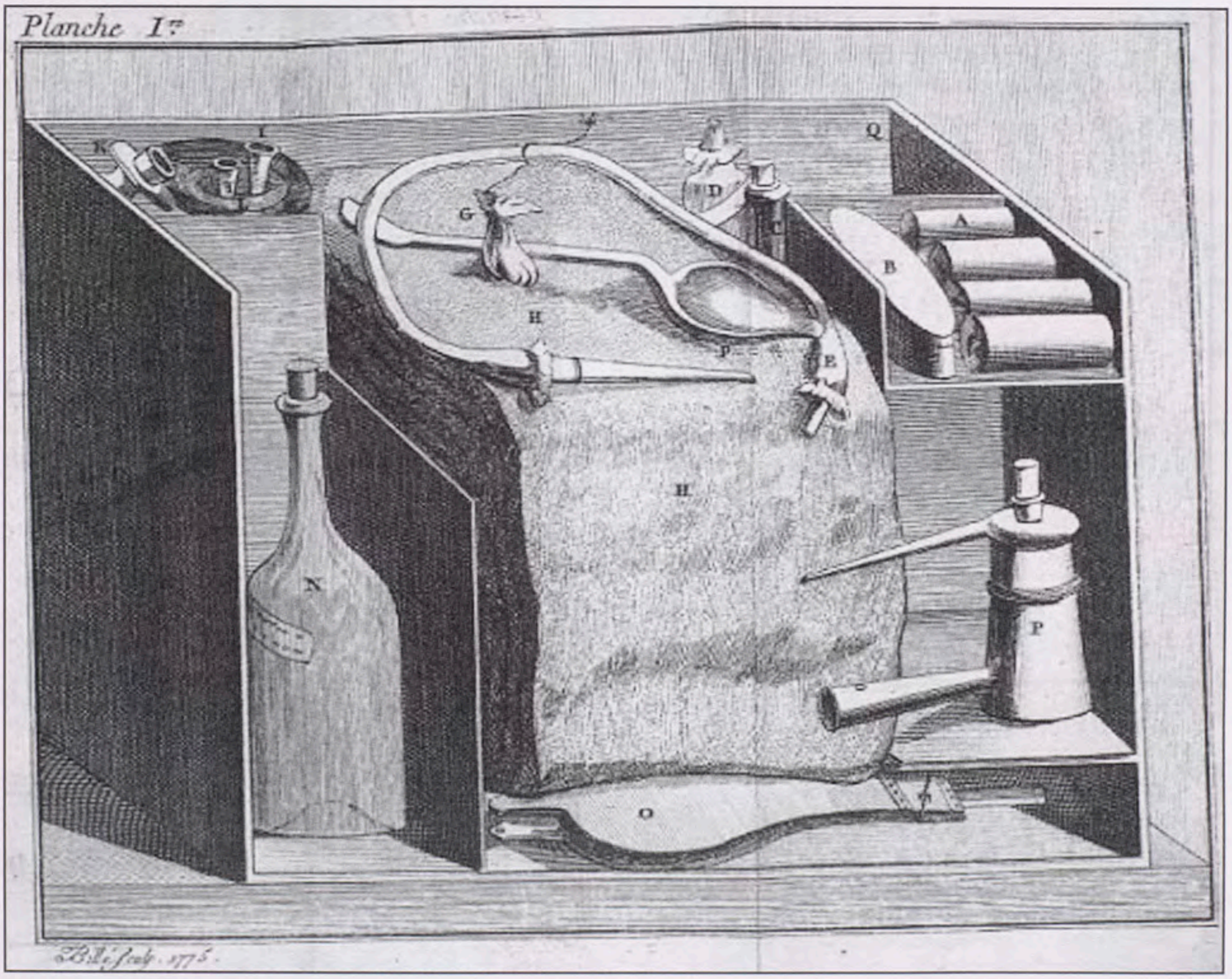
The Second Figure shows the fumigatory Machine (A-A) open; a detailed description has been made in the first figure so there is no need to repeat it.
The Third Figure; the woollen blanket is in the form of a tunic; this has been made to wrap up the Drowned ones, to cover them promptly, & to protect them from the sensation of the outside air. It can be seen how convenient this tunic is in all respects. In the upper part of this tunic/blanket are placed tapes in the hem (so as to be able) to grip, so that the shoulders will be covered; & the strings which are stitched in the lateral parts of the aforementioned blanket or shirt

*

Dimensions Guide
Pied = 12¾ inches (= 0.324 m.)
Pouce = one-twelfth of a pied (approximately one inch)
Ligne = one-twelfth of a pouce (= 3.175mm.) (Lines were used in the UK).
Pinte = 0.93 litre (approximately 1¾ pints)
Once = 8 gros = 8 drams(apothecaries weight) (Approximately 30.6 gm., roughly an ounce avoirdupois)

Before 1795 French weights and measures were by no means standardised however. The figures given are derived from the *mesures usuelles* introduced by Napoleon in 1812.

¶
Cuivre jaune = brass? *Cuivre rouge étamé* = plated / tinned copper?



FIRST PLATE

DÉTAIL
DES SUCCÈS
DE L'ÉTABLISSEMENT
QUE LA VILLE DE PARIS
A FAIT
EN FAVEUR DES PERSONNES NOYÉES,

& qui a été adopté dans diverſes Provinces de France.

TROISIÈME PARTIE.

ANNÉE 1774.

On y a joint pluſieurs exemples de moyens éprouvés pour rappeller à la vie les Perſonnes que des vapeurs moféτiques & d'autres accidents de différente nature, ont frappé d'une mort apparente ; avec le Procès-verbal de la mort des Sr & Dme le Maire, ſuffoqués à Paris, par la vapeur de Charbon allumé :

PAR M. PIA.

(Ampliat ætatem ſuam vir bonus, quandò longævitati conſortium prodeſt.)

A PARIS,

Rue S. Jacquet, près de S. Yves, au Coq & au Livre d'Or,

Chez {LOTTIN l'aîné, Imprimeur de la VILLE, Eugène ONFROY, Libraire.

