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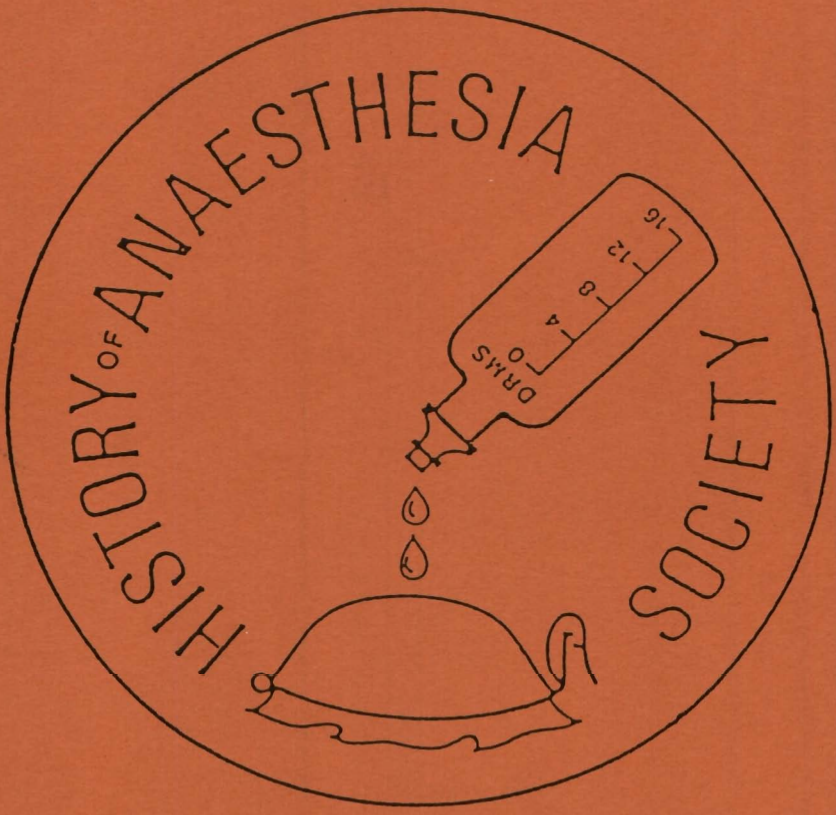
THE HISTORY OF ANAESTHESIA SOCIETY PROCEEDINGS



Volume 18

Proceedings of the Meeting in Poole

21st October 1995

The History of Anaesthesia Society

Autumn 1995 Meeting

Acknowledgements

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Proceedings of the History of Anaesthesia Society

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HISTORY OF ANAESTHESIA SOCIETY
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EDITORIAL

ESSAYS ON THE HISTORY OF ANAESTHESIA - A NEW VENTURE

A publication of interest to all our members will appear this autumn, in time for the 150th anniversary of ether anaesthesia. *Essays on the History of Anaesthesia - Selected and Revised Contributions by Members of the History of Anaesthesia Society* is the first volume of a new publishing venture by the Society. The editors have selected 46 presentations from the first five years of the Society's meetings and, together with the authors, have produced a volume of highly readable essays, revised and updated with new illustrations. The range of topics is so wide that the book will have appeal for all medical, nursing and para medical professionals whose work impinges on anaesthesia and intensive care.

The Royal Society of Medicine has agreed to publish this work as one of its International Congress and Symposium Series, on very favourable terms. Since the intention is not to make a large profit, but to expand interest in the history of anaesthesia, the book is being sold at the remarkable pre-publication price of £13.50 plus p&p*. We hope that members will not only wish to have their own copy, but will consider these essays to be a most appropriate gift for junior colleagues and fellow workers. If successful, this will be the first volume of a continuing series.

