

## Recent advances in the treatment of burns— 1843–1858\*

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Mr. President, Ladies and Gentlemen, the year is 1858. Living as close as we do to great events in history many of which cost the lives of thousands it is difficult to see the care of the burnt in proper perspective. During these fifteen years the potato famine in Ireland (1845–47) killed one million men, women and children. Ten years ago (1848) was the year of revolution when unrest swept through Europe. Louis Napoleon set up the Second Republic in France and there were revolutions in Milan, Naples, Venice, Rome, Berlin, Vienna, Prague and Budapest. We put down the insurrection in Tipperary, Russia suppressed the uprising in Roumania (Wallachia) and Austria that in Hungary. That same year saw a Convention of Womens' Rights in New York, an activity of which I believe neither our Queen nor Lord Palmerston can approve. Neither can they approve the sentiments in the Manifesto published in that same year by Mr. Marx who had been working on it in London, "The workers have nothing to lose but their chains. They have a world to gain. Workers of the world, unite!" With the Californian gold rush beginning in 1848 and that in Australia in 1851 there would appear to be a distinct possibility that there may be future conflicts of interests between these "communists" and those with capital.

The Russian invasion of Turkish territory in 1853 precipitated the Crimean War (1854–56), but the consequent nursing disciplines imposed by Miss Nightingale must soon help our cases of burns. Balaclava, Inkerman and Sevastopol were being fought whilst Dr. David Livingstone was crossing Africa. While our military was fully employed in Turkey the United States of America was busy signing a commercial treaty with Japan (1854). No sooner had the Treaty of Paris marked the end of the fighting in the Crimea than the horrors of the

Indian Mutiny (1857–58) were upon us all. These distant events little affected our life in London. The Lords moved into their new house in 1847 and the Great Exhibition was there for us all to see in 1851. Railway lines continue to extend throughout the length and breadth of this United Kingdom.

### General Anaesthesia

General anaesthesia is the most significant medical innovation of our lifetime. Dr. Furnell, who trained at St. Bartholomew's Hospital, London, has described one of the first operations he saw under the old régime (Furnell, 1877).

"It was on a girl who had in childhood been desperately burnt on the neck and shoulders by falling into a fire. The cicatrix had gradually contracted, so as to draw the unfortunate creature's head down on her breast and her lower lip away from the mouth, exposing the lower row of teeth and allowing the saliva to dribble continually from her mouth. She was a repulsive spectacle, and had gladly consented to Mr. Skey's suggestion of an operation, which by transplanting a piece of skin from her arm and dissecting up the cicatrix, appeared to afford some chance of mitigating her unfortunate appearance. The patient was tied to the operating table, as was customary in those days but before many minutes of the operation had elapsed her cries and entreaties to be untied and allowed to remain as she was were the most frightful that can be imagined. As the operation, which was necessarily a lengthy and slow one, proceeded, her cries became more terrible, first one and then another student fainted, and ultimately all but a determined few had left the theatre, unable to stand the distressing scene."

May I refresh your memory on the chronology of the beginnings of general anaesthesia? On the 16th October, 1846, our dental colleague, William

\* The substance of an illustrated lecture delivered to a meeting of the British Association of Plastic Surgeons held in London in December 1985.

Thomas G. G. Morton, first used ether in Boston. In December Robert Liston amputated a leg under ether anaesthesia at University College Hospital, London, and in January, 1847, Heyfelder introduced general anaesthesia to Germany (Goldwyn, 1968). Later in 1847 Joseph-François Malgaigne brought ether anaesthesia to Paris (Malgaigne, 1847), and James Simpson was using chloroform in Edinburgh for obstetrics. Incidentally, Michael Cudmore Furnell, whose horrific description of the operation on the girl has just been quoted, most probably used "chloric ether" before Simpson. Our Queen's gracious submission to chloroform in 1853 greatly aided acceptance of these innovations by the public at large. Professor Janos Balazza was the first to use ether narcosis in a war-like situation, during the Hungarian Revolution in 1848-49 (Berndorfer, 1958). The British Army has been slow to build upon his initiative. George Lawson, now on the staff of The Middlesex Hospital, was a Staff Surgeon in the Army Medical Corps for a year of the Crimean War and during the terrible winter of 1854-55 was in the lines before Sevastopol. Lawson's was the only anaesthetic inhaler in the outfit of the whole Third Division (Lawson, 1903).