M. DCC. LXXV.

Avec Approbation & Permiſſion du Sceau.

DESCRIPTION
DE LA BOÎTE-ENTREPÔT,

CONTENANT les ſecours qu'on eſt dans l'uſage d'adminiſtrer aux NOYÉS, d'après l'Etabliſſement que la Ville de PARIS a fait en leur faveur.

CETTE BOÎTE eſt faite avec de beau bois de Hollande ; elle a
12 pces de haut, }
18 pces de long, } y compris les épaiſſeurs des bois,
9 pces de large, } qui ont 5 lignes.
Toutes les parties en ſont aſſemblées ſolidement & proprement en queue d'arronde.

On a pratiqué, dans cette Boîte, différentes ſéparations, dont deux reçoivent chacune une bouteille de pinte remplie d'Eau-de-vie camphrée, animée avec l'eſprit volatil de Sel-Ammoniac. Une troiſiéme ſéparation eſt deſtinée à recevoir le bonnet & les deux frottoirs de laine roulés enſemble, dans leſquels on a enfoncé

A ij

4 *Deſcription*

(de manière à les faire appercevoir en ouvrant la Boîte) deux tiges de la canule fumigatoire & la canule à bouche.

Au-deſſous du bonnet & des deux frottoirs, dans le fond de la Boîte, on a placé les deux bandages à ſaignée, roulés avec leur compreſſe. Ces deux bandages ſont le ſeul article eſſentiel qu'on n'a pû repréſenter dans le détail en apperçu qu'on va faire de la Boîte.

Une quatriéme ſéparation eſt une tablette pratiquée pour la Machine fumigatoire, dans le fourneau de laquelle on loge le flacon bouché en cryſtal, qui contient l'eſprit volatil de Sel-Ammoniac.

Une cinquiéme ſéparation eſt une autre tablette apparente à l'ouverture de la Boîte & à ſa ſurface interne, faiſant le deſſus de la Machine fumigatoire. Cette tablette eſt fermée de tous les côtés, & forme, à-peu-près, un quarré d'un pouce & demi de haut, dans lequel on voit quatre rouleaux de tabac à fumer, d'une demi-once chaque, & une petite boîte

de la Boîte-Entrepôt. 5

renfermant pluſieurs paquets d'Emétique, de trois grains chaque.

Dans le fond de cette Boîte-Entrepôt & deſſous la Machine fumigatoire, on apperçoit le ſoufflet.

On voit, dans cette Boîte, un petit piton à vis, d'où pend, par le moyen d'une ficelle, un nouet de ſouphre & de camphre qui n'eſt pas utile aux Noyés, mais qu'on a cru devoir ajouter pour la conſervation de la couverture & des autres uſtenſiles de laine dont il occupe toujours le milieu.

Par-deſſus la couverture, on voit la canule fumigatoire, la cuillier de fer étamé & les Brochures contenant les détails des ſuccès obtenus depuis l'Etabliſſement ; (on a ſouſtrait ces brochures comme inutiles à repréſenter figurément.)

Pour l'intelligence & la facilité dans l'adminiſtration des ſecours à donner, on a penſé qu'il ſeroit utile de coller en dedans du couvercle de cette Boîte, l'uſage qu'on doit faire des différents articles ci-deſſus comportants les ſecours.

A iij

6 *Deſcription*

Et enfin, au-devant de la Boîte, on affiche une feuille imprimée, qui préſente, en précis & par ordre, les ſecours à adminiſtrer aux Noyés, & les conditions qu'on fait aux ſecouriſtes.

La ferrure de cette Boîte eſt ſolide & proprement faite ; &, pour empêcher qu'elle ne ſoit ſuſceptible de la rouille, on a eu l'attention de faire appliquer par-deſſus deux couches de vernis.

On a évité de la fermer avec une ſerrure à clef, parce qu'on a fait réflexion que la ſerrure peut ſe mêler, que la clef peut ſe perdre ; & que, lorſqu'on voudroit faire uſage des ſecours (ſi cet accident arrivoit), on ſeroit obligé, pour ne pas perdre de temps, à briſer la Boîte, en faiſant ſauter la ferrure.

On voit, par ce détail, qu'on a tâché de tout prévoir, autant qu'on l'a pû.

de la Boîte-Entrepôt. 7

PREMIÈRE PLANCHE.

Inventaire indicatif & figuré de la Boîte-Entrepôt, dont on a ſupprimé le couvercle ainſi que le devant, afin qu'on puiſſe plus facilement voir, dans ſa place, chacun des objets indiqués par des lettres relatives.

(A) Quatre rouleaux, chacun d'une demi-once de tabac à fumer.

(B) Une petite boîte renfermant pluſieurs paquets d'Emétique, de trois grains chaque.

(C) Une bouteille de pinte remplie d'Eau-de-vie camphrée, animée avec l'eſprit volatil de Sel-Ammoniac ; (on ne voit qu'une partie du col de cette bouteille ; le reſte ſe trouve caché, dans la profondeur de la Boîte, par la tunique ou chemiſe de laine.)

(D) Flacon de cryſtal contenant de l'eſprit volatil de Sel-Ammoniac ; (il ne paroît pas dans la Boîte, parce que ſa place eſt dans le fourneau de la Machine fumigatoire, lorſqu'elle eſt en repos.)

A iv

8 *Deſcription*

(E) Tuyau ou Canule fumigatoire.

(F) Cuillier de fer-étamé.

(G) Nouet de ſouphre & de camphre.

(H-H) Couverture de laine en forme de tunique.

(I-I) Deux tiges du tuyau fumigatoire pour faire parvenir la fumée de tabac dans les inteſtins; l'une ſupplée l'autre, lorſqu'elle ſe trouve engorgée.

(K) Canule à bouche.

(L-M) Bonnet de laine roulé avec les deux frottoirs de laine.

(N) Deuxiéme bouteille de pinte remplie d'Eau-de-vie camphrée, animée d'eſprit volatil de Sel-Ammoniac.

(O) Soufflet à une ſeule ame.