** The Book may be ordered from Dr CN Adams, 118 Appledown Drive, Bury St Edmunds, Suffolk IP32 7HQ. Pre-publication price £13.50 (US $24 or Aus$30) plus £2.50 p&p in the UK and Europe, or £5.50 (US $8.50 or Aus $10.50) for the rest of the world. OUTSIDE THE UK ONLY a Visa/Mastercard number is acceptable, with the expiry date, cardholder's name and cardholder's signature.*

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CONSERVATION OF JOHN SNOW CASE BOOKS
RECEPTION AT THE ROYAL COLLEGE OF PHYSICIANS

On the morning of Wednesday 3 April, a reception was held in the Fellows' Room of the Royal College of Physicians, to mark the completion of conservation work on the *Case Books* of Dr John Snow, which was sponsored by the History of Anaesthesia Society in memory of Dr Richard Ellis.

Mr Geoffrey Yeo, the Archivist and Records Manager, and Mr Geoff Davenport, the Librarian, welcomed Mrs Elizabeth Ellis, her son Thomas, the President, Past Presidents and Officers of the History of Anaesthesia Society. David Zuck and Mr Yeo spoke on the value of Richard Ellis's work and the importance of the *Case Books*. Mr Yeo expressed the grateful thanks of the College to the History of Anaesthesia Society for its generosity in making possible the very necessary conservation work.

Mrs Ellis and Dr Zuck holding the commemorative plaque

The restored books were splendidly displayed, and Mrs Ellis was presented with a plaque bearing the insignia of the Royal College of Physicians and the History of Anaesthesia Society, and carrying the wording from the display:

> *'The three Case Books of John Snow provide a record of his daily clinical activities from July 1848 to June 1858. After his death they passed into the possession of his friend Benjamin Ward Richardson. They remained in the keeping of the Richardson family until February 1938, when they were presented to the Royal College of Physicians. A complete transcription by Dr Richard H Ellis FRCA was published in 1994 as Medical History Supplement No.14.*
>
> *Following the tragic death of Richard Ellis in May 1995, the History of Anaesthesia Society provided for conservation work on the Case Books to be undertaken in his memory.'*

Following the Reception, the President and Officers of the HAS entertained Elizabeth and Thomas Ellis to a pleasantly informal luncheon at the Royal Society of Medicine.

PROCEEDINGS OF HISTORY OF ANAESTHESIA SOCIETY

Volume 18

PAPERS PRESENTED AT THE POOLE MEETING
21st OCTOBER 1995

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THE AMSTERDAM SOCIETY FOR RESCUING THE DROWNED

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It is sometimes claimed that the resuscitation of the apparently dead has a history as old as medicine, but such claims are hard to substantiate. Traditionally the medical profession recognised the absence of breathing and heartbeat as signs of death, while loss of consciousness was not clearly regarded as an indicator of impending demise. Poets certainly knew the concept of apparent death. In Shakespeare's *Romeo and Juliet* the cessation of all vital functions is described as 'borrow'd likeness of shrunk death'. Whether this was fanciful and wishful thinking, or genuine insight, one does not know. The Medicine of that time certainly did not teach or practise what is now called resuscitation.

The European Enlightenment brought radical changes to everyday life. Numerous societies were formed through which citizens could cultivate their interests and promote their views. One of these societies was De Maatschappij tot Redding van Drenkelingen (literally, The Society for Rescuing of the Drowned(SRD)). When it was formed there was no comparable organisation in Holland or around the world. The Society was established in Amsterdam on 26 October 1767, at first calling itself De Maatschappi tot Behoudenis der Drenkelingen (The Society for Saving of the Drowned). This name was changed soon after the inauguration. From the very start the Society limited its activities to the promotion of measures by which persons apparently dead from drowning could be brought to life, and the spreading of knowledge of these resuscitative methods to the public.

Historians disagree on the date which marks the true origin of the SRD. The periodical of that time *De Philosooph* published in its no.86 of 24 August 1767, an appeal to apply resuscitative measures to those rescued from water and apparently dead, instead of waiting passively for 48 hours to confirm the death prior to burial. Just two months later the Society was officially founded and it is practical to regard 26 October 1767 as the birthday of the earliest organised activity for saving the apparently dead. It must be stressed that no attempt was made to encourage methods of resuscitation for those who were not victims of drowning. Other societies were to promote for example, the resuscitation of the newborn.