### The first Burn Hospital

It is to the credit of James Syme\*, already known for his enthusiastic use of dry absorbent dressings for burns (Wallace, 1966), that the first Burn Hospital in the world was opened in Edinburgh in 1843, with two wards to accommodate a total of four men and four women (Simpson and Wallace, 1956). The Managers of the Royal Infirmary were and are typical administrators and in a long letter written to them on 13th March, 1843, Syme patiently explained that:

"if under such circumstances I had admitted a woman burnt over nearly the whole body into a ward fully occupied by patients, most of whom had suffered operations, I should have been justly chargeable with the highest degree of culpable recklessness." On the 17th April, 1843, the Board of Management "inspected the premises connected with the Surgical Hospital and found no means of obtaining additional accommodation for Burns or tem-

porary accommodation till a bed might become vacant, in the wards of the Hospital, without some additional building; but they concur with Mr. MacGibbon's opinion that the building formerly used as the Janitor's House for the High School, and now used as a Wright's Workshop, might be adapted most commodiously for the purpose".

Two days previously Charles MacGibbon had written:

"The alterations necessary will be to take out the present joisting and flooring and to relay them at about 12 inches above the level of the ground at the South Front. The present partitions and stair to be entirely removed and a new partition to be built across the centre with a lobby towards the outer door from which there is a door leading to each ward [Fig. 1]. The windows, the skirting board and the broken plaster to be repaired. The expense of these alterations will be £18.10s."

On the 21st August, 1843, the Managers reported that they

"considered that these wards might now be made over to the Surgical Hospital for the purpose for which they were fitted up, viz. for cases of Burn."

On the 17th September, 1845, "It was resolved that the Professor of Clinical Surgery and the Senior Acting Surgeon should enjoy every facility by having access to all cases of Burns within the Ward, for illustrating their Clinical Lectures, the Ward continuing under the care of the Junior Acting Surgeon". The last reference to the Burn Ward appears in a Minute dated 16th May, 1848, "Mr. Inglis reported that on visiting the Surgical Hospital some days ago he found that in consequence of the unusual number of accidents, particularly from the railways at the present time, the wards were overcrowded. He had therefore on the application of the Surgeon authorised the House appropriated to cases of Burn to be temporarily occupied by Surgical patients, while those patients suffering from Burns could be accommodated in a portion of one of the empty Sheds. The meeting approved of the arrangement as a temporary measure while so many urgent surgical cases presented themselves." We all know administrative "temporary measures"! (Figs 2 and 3).

It is ironic that the effective closure of the first

\**Editor's note.* Most pertinently, Miss A. B. Sutherland of Edinburgh suggests that Syme should not really get the credit for the first Burn Hospital as all he wanted was to get rid of the burns from his surgical ward—a familiar situation!