(P) La Machine fumigatoire repoſant ſur une tablette pratiquée exprès; elle loge, dans ſon fourneau, le Flacon d'eſprit volatil de Sel-Ammoniac.

(Q) Corps de la Boîte-Entrepôt, dont on a ſupprimé le devant & le couvercle.

Nota. On n'a pû repréſenter à l'œil

de la Boîte-Entrepôt. 9

deux bandages à ſaignée, des plumes pour chatouiller le dedans du nez & de la gorge, & des Imprimés qui indiquent la maniére de faire uſage de toutes les choſes contenues dans la Boîte-Entrepôt.

SECONDE PLANCHE.

Développement de la Boîte.

FIGURE Ire. La Machine fumigatoire montée avec ſon ſoufflet (A), fixé (B) par une fiche de fer qui traverſe le manche (C) de la Machine (D), par le moyen d'un trou qu'on a pratiqué au manche (C) & à la douille (E) du ſoufflet (A); de maniére qu'on peut faire faire à la Machine, ainſi aſſujettie, tous les mouvements poſſibles, en les dirigeant avec le ſoufflet; & on eſt diſpenſé de toucher à la Machine lorſque le tabac eſt allumé; autrement on ſe brûleroit.

(F) Chapiteau ou couvercle de la Machine.

(G) Tubulure ou cheminée du chapiteau.

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(H) Bouchon de liége, fermant la cheminée (G) du chapiteau (F), dont l'uſage eſt de pouvoir juger à quel point le tabac fournit de la fumée.

(I) Bec ou canal du chapiteau (F) qui conduit la fumée du tabac juſques dans les inteſtins du Noyé.

(K) Bout de cuivre-étamé, ou gorge dans laquelle s'inſére le bec (I) du chapiteau (F), pour la direction de la fumée juſques dans les inteſtins.

(L) Tuyau fumigatoire; c'eſt une ſpirale en reſſort à boudin de fil de laiton recouvert d'une peau blanche de mouton, collée avec de bon Empois.

(M) Canule de buis terminant le tuyau fumigatoire. Cette canule eſt compoſée de deux piéces, dont le no 3 eſt fixé au tuyau fumigatoire (L), & fait corps avec lui; & le no 4 eſt la tige d'une canule ordinaire qu'on peut retirer & remettre à volonté, pour pouvoir lui ſubſtituer une autre tige dans le cas où, pendant l'opération des ſecours, la premiére viendroit à s'engorger, par la matiére qui

de la Boîte-Entrepôt. 11

ſe trouve quelquefois retenue dans les gros inteſtins.

Le ſoufflet (A) a cinq pouces & demi de long, depuis ſa partie circulaire (A) juſqu'à ſon muffle (a-a); ſa plus grande largeur eſt de trois pouces quatre lignes.

Le muffle (a-a) a ſeize lignes, réduites à douze près de la tuyère ou douille (E), laquelle a deux pouces & demi de long, & eſt percée dans toute ſa longueur, pour communiquer le vent du ſoufflet.

Le manche (C) a trois pouces & demi de long, & dix lignes de diamétre.

La Machine (A-A), fig. II, ſans ſon couvercle, a trois pouces de haut, y compris la gorge (B-B), qui ſeule a trois quarts de pouce; cette gorge eſt de cuivre jaune, poli au tour, & a près de deux lignes d'épaiſſeur. Le corps de la Machine eſt de cuivre rouge étamé, & toutes ſes parties ſont braſées à ſoudure forte; de maniére que, ſi forte que ſoit la chaleur qu'on peut faire endurer à cette Machine, il n'y a pas

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à craindre que les ſoudures manquent; ce qui interromproit l'opération.

Le diamétre de la gorge de la Machine (A-A) eſt de vingt-une lignes, & celui du fond du fourneau eſt de vingt-quatre.

Le couvercle, ou chapiteau (F), a deux pouces de haut, non compris ſa tubulure, ou cheminée (G), qui a ſix à ſept lignes de haut, ſur autant de diamétre.

Le bec ou canal (I) du chapiteau (F) eſt long de quatre pouces, il a ſix à ſept lignes de diamétre à la baſe qui eſt ſoudée au chapiteau, & ſe réduit à deux lignes à l'extrêmité qui s'ajuſte à la gorge du tuyau fumigatoire (L).

Le tuyau fumigatoire (L) a quatorze à quinze pouces de long; c'eſt une ſpirale en reſſort à boudin de fil de laiton, recouvert d'une peau blanche de mouton, collée avec de bon empois; ſa partie ſupérieure, no 1, eſt de cuivre rouge étamé; elle forme la gorge dans laquelle on inſére le bec (I) du chapiteau (F), lorſqu'on veut faire manœuvrer la Machine. Ce