The Society for Rescuing the Drowned is of particular interest to anaesthesiologists and to students of the history of resuscitation because it was the first organised and publicly recognised attempt in Europe to do something in cases of apparent death. In 18th century Holland a plethora of groups were formed by individuals who devoted themselves to intellectual pursuits. The SRD was one of the earliest, and it was different because its activities were directed towards something useful in everyday life. This outward orientation to serving the public was in clear contrast to other learned societies which sought their goal within themselves.

Activities of the Society - pragmatic and practical

The founding members were from all walks of life including merchants, the clergy and medical practitioners. If their goal was practical, i.e. bringing to life a drowned person, then their means of promoting this activity were even more practical. The Society rewarded each successful salvation financially and with a special medal. Needless to say, there was substantial bureaucracy involved in the process of the awards. This use of financial means to ennoble a goal is a reflection of the thinking among the rich of 18th century Amsterdam.

Resuscitation activities were hampered by existing jurisdiction which demanded that a drowned person be held with feet in the water until municipal experts decided whether an off-shore crime was involved. The SRD succeeded in changing this law to improve the immediate help for the rescued victim. The drowned person was thus transformed from a legal object into a patient, and the possible saving of life took precedence over the course of justice.

The SRD also achieved a rule in Amsterdam that inn-keepers were obliged to permit resuscitation of the drowned on their premises. Refusal to do so was punishable. Furthermore, many street lamps were placed at dangerous sites to prevent people falling into the water, and special guards were organised to patrol the waters of the city. Before long, such measures were being taken in other towns of Holland where local branches of the SRD became active. In 1838 boxes of resuscitation equipment were deposited at 60 pharmacies in Amsterdam, a practice which ended in 1913.

We have noted that the SRD was started following a pamphlet in *De Philosooph*. Soon after its foundation, educational notices were printed and widely distributed, and subsequently regular revisions were made of these instructions. Of the so-called 'Declaration' of 1877, 50,000 samples were printed for the public and 65,000 for the naval forces.

Similar organisations abroad

Most of the larger cities recognised a need for improvement in the rescuing of the drowned. In Venice special rules for saving from water were put into practice in 1768, a year after Amsterdam. The French became very active and published several works on salvaging the drowned. In Hamburg, Gesellschaft zur Rettung Ertrunkener (Society for Rescuing the Drowned) was established in 1768. Catherine the Great ordered that reports of the SRD be translated into Russian. In Austria, Maria Theresa promoted the process to rescue those 'unfortunates at the door of death'. *The New York Gazette* of 4 March 1771 published an account of the SRD. A special relationship, including the exchange of medals, developed between the SRD and the London based Humane Society, established on 18 April 1774. The aim of this society which became 'Royal' in 1787, was identical to that of the SRD: 'The recovery of persons apparently dead by drowning'.

Therapeutic instructions of the SRD

The initial instructions for resuscitation of the drowned derived from the existing medical literature[1]. Ten measures were applied in decreasing order of importance:

1. Tobacco clyster
2. Warming by one or two naked persons
3. Warming of the drowned
4. Clyster, different from tobacco
5. Rubbing
6. Shaking
7. Insufflation of air into the lungs, sometimes rectum
8. Blood-letting
9. Instillation of a medicine (oral)
10. Administration of an emetic agent

These measures remained in use, practically unchanged, for nearly a century. The foremost medical historians cannot give an explanation for such conservatism. Whenever the SRD had to choose between medical innovation or experience, the old approach was chosen. The rationality of new methods was thus usually defeated by the weight of experience or of habit. An extensive medico-historical analysis of resuscitative measures promoted by the SRD can be found in its 225th year Jubilee book: *Idealen op leven en dood.*[1]

The SRD, one of the earliest foundations in the Netherlands, is still a wealthy charity. That its original role is no longer necessary in contemporary society testifies to the changes in public life since the end of the 18th century. Resuscitation is now the task of organised medical services. Occasionally, however, the Amsterdam Society for Rescuing the Drowned provides financial support for studies in the field of resuscitation.