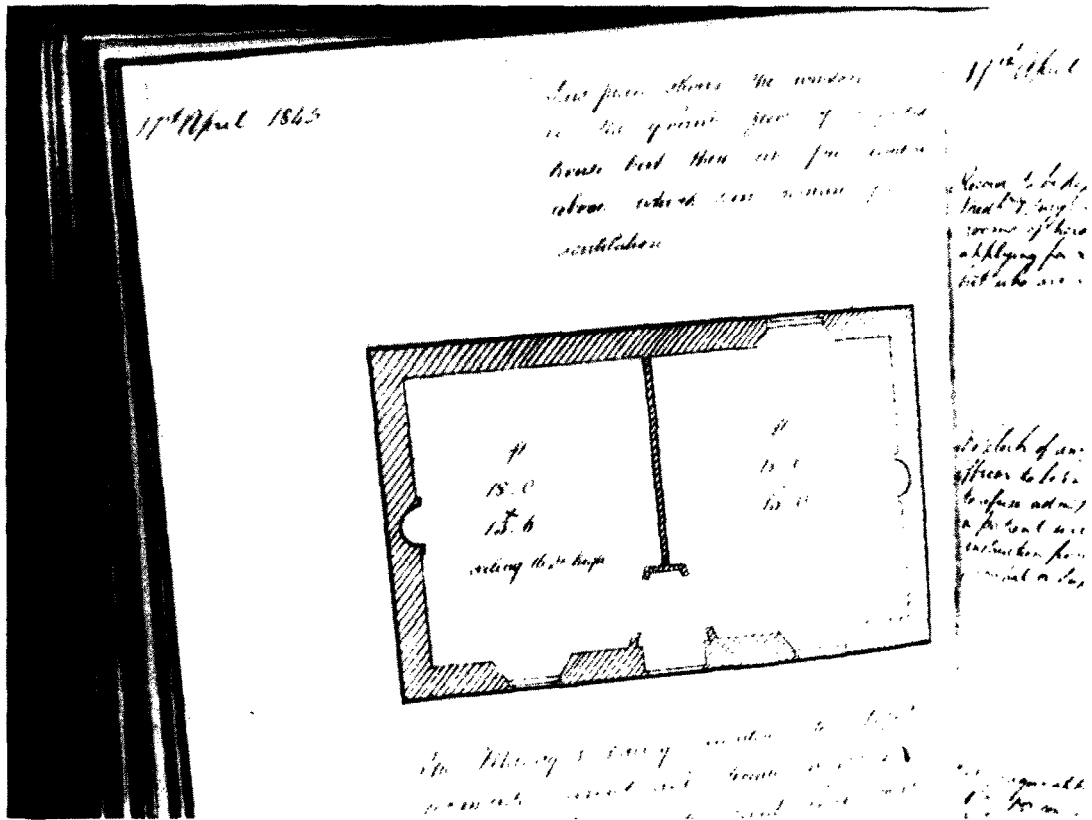


Fig. 1

Figure 1.—The entry in the minute book of the Edinburgh Royal Infirmary showing the sketch of the proposed alterations.

Burn Hospital occurred in the same year (1848) in which Sir Edwin Chadwick, barrister, saw through the enactment of such effective legislation as the "Public Health Act" and the "Nuisances Removal Act". Some improvements in the slum conditions had taken place earlier, often the outcome of demolition to improve roads such as with the construction of Victoria Street, London, in 1845.

**Burn management**

Sir John Erichsen, Professor of Surgery here in London, led us astray in 1843 when he suggested that burns should be treated by dehydrating the patient since, at post-mortem examination of patients having died from burns, the internal organs are congested. He deduced that,

"the first object should be to relieve the system of an abnormal quantity of fluid that must have accumulated in it in consequent of the arrest, to a greater or less extent, of so important

a secretion as the perspiration. This may be accomplished by either the administration of diuretics, by guarded blood-letting, or by encouraging the process of suppuration, if it be deemed prudent to wait until this be established" (Erichsen, 1843).

Monsieur H. Baraduc in Paris, however, has pointed the way forwards, having demonstrated that the blood after a burn loses so much fluid that it grows thicker and has difficulties in passing through the small vessels (Baraduc, 1862).

Some of us still prefer wet dressings for burns: aqua phagodemica, a mixture of mercuric chloride and lime water, dates from 1835 while in the same year Lisfranc was using a solution of sodium and calcium chlorides (Wallace, 1966). Most of us now use dry dressings but we cannot be proud of the mortality statistics of burns and scalds. In Glasgow Royal Infirmary for the decade 1844-54 these totalled 17.2% (Dunbar, 1934).