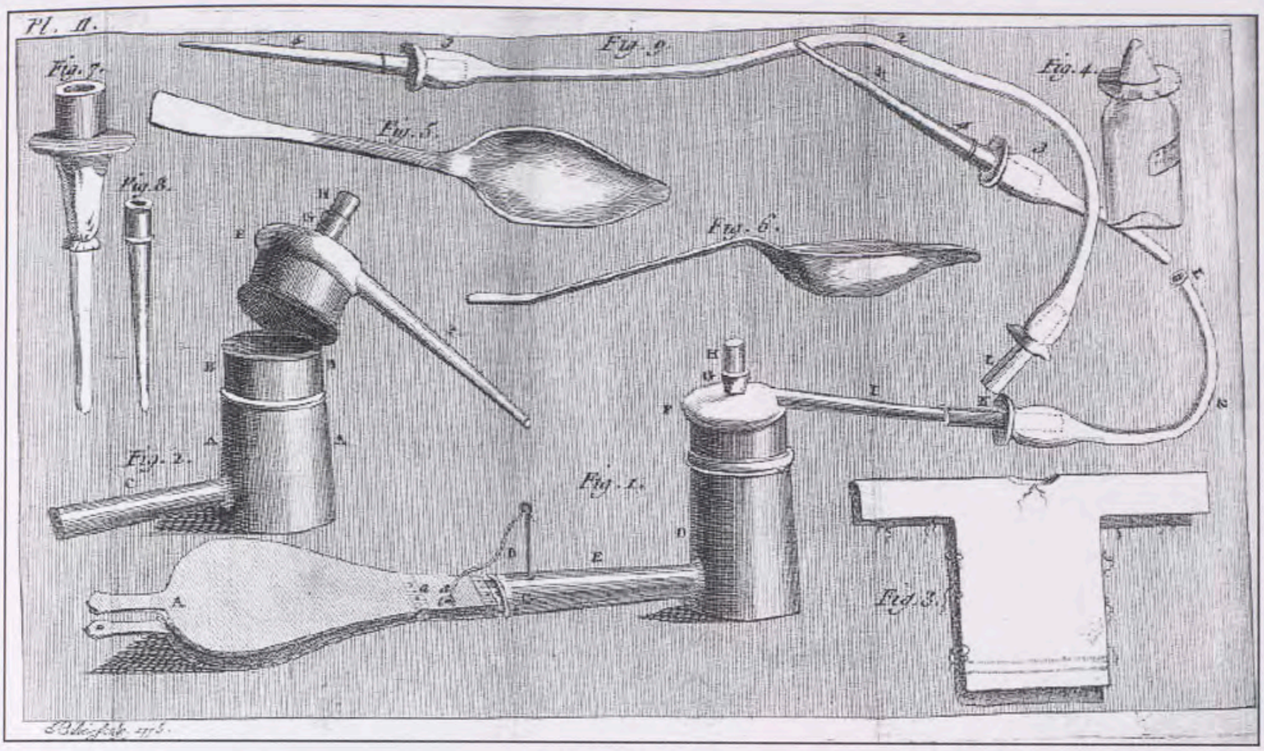
de la Boîte-Entrepôt. 13

tuyau (L), no 2, eſt terminé par une canule, no 4, compoſée de deux piéces, dont le no 3 eſt fixé au tuyau fumigatoire (L), & fait corps avec lui; & le no 4 eſt la tige d'une canule ordinaire qui eſt amovible, pour pouvoir être changée, à volonté, dans le cas où elle s'engorgeroit pendant l'uſage qu'on en feroit; & c'eſt pour cette raiſon que, dans l'inventaire de la Boîte, on a mis deux tiges de canule indiquées par les lettres (I-I).

On obſerve que le tuyau fumigatoire (L), adapté à la Machine toute montée, eſt coupé, pour ne pas le repréſenter deux fois dans toute ſa longueur; mais il eſt figuré en entier dans la partie ſupérieure de la Planche IIe, & indiqué par les chiffres 1, 2, 3, 4, figure 9e.

LA FIGURE IIe repréſente la Machine fumigatoire (A-A) ouverte; on en a fait la deſcription aſſez détaillée dans la figure Ire, pour n'y pas revenir.

FIGURE IIIe. La couverture de laine en forme de tunique; on a donné la



SECOND PLATE

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forme d'une tunique à cette couverture qui ſert à envelopper les Noyés, pour la facilité de les couvrir promptement, & de les garantir de l'impreſſion de l'air extérieur. On voit aſſez combien cette forme eſt commode à tous égards. On a placé, dans la partie ſupérieure de cette couverture, des rubans en couliſſe pour pouvoir être ſerrés, afin que les épaules ſoient couvertes ; & les cordons qu'on a couſus aux parties latérales de ladite couverture ou chemiſe, ainſi qu'aux manches, peuvent être noués, ſi on le juge à propos.

FIGURE IVe. Flacon bouché en cryſtal rempli d'eſprit volatil de Sel-Ammoniac. (La place de ce Flacon dans la Boîte-Entrepôt, eſt dans le fourneau de la Machine fumigatoire.)

FIGURES Ve & VIe. La cuillier de fer-étamé vue en deux différents ſens.

Le bateau de cette cuillier eſt terminé par un petit bec pour la facilité d'introduire, dans la bouche des Noyés, de l'Eau-de-vie camphrée, ou

de la Boite-Entrepôt. 15

autre Liqueur, pour peu que les dents ſoient deſſerrées. Ce bateau eſt plus profond que celui des cuilliers ordinaires, pour qu'il contienne plus de Liqueur, & qu'il puiſſe ſuppléer à un gobelet; ſon manche eſt dirigé de manière à pouvoir placer la cuillier pleine, ſans qu'elle ſoit expoſée à répandre ; & l'extrêmité du manche eſt faite pour ſervir de lévier, afin d'écarter les dents ſi elles étoient trop ſerrées, en prenant toutefois les précautions néceſſaires pour ne pas riſquer de diſloquer la machoire du Noyé qu'on voudroit ſecourir.

FIGURE VIIe. Canule à bouche; c'eſt une canule ordinaire diviſée en deux piéces réunies enſuite par un boyau de peau large d'un pouce & long de deux, pour intercepter, à volonté, le ſouffle récurrent, & pour garantir le ſouffleur des exhalaiſons qui ſortent de l'eſtomach du Noyé lorſqu'il commence à revenir. Pour éviter l'inconvénient qui réſulte du retour de ces exhalaiſons, il ſuffit de pincer, avec deux doigts, le boyau

16 *Deſcription de la Boite-Entrepôt.*

de peau lorſqu'on ceſſe de ſouffler, & qu'on veut reprendre haleine.

La tige de cette canule eſt plus forte que celle des canules ordinaires, pour pouvoir réſiſter aux efforts que font les Noyés pour la caſſer avec leurs dents; ce qui eſt arrivé dans le commencement de l'Etabliſſement ; elles n'étoient pas ſi fortes qu'on les a faites depuis.

FIGURE VIIIe. Seconde tige de la canule fumigatoire pour être ſubſtituée à la première, ſi elle étoit engorgée.

FIGURE IXe. Tuyau fumigatoire repréſenté dans toute ſa longueur avec ſes diviſions 1, 2, 3, 4, dont le détail ſe trouve développé à la lettre (L), *pag.* 12.

APPROBATION DU CENSEUR ROYAL.