Reference

1. Van Lieburg MJ. Tot opwekking van een zwak en onderdrukt levensbeginsel. In: *Idealen op leven en dood.* The Hague: Stichting Hollandse Historische Reeks, 1992; 65-101.

THE DIAGNOSIS OF DEATH IN THE LATE 18th CENTURY

Dr D Zuck
President, History of Anaesthesia Society

From antiquity onwards there was concern about the difficulty of diagnosing death. Until fairly recently this was related to worry about the risk of premature burial, and was accompanied by accounts of the restoration of life in the apparently dead. Celsus, for example, writing about 25 AD,[1] discusses the signs that indicate that an illness has entered its last stage, and continues:

> 'I know that on this point someone may question me:- if there are such sure signs of approaching death, how is it that patients who have been deserted by their medical attendants sometimes recover?'

His answer is that the art of medicine is conjectural, and such is the characteristic of a conjecture, that it sometimes deceives. He continues with the story of Asclepiades who, meeting a funeral procession, recognised that the man being carried out for burial was still alive.

In more recent times the problem was very fully considered in a treatise published in 1740 by the Danish anatomist, Jacobus Benignus Winsløw (1669-1760).[2] He immediately expressed what may have been a general sentiment:

> 'Tho' death, at some time or other, is the necessary and unavoidable portion of human nature, yet it is not always certain, that persons taken for dead are really and irretrievably deprived of life; since it is evident from experience that many apparently dead, have afterwards proved themselves alive by rising from their shrowds, their coffins, and even from their graves ...'

He continues with a number of accounts where the apparently dead had responded to stimuli, for example, during a supposedly postmortem Caesarean section, or a dissection;* then he relates the famous and apparently well-attested story summarised here. A woman being interred with a valuable ring on her finger in the public churchyard of Orleans, next night a servant uncovered and opened the coffin, but finding that he could not pull the ring off the finger, began to cut it off; this roused the woman, whose hideous shrieks put the robber to flight. The woman in the meantime disengaged herself from her shrowd, returned home, and lived with her husband for ten years, during which time she furnished him with an heir.

What, then, was to be done, to avoid the terrible hazard of premature burial? The remainder of the book considers the signs of death, discussing in detail the appearance and colour of the body, its heat, and the softness of the flexible parts; but all these are fallacious. Arterial pulsation and respiration are infallible signs of life, but their absence is not an infallible sign of death; they

* Such a tale was told about Vesalius, possibly spread by Ambroise Paré. See: O'Malley CD. *Andreas Vesalius of Brussels 1514-1564.* Berkeley. University California Press 1964: 304-305.

may become invisible to the eye, or imperceptible to the touch. Winsløw stresses that great care is needed, and some technical ability and experience, to detect the vital signs, and he continues with detailed practical advice on how to feel the pulse, and to test for respiration by applying a lighted candle to the mouth and nostrils .... or a little fine cotton or wool, or a mirror, or standing a glass of water on the sternum: 'but these methods are as fallacious as they are common'.

He considers stimulatory tests, irritating the nostrils with the juices of onions, garlic, horseradish, whipping with nettles, and shocking the ears with hideous shrieks and excessive noises. All this having failed, the surgeon should be called in to stimulate the skin with pricking or cutting instruments, or fire. Boiling water and molten wax have been used successfully, as has a long needle thrust under the nail of an apoplectic woman's toe. But all else failing, we can rely on time, and he cites the opinion of several authorities that there is no other infallible proof of death than the beginning of putrefaction. So the safest way is to let the supposed dead person remain in bed, as if he were alive, and not put him in his coffin until two or even three days after. But, even then, it has to be a generalised putrefaction, not the localised variety that can occur in certain diseases.**

From Winsløw we gather two things: first, that the principal test by which tissues were recognised to be living was a response to unpleasant stimuli and, second, that there was no conception of the death of the organism as distinct from the death of the tissues and organs that made it up.

The diagnosis of death assumed an additional importance and urgency with the rise of the resuscitation movement. Because resuscitation was an innovation with virtually no foundation of experience,[3] and very few animal experiments on which to base its methods, the early practitioners sought guidance from the considerations upon which current medical practice was based. As a result, their writings throw considerable light on the application of such theories to practice, but for an appreciation of this, some preliminary discussion of certain ideas is necessary.