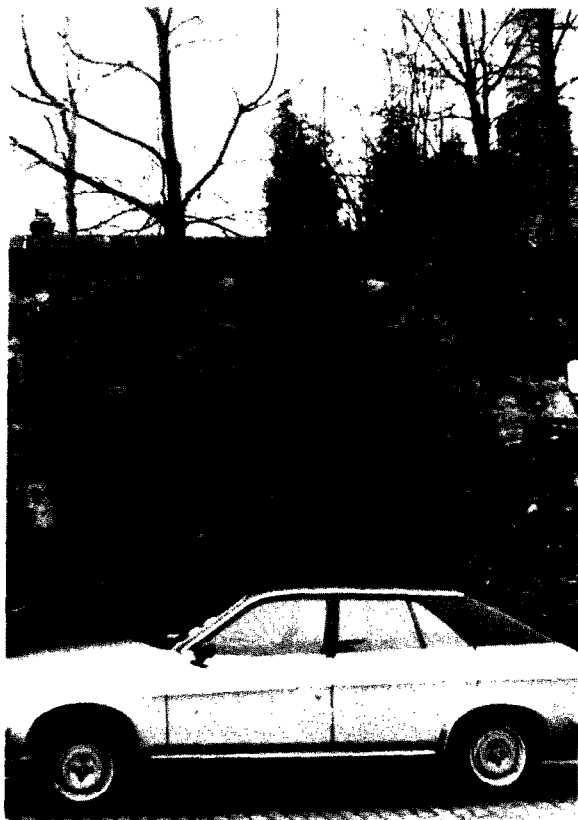


Fig. 2

Figure 2.—The bricked up doorway of the first Burn Hospital.

### Control of sepsis

Observations made in Vienna in 1846 by another Hungarian, Ignaz Philipp Semmelweiss, may yet help us to prevent some of the later deaths from burning. In the Vienna General Hospital the death rate from puerperal sepsis ranged from 10% to 30% and these women were attended in labour by students or physicians who were regularly visiting the post-mortem room. Semmelweiss demonstrated this link and by also insisting on sterilisation of hands he reduced the mortality to about 1%. I fear that his work aroused professional jealousies since only five days after his appointment as an Assistant Professor in Vienna in 1850 he had returned to Budapest (Singer and Underwood, 1962; Gabka and Vaubel, 1983). In the year following (1847) Augustus Volney Waller observed the migration of white blood corpuscles through the walls of the capillaries (Waller, 1847). Could this be in any way connected with infection?

At this juncture I crave your indulgence to quit

the clinical scene for the social world and to congratulate, a little belatedly, Agnes Syme on her marriage in 1856 to James Syme's ex House Surgeon, a young man of promise, one Joseph Lister. Lister graduated in 1852 and became House Surgeon to Syme in 1853 but he would have had no opportunity to work in the first Burn Hospital. One hopes that tales of the infections therein may cause him to seek some pathway for their amelioration.

I am confident that we all wish Eduard Zeis well in his recent (1849) appointment as Chief of the Surgical Department in the new Dresden Hospital. Eduard is, ladies, a confirmed bachelor and I hear he devotes much time to the compilation of an encyclopaedic textbook about plastic surgery (Gibson, 1976).

It has just come to my notice that Joseph Lister is beginning to believe that the occurrence of suppuration in a wound is determined "simply by the influence of decomposition." He is much influenced by the writings of Professor Louis P. Pasteur who, in the fifteen years with which we are concerned, became Professor of Physics in Dijon in 1848 at the age of only 26, became Professor of Chemistry in Strasbourg in 1849, was called to a Chair in Lille in 1854 and went to Paris in 1857, the year in which he published his "Memoire sur la fermentation appelée lactique" (Pasteur, 1857; Gabka and Vaubel, 1983).