J'AI LU & approuvé cette feuille, comme Cenſeur du *Détail des ſuccès de l'Etabliſſement en faveur des Noyés*, dont la Deſcription ci-jointe fait partie : A Paris, ce 21 Mars 1775.

Signé LE BÉGUE DE PRESLE.

De l'Imprimerie de LOTTIN l'aîné ; 1775.

Spectacles and Eye Coverings in Radiology

Adrian Thomas

Introduction.

The topic of spectacles and eye coverings in radiology is a surprisingly complex and interesting one. There are glasses that might be used in radiology that are not specific to radiology such as eye and facial shields used for protection from blood splashes and infection. These were particularly important during the period of Covid-19 pandemic, and will not be considered.

Diagnostic Radiology	1. Red goggles for dark adaptation 2. Lead glasses for radiation protection of the eyes 3. Glasses for foreign body localisation 4. The Cryptoscope 5. Stereoscopy: Binoculars and Stereo-Viewer
Therapeutic Radiology	6. Eye coverings to hold radiation sources
Popular Culture	7. X-ray Specs or Gogs.
Computing	8. Virtual Reality Goggles

1. Red Goggles for dark adaptation

Before the development of image intensification the unenhanced fluoroscopic image was quite dim and viewed on a simple fluorescent screen. The examination was therefore performed in a darkened room. A period of dark adaptation was needed to have a full ability to see the dim image, and the failures of fluoroscopy were said to be mostly due to insufficient dark adaptation (**1**). In order to assist this dark adaptation the radiologist would wear red goggles, and there are stories of these being worn when driving between hospitals so as not to lose sensitivity. This must have interfered with the ability to recognise changes in traffic lights. Figures 1a and 1b show red goggles made by Mottershead & Co. from Manchester, previously the property of Dr. Glendinning of Bromley Hospital and found in a cupboard by the author. In this example red film is used. Figure 2 shows late model red goggles made of plastic.

Figure 3 shows early goggles (C/30041. Duplex Protective Spectacles), made by Newton & Wright Ltd, that were especially designed for fluoroscopic work, and might have hinged flaps glazed with tinted glass. The aim was to preserve the sensitivity of the eyes between the examinations of patients.

2. Lead glasses for radiation protection of the eyes

The exposure of the orbits to radiation may result in injury, particularly to cataract formation. This is a particular problem today with interventional radiology with its often prolonged screening times during fluoroscopy. There are many such radiation lead glasses currently on the market. A popular model today has a wrap-around frame, being made of high impact TR-90 nylon with a retainer cord. Distortion-free SF-6 Schott glass is used which contains lead oxide (of 0.75mm lead equivalency). This classic glass type has lead oxide as an essential

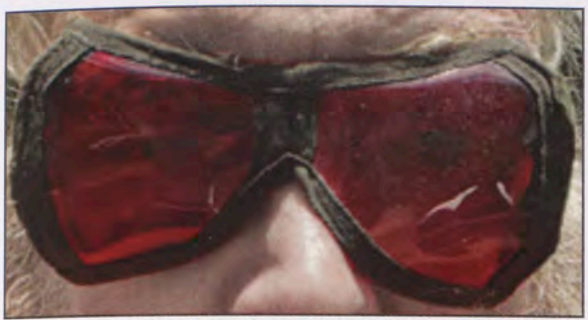


Figure 1a. Dr. Glendinning's Mottershead goggles

Figure 1b

Figure 2. Late model, plastic red goggles

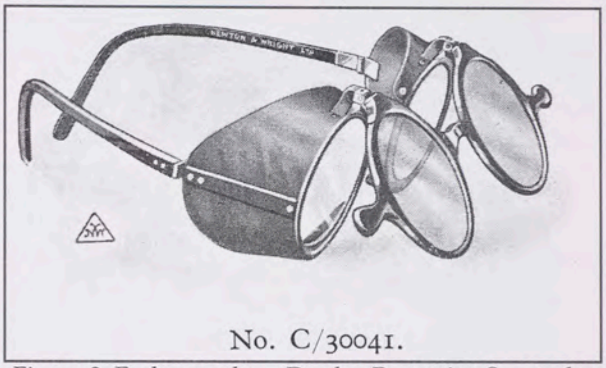


Figure 3. Early goggles – Duplex Protective Spectacles

component for outstanding optical properties. The optical properties are why lead glass is used for high quality glass ware.

In the early years of radiology there was a variety of designs, and the protective goggles made by Newton & Wright Ltd. were similar in design to their red goggles (Fig. 3), and were fitted with lead glass optics with a density equivalent to 0.5mm lead.

3. Glasses for foreign body localisation

The history of the use of radiography for the localisation of foreign bodies is a complex topic. Simple radiography could be used, or a limbal ring could be attached by a surgeon. The limbal ring was a 24mm radio-opaque metal ring sewn onto the cornea. This would move with eye movements. The position of the foreign body in relation to this ring could be determined. External Point and Cross localisers might also be used. There were exact techniques devised by Sweet, McGrigor and Comberg, and Bromley and Lyle's 'eye localiser'.

The spectacle method was developed as the McGrigor Localiser. Figure 4 shows the localiser made by John Weiss & Son Ltd, of Oxford Street in London, and figure 5 shows them in position. *
The spectacles could be adjusted for size. The spectacle technique was quite complex and required special spectacles, and charts were needed. The spectacles were precision made. The following stages for examination were needed:

a) Taking the shadow-shift film.
b) Estimating the surface position of the foreign body.
c) Calculating the depth measurement.
d) Charting the actual position of the foreign body.

Practice was needed before using the technique, and practice using a skull model. The cross-wires on the spectacle which divided the eye into quadrants could be simulated by using a small brass curtain ring fitted with cross-wires.