Sympathy, Irritability, Animism and Vitalism.[4]

Sympathy was a supposedly observed relationship between two or more parts of the body. There was general sympathy, that inter-connected the whole of the body, each part being dependent on the remainder, and special, or local sympathy, where two more parts were concerned. The sympathetic relationship could be of equilibrium, where increased action of one part brought about a weakening of the other, or of association, when the related parts would act together. Parts that had a relationship of equilibrium included the uterus and the breasts; the reduction in action of the pregnant uterus that occurs at delivery being accompanied by an increased action of the

** The idea persists: Marquez GG. *La Hojarasca*. Buenos Aires. Editorial Sudamericana SA, 1982: 32. 'No podemos asegurar que esta muerto mientras no empiece a oler', dice el alcalde. ('We cannot be sure he is dead until he starts to smell', said the Mayor)

breasts that begin to lactate. The stomach was held to have a widespread association of sympathy with the liver, the intestines, the heart and the brain. For example, an increase of action of the stomach, as caused by a full meal, reduced the action of the brain, so inducing sleep. John Hunter was a great believer in sympathy. The idea persists in the designation of the sympathetic nervous system.

The idea of tissue *irritability* is generally attributed to Francis Glisson (1597-1677), but has been traced back to Galen.[5] Glisson's original studies were concerned with the contractile response of the gall bladder to distension, and this idea was used also to explain the contraction of the chambers of the heart. But Glisson went on to generalise, so that for him irritability meant the property of a tissue to react to a stimulus independently of the nervous system or of consciousness. To the naked eye this reaction would have been seen as a contraction, hence located in the muscle, and irritability became regarded as a prime characteristic of living tissue. The concept was brought into greater prominence in the mid-18th century by the immensely influential publications of the great physician and physiologist, Albrecht von Haller. The idea was further developed by Cullen.

The doctrine of *vitalism* went through a number of permutations over the course of more than a century: this is a much simplified account. The concept originated with Georg Stahl (1659-1734), who was also responsible for the phlogiston theory. Stahl was a religious man, and held that God had created man with a body and an 'anima', a soul. The body was made up of matter that tended towards corruption and decay, but the soul was immortal and protected the body from dissolution, directing its vital activities so as to prolong life In the hands of his less devout successors, the 'anima' became replaced by a vital principle, inherent in all living tissues, that counteracted the tendency to dissolution. Hence life became defined as the sum of the forces that counteracted death. Again, John Hunter was a confirmed vitalist.

So this was a physiology in which irritability was the distinguishing feature of life, in which the tissues were kept alive by an inherent vital force, and in which various parts of the body were sympathetically related to others, either reciprocally or additively. In such a physiology there was no conception of the death of the person as an entity, as opposed to the death of the individual tissues that made him up.

Two expert opinions

The establishment of resuscitative procedures as a discipline may be dated from 1767, when the society for the restoration of the drowned was founded in Amsterdam.[6] The stimulus for the founding of the London Society, which was established at a meeting at the London Coffee House on 18 April 1774, was the publication in 1773 of Thomas Cogan's translation of the *Memoirs of the Amsterdam Society.*[7] A number of questions immediately presented. Was the whole enterprise worthwhile? If so, then there was the need for an appropriate resuscitative protocol, and of knowing when to stop, of being able to diagnose death. Opinions were sought from prominent medical men. In Scotland the initiative was taken by Lord Cathcart, President of the Board of Police. He approached William Cullen. In England, one of the founders of the

Humane Society, William Hawes, asked the advice of John Hunter. The two key documents are their responses to these questions.

Both replies are most interesting for the way they incorporate the physiological theory of the time. Both state that with so little practical experience, theory is all they have to go on, but both nail their colours firmly to the vitalist mast.

In Cullen's opinion,[8] attempts to resuscitate were worthwhile, because in his view:

> 'Life does not immediately cease upon the cessation