There could not have been many, except Mr. Dickens, who still believed in the possibility of spontaneous human combustion, when on the 14th June, 1847, such a case was reported from Darmstadt in Germany, that of the Countess Gorlitz. She had been found on the floor of her bedroom with her head and trunk deeply burnt. Cases reported elsewhere in the world had followed the consumption of gin in large quantities. Dr. Graff diagnosed spontaneous human combustion and this was not refuted until March 1850 when the Countess's servant Stauff confessed that he had first strangled her and then set her alight (Graff, 1850; Thomson, 1978). Those who, in December 1852, enjoyed the tenth instalment of Dickens' new novel "Bleak House" will remember that Mr. Krock fell asleep in front of his fire after his second bottle of gin and when later the room is entered the man is nowhere to be found but at the foot of his chair is seen a small burnt patch of flooring.

The years 1843 to 1858 have included four reconstructive surgical innovations which, in future years, may make it possible to release the cicatrices which follow the healing of deeper burns.

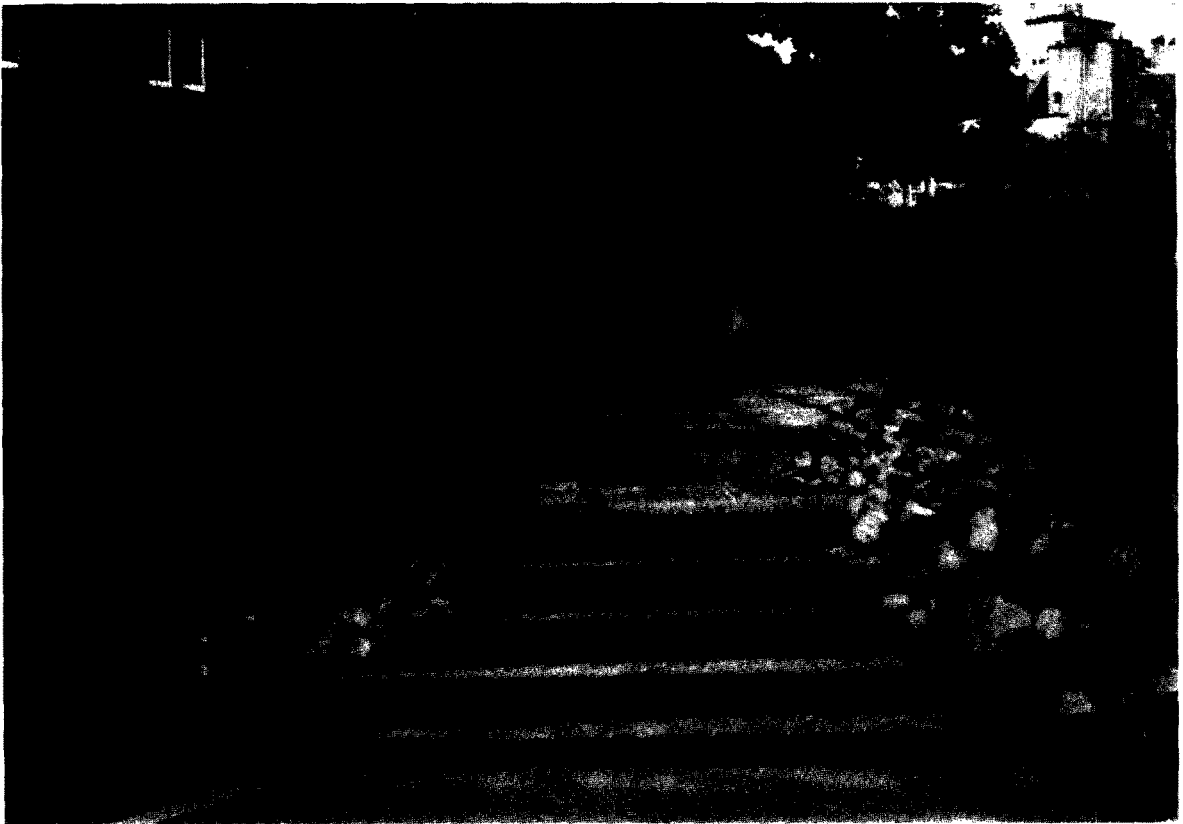


Fig. 3

Figure 3.—The garden, behind the wall with the doorway shown in Fig. 2, which covers the foundations of the first Burn Hospital.