Figure 4. MacGrigor Localiser with its box

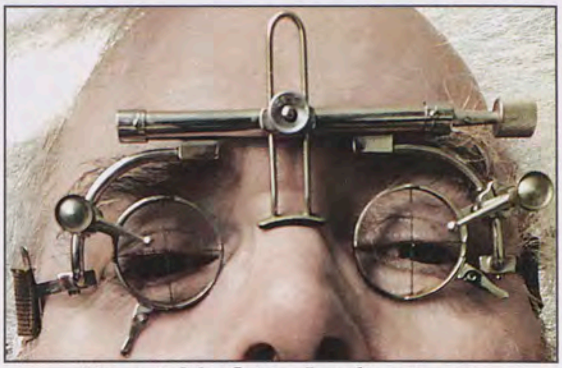


Figure 5. MacGrigor Localiser in use

4. The Cryptoscope

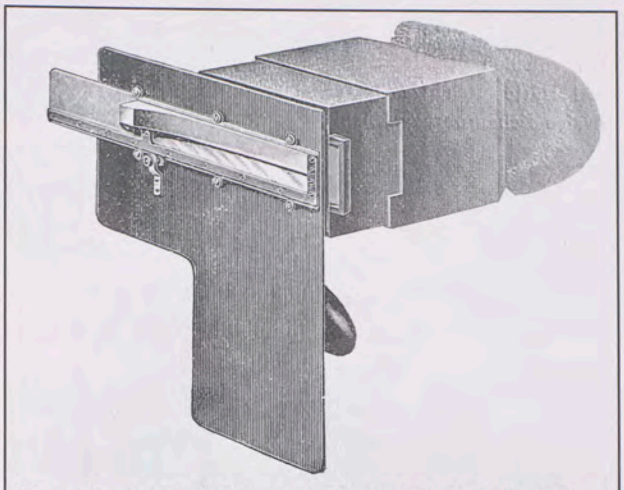
When Wilhelm Conrad Röntgen discovered the X-rays in 1895, he observed their effect on fluorescent salts and then on photographic glass. Certain crystalline salts such as barium platino-cyanide or calcium tungstate show fluorescence when exposed to X-rays. These fluorescent effects could be observed by holding a coated screen in front of an object. The first screens for clinical use were handheld, and by February 6, 1896, Enrico Salvioni from Perugia in Italy developed the cryptoscope, or 'criptioscopio'. (**2**) Salvioni described his simple apparatus which consisted of a small cardboard tube 8cm high. On one end of the tube is a sheet of black paper on which was spread a layer of fish glue and calcium sulphide, which substance he found to be "very phosphorent under the action of Röntgen rays". On looking through the open end, even in a light room, he was able to see objects in a cardboard box.

William Magie (1858–1943) was working independently in Princeton in the United States, and on February 15, 1896, he described the use of a sheet of black paper coated on one face with platinum baricyanine, located at the end of a tube or box. (**3**)
He gave the advantage of the apparatus as avoiding the inconvenience of working in a darkened room, with the benefit of avoiding the long delay involved in the photographic process.

Figure 6 shows a typical hand held cryptoscope. The cryptoscope was often used to test the quality of the X-ray tube and the hand was a convenient test object, and this is one reason for the high incidence of injuries to the hand with early X-ray workers. Figure 7 shows an X-ray quality test-device (Krypto-Radiometer) attached to the cryptoscope, with again poor radiation protection features for the operator. With a strongly active X-ray tube the cryptoscope would enable the operator to see the bones in the hands clearly when standing even 10 to 12 feet (3.9m) away from the X-ray tube.

By 1897 the cryptoscope was in use in Paris railway stations, and was used to examine luggage for contraband and harmful material as shown in figure 8. The cryptoscope developed in design and was in use until the 1950s. The cryptoscope could be held in the hand, however an operating cryptoscope was made for use by surgeons in the operating theatre. The cryptoscope could be strapped to the head and could be tilted to allow either inspection of the fracture or fluoroscopy of the fracture to assist in reduction. In spite of the dangers the cryptoscope remained in use for many decades into at least the 1950s. Presumably this was partly related to its ease of use. Again, note the complete lack of electrical and radiation protection of the X-ray tube and absence of protection to the operator and observers.

Figure 6. Typical hand-held cryptoscope



No. 4638. Krypto-Radiometer nach Prof. Dr. Wehnelt. K. 66.—.

Figure 7. X-ray quality test-device (Krypto-Radiometer) attached to the cryptoscope

Figure 8. The cryptoscope in use in a Paris railway station in 1897

5. Stereoscopy: Binoculars and Stereo-Viewer

Stereoscopy as a photographic technique was well-developed by the time Röntgen discovered X-rays in 1895. Stereoscopy in photography replicates the action of the eyes when two images are obtained separated by a small distance. Cameras were produced with two lenses to obtain a stereo-pair of photographs and these were viewed with a special viewer. The topic has been reviewed by Denis Pellerin and Brian May. (**4**) Röntgen had such a camera which may be seen in the Deutsches Röntgen Museum in Lennep, and the museum has a collection of his stereoscopic photographs that he took on his holidays in the Swiss mountains. Prints of radiographs were made and were used as an effective teaching aid as can be seen in figure 9.

The technique of stereo-radiography was soon developed. Two radiographs were taken with a small gap. A left and a right image were obtained and were viewed separately with each eye, so the left radiograph was viewed with the left eye and the right radiograph was viewed with the right eye. These stereo-pairs could be viewed in three ways:

a. The pair of films could be placed on two adjacent viewing boxes and some radiologists were able to look at them separately with each eye.
b. The stereo-pairs could be placed on viewing boxes facing each other and viewed by a pair of angled mirrors using a stereoscope.
c. The images could be placed side by side and viewed using stereoscopic prismatic binoculars as are shown in figure 10. These were of high quality design and manufacture.

Stereo-radiography was a popular technique and gave a three-dimensional image that was only surpassed by those obtained in modern imaging.

Figure 9. Stereo-viewer for viewing photographic prints

6. Eye coverings to hold radiation sources

These are not really spectacles but are mentioned here for completeness. Radiation sources may be held in a mould or applicator for the treatment of orbital and peri-orbital neoplasia.

The eye may also be protected from radium using an eye screen. This could be made from a sheet of gilded brass, 1mm thick, and curved to fit the contour of the eyeball. It was apparently easily fixed under the eyelid when smeared with Vaseline.

Figure 10. Stereoscopic prismatic binoculars for viewing stereo-pairs of images

7. 'X-ray Specs'

There have always been toys and puzzles associated with X-rays, and Wilhelm Röntgen himself had a magician's box when he was at Weilheim containing magical tricks and puzzles.(5) Cards that had an aperture containing a grid gave the illusion of X-ray vision when looked through. Such cards were sold from an early time as X-ray viewers. In the 1960s the idea of placing such grids into spectacles was thought of, and these were sold in comic books from the US. When looking at a person through such a grid an illusion of seeing bones is produced. Such X-ray spectacles have long been a part of popular culture as 'X-ray specs' or 'gogs' (figure 11).

Figure 11. 'X-ray specs' or 'gogs'

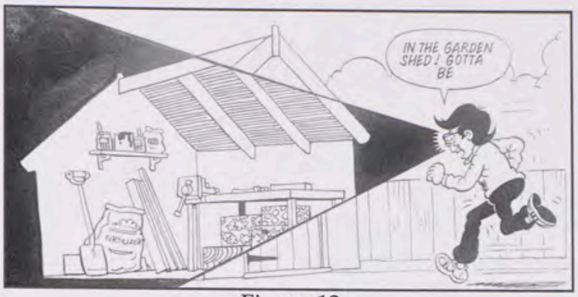


Figure 12

In the Punk Rock world, a South London band was formed in 1976 calling themselves X-Ray Spex.(6) Their music has a raw and invigorating quality, and featured the singer Poly Styrene, who was born as Marion Joan Elliott-Said. X-Ray Spex gave their debut performance at London's Roxy nightclub in Covent Garden, having had only six rehearsals in their manager's front room. The Roxy was the centre of London's developing punk music scene. As their debut album Germfree Adolescents of 1978 showed, their music was highly energetic, but perhaps a little shambolic.

X-Ray Spex appeared under the EMI label, as did other punk rock groups including Johnny Rotten and the Sex Pistols. Johnny Rotten was the stage name of John Lydon. It was the Sex Pistols that were to cause EMI considerable anguish in November 1976 with an infamous interview on an EMI-controlled Thames Television programme. The British nation was both scandalised and fascinated at the same time, and EMI deleted their single Anarchy in the UK from its catalogue. The EMI management had to engage in damage limitation, and the Sex Pistols were sacked. (7) Dropping the Sex Pistols in 1977 was a financially unwise move since they moved to Virgin Records where they sold more than a million records.(8) Management attention was unfortunately diverted from EMI Medical Electronics and the EMI scanner which was having its own problems at that time.

A children's film *The Kid with the X-ray Eyes* directed by Fred Olen Ray was released in 1999. In the film the twelve-year-old Bobby finds a special pair of glasses that gives him X-ray vision, and has a series of exciting adventures. These ideas obviously have an appeal to children and a comic strip *X-ray Specs* appeared in the British children's comic *Buster* in the 1990s, featuring a schoolboy called Ray and his escapades with the glasses that gave him X-ray vision. His 'X-ray specs' resulted in many adventures and saved him from many scrapes. In figure 12, from the original art work of 24th December 1988, Ray is looking for presents in his father's garden shed.

8.Virtual Reality or Augmented Reality glasses and headsets

Finally there is the use of virtual reality headsets, and these are not yet historical equipment. These have been used to give young people an image of what they might encounter when they enter a radiology department and forewarn them to prevent anxiety. In the future there is the possibility that a three-dimensional data set of an imaging study could be interrogated using a radiological version of the Metaverse. The Metaverse is a hypothetical iteration of the Internet as an immersive and virtual world.

Conclusion

The topic of spectacles and eye coverings in radiology is interesting and complicated. This short review can only give a brief overview.

Note: The author is the model for the photographs in the figures.

*Page 31. Major D.B. McGrigor was the clinician concerned, but some use the alternative spelling of MacGrigor, as did John Weiss and Son Ltd, manufacturers of the instrument illustrated in figures 4 and 5.

References

1 Zimmer, E.A. Technique and Results of Fluoroscopy of the Chest.
Charles C Thomas, Springfield. 1954

2 Salvioni, E. 1896. Investigation on Röntgen Rays. Nature 1896 **53** 424-425.

3 Oestreich, A.E. Professor William F. Magie and the American Discovery of the Fluoroscope, 1896. American Journal of Roentgenology 1995 **165** 1060-1063.

4 Pellerin, D (Ed. May, B.) Stereoscopy, The Dawn of 3-D.
London: The London Stereoscopic Company. 2021

5 Glasser, O. 1933. Wilhelm Conrad Röntgen and the early History of the Roentgen Rays.
John Bale, Sons & Danielsson Ltd., London. 1933

6 https://www.x-rayspex.com/xrayspex (accessed 25 April 2021)

7 Cavendish, W. His Masters Voice, Sir Joseph Lockwood and Me.
Unicorn, London. 2017

8 Southall, B. The Rise and Fall of EMI Records. Omnibus Press, London. 2009

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DIAGNOSTIC INSTRUMENTS—Continued.
PHONENDOSCOPE.

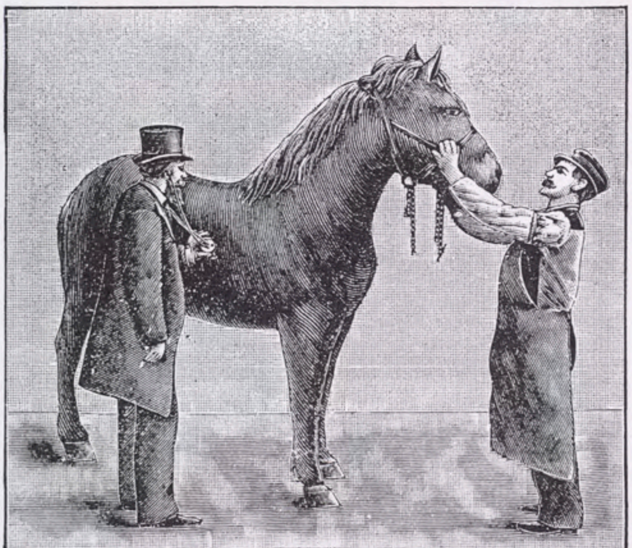

Fig. 2263.