#### *Full thickness skin grafting*

In his book published in Philadelphia in 1844 Mr. Joseph Pancoast reports free full-thickness skin grafting. He uses it to reconstruct an ear-lobe (Pancoast, 1844). Perhaps it could be used for a burnt eyelid.

#### *Tubing a flap*

The late great Professor Johann Friedrich Dieffenbach, who died only in 1847 at the early age of 53 years, had the satisfaction of seeing his "Text-book of Operative Surgery" published in Leipzig in 1845. In it he describes his use of a Tagliacozian arm flap for a nasal reconstruction where much of the work of shaping the new nose is completed on the arm before attachment to the face. He raised a triangular flap left "connected only at the top and bottom". Dieffenbach proceeds,

"After careful mopping and reduction of the arm-wound with strips of plaster which run

under the flap, pull the wedge-shaped section with a hooked instrument through under the flap and out the other side. By this one obtains a rolling-over of the entire section which has now its epidermis side turned towards the arm-wound, and the cellular tissue turned outwards. After mopping the entire surface with a fine cloth, and when no more drops of blood appear, sew the outer edges of the flap together, joining them with a sufficient number of sutures to ensure that there are no gaps whatsoever"

(Dieffenbach, 1845). He has turned this flap into a tube of skin and no-one previously has described this device. It just might have future application.

#### *The Z-plasty*

In 1854 Monsieur Dénonvilliers operated on a man of 23, the outer canthus of whose right eye was pulled downwards by a contracted scar which had also produced ectropion of the lower lid (Dénonvilliers, 1854). He describes how he planned to

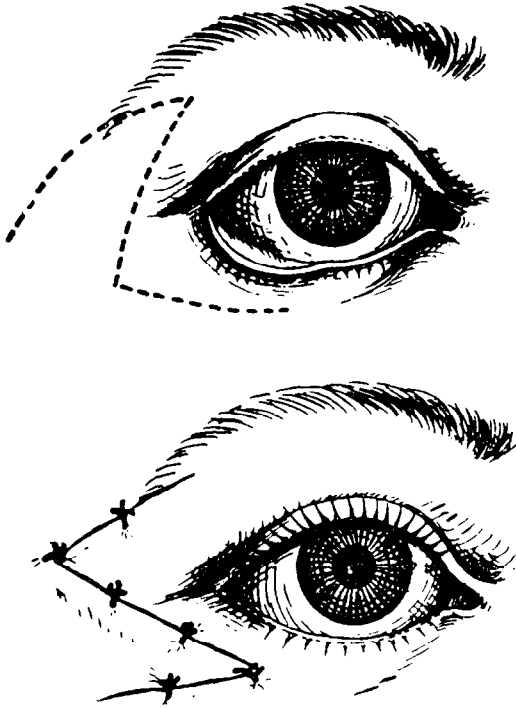


Fig. 4

Figure 4.—The probable design (Borges and Gibson, 1973) of Dénonvilliers' Z-plasty, drawn by Beard in 1911.

"free the lowered external angle of eye by two incisions above and below the lid margins meeting at the angle. Then I will form above and a little external to the first triangle, a second triangle opposite to the first. This accomplished, I will raise the triangle involving the external corner of the eye and cause it to take the place of the second triangle which I will then bring down to take the place of the first" (Fig. 4).

Charles Pierre Dénonvilliers is not here concerned with a burn contracture but his description of this Z-shaped incision could be put to use for any restrictive band of cicatrix. The scar release operation performed by Professor William E. Horner in Philadelphia in 1837 was not a complete Z-plasty (Horner, 1837).

#### *Stent's composition*

In 1857 Mr. John Tomes, Dental Surgeon at The Middlesex Hospital, spoke at a meeting of the Odontological Society of Great Britain at which he recommended a new compound for making impressions invented by Mr. Charles Thomas Stent, a

London dentist. Stent has much improved the qualities of the gutta percha, which itself was introduced into dentistry in 1847 by another Englishman, Edwin Thomas Truman (Mulliken and Goldwyn, 1978). I have handled Stent's compound and recommend it to you as of potential value in the surgical treatment of the burnt. Could it perhaps be used to hold an eyelid graft in place? Time alone will tell. Both Mr. Truman and Mr. Stent are men of business and both have patented their manufacturing processes.

#### **Exposure treatment**

Putting pen to paper, firstly in 1857, Monsieur Étienne-Frédéric Bouisson has written extensively on the healing of ulcers by "ventilation" (Bouisson, 1861). The benefits he cites include less pain, less discharge, the formation of a "skin" on the surface like milk, protection and isolation, and combating sepsis. The method consists in leaving small wounds exposed to air, and acting upon larger ones by means of the domestic bellows for a period varying from 5–20 minutes every two, three or four hours according to the amount of discharge and moisture that may be present.

Burns "may also be combated advantageously by ventilation, at least in first degree burns and whenever it acts to moderate inflammatory movements or to protect the scarring process". "When a deeper lesion has given rise to uneven loss of dermis or subdermis so that the formation of a fibrous nodular tissue is to be expected, the retraction of which causes very bizarre deformations which are sometimes refractory to reparative surgery, is it not the time to change the adverse scar forming conditions and to attempt to transform bare or exposed post-burn wounds into encrusted wounds? We have mentioned previously, with regard to this type of cicatrization, the advantages of isolation obtained by using cotton wool and artificial coverings which are produced for the drying of pus absorbed and imprisoned in their meshes. Would not ventilation be just as good?"

Bouisson gives us a short case history "In a woman suffering from a lesion in the malleolar region caused by boiling water, and in whom scabs formed and detached, cicatrization under a crust produced by ventilation was followed by a prompt cure without the formation of deformative fibrous nodule."

### Treatment baths

On September 15th of last year, 1857, Gustav Passavant found himself in charge, in Senkenberg Hospital, of the treatment of 13 survivors from an explosion in a pyrotechnical laboratory in Frankfurt-am-Maine, just 15 miles to the north of where Countess Gorlitz had been murdered 10 years previously. Seven died in the fire, 5 of them of inhalation of smoke and toxic gases. Of the 13 initial survivors, a 17-year-old woman died of respiratory complications. Another young man died three weeks after having sustained deep burns. Passavant nursed his patients continuously in zinc baths containing warm water at 27°, which was changed two or three times a day, for as long as seven days. Later, individual burnt areas were treated with water compresses. He recommends this treatment as it relieves pain and speeds recovery from burns. This is irrespective of the extent of depth of the burns, and here he uses Dupuytren's classification. Some patients suffered from cramps, but I wonder if these were due to the restricted dimensions of the baths. Passavant recommends his treatment enthusiastically considering it better than all other methods. He concludes his communication with two case histories (Passavant, 1858).

Although Passavant's paper "Remarks on burns of the human body and their treatment with permanent warm water baths" has been published, no report has reached me of surgeons elsewhere using his techniques of management; here is, perhaps, an example of that well recognised tendency for enthusiasts to overstate their case. Nevertheless, there may well prove to be continuing merit in washing the burnt in baths of water, possibly with salt added since the merits of sea water in keeping wounds clean has been recognised since the Hippocratic era.

In summary, the last decade-and-a-half have seen, in addition to general anaesthesia, four other significant signposts to the future management of the acute burn—the first Burn Hospital, effective measures to control sepsis, treatment by exposure and the use of treatment baths. Additionally, there have been described four new surgical techniques of lasting value in post-burnt reconstruction—full thickness skin grafting, tubing of skin flaps, the Z-plasty and Stent's compound. A truly remarkable 15 years.

### Acknowledgements

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Figure 1—*Journal of the Royal College of Surgeons of Edinburgh* (1956), 2, 139.

Figures 2 & 3—Photographs taken for the author by Dr Mary Bunney of Edinburgh.

Figure 4—*British Journal of Plastic Surgery* (1973), 26, 239.

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