This instrument, destined to replace the stethoscope, was devised by Drs. Aurelio Bianchi, of Rome, and Eugenia Bazzi, of Florence, Italy.

It consists of three principal parts: The resonator; a detachable hard-rubber diaphragm, and a metallic rod with flattened end which screws into the detachable diaphragm.

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	25th July 2021	*£1550.90*

Income		Expenditure	
Subs @ £10 single or £15 joint.	£418.00/*£25*	Bulletin costs	£283.76/*£225.48*
One member paid x 2. A joint member paid £18		Website costs	nil /*£ 29.96*
No Meeting fees for three years	£0.00	BSHM sub	£0.00/*£ 42.00*
Totals:	£418.00/*£25.00*		£283.76/*£580.31*

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Adrian Padfield Honorary Treasurer

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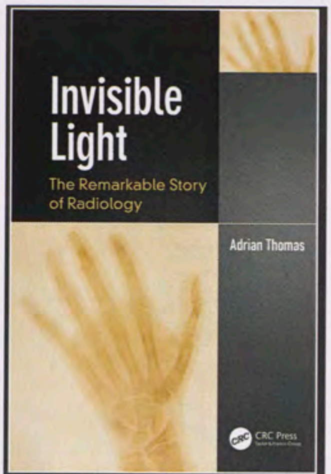

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We are sure that readers will be interested in **Invisible Light – The Remarkable Story of Radiology.** by Adrian Thomas.

We have received the announcement shown, but not yet had a chance to review the book. Nonetheless, any who have read Professor Thomas' article in this edition of the journal may assume that the book is readable and absorbing, telling a story that needs to be told, as a glance at the table of contents shows:

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12. The future.

To know more and to read the praising reviews by Arpan K Banerjee (Chair, International Society for the History of Radiology); and by Michael Collins (for the British Society for the History of Medicine, July 2022);

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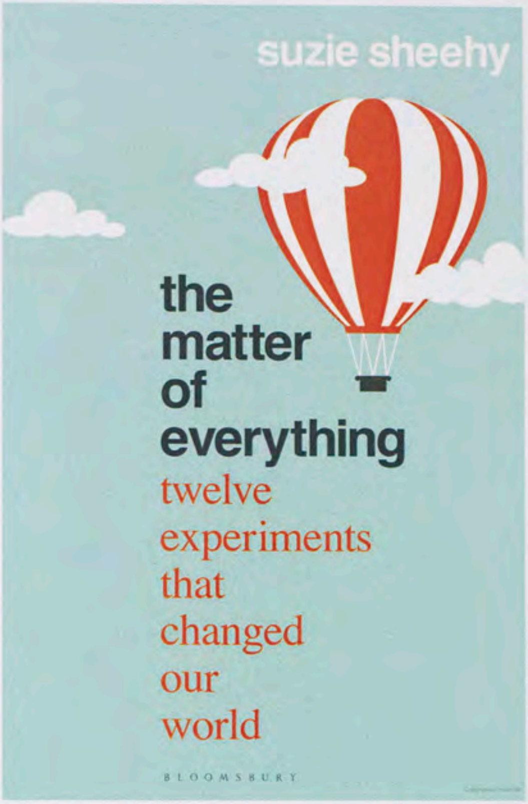
The Matter of Everything Twelve Experiments that Changed the World

by Suzie Sheehy



Dr Sheehy is a nuclear physicist and science historian based at Oxford University and the University of Melbourne. Her research is focused on the development of particle accelerators and their application to medicine for diagnostic imaging, radiotherapy, radio-isotopes and proton beam therapy. She is also interested in the evolution and sociology of large research groups; how they interact and develop long-term projects in their never-ending search for sub-atomic particles.

Her book is a well-written account of a complex subject, the history of nuclear physics and the discovery of sub-atomic particles. There are no illustrations; her clear account provides an insight into the sub-atomic world of protons, muons and quarks etc. Her book covers the history of how super-conducting magnets, linear accelerators, cyclotrons and detector machines reveal the structure of matter. Massive projects like the Large Hadron Collider (LHC) at CERN take years to build and teams of international scientists to run; this book is about the researchers, their theories, organisation and failures.

The sections on the 'standard model' and sub-atomic particles is complicated. Atoms, radioactive decay, cosmic rays, isotopes, indeed all of matter are composed of sub-atomic particles. Their detection is 'Big Science', run by international teams with detectors deep in underground laboratories or produced in huge particle accelerators like the 27-kilometre LHC at CERN. Protons are made from six types of 'quarks' (up, down, strange, charm, bottom, top). Gluons help to bind the quarks. Other particles include the electron, tau and neutrinos and muons. Bosons, including the famous Higgs boson, discovered in 2012, carry the 'weak force'. A diagram or table might would have been helpful!

These esoteric scientific discoveries often have some unexpected spin-off benefit for society. Physics gave us electricity and electronics and Dr Sheehy stresses how much medical technology has benefited: X-rays, radiotherapy, isotopes, NMR scanners, lasers, proton beam therapy and the World Wide Web - invented to store all the data!

PDM

The Matter of Everything (Bloomsbury Publishing, London 2022)
Author: Dr Suzie Sheehy PhD

Next Meeting of the Society – April 2023

The next meeting of the HMES is planned for
Friday 21st April 2023
at the British Cardiological Society, Fitzroy Square, London.

Please make a note in your diary! A good attendance is essential to ensure the booking.

If you would like to present a paper or short presentation, please email Dr Mohr as soon as possible:

peter.mohr@manchester.ac.uk

What is it?

What was it? The answer to last year's puzzle.
This is a Victoreen dose meter from the 1960s, used to measure the dose of therapeutic radiation.
Victoreen is an American company which is still in business and makes Geiger counters.
It was started by John Austin Victoreen (1902-1986), an engineer and physicist.

Can you identify this object?

A clue: perhaps a desirable item for your kit, going to serve in the Colonies?
Answer next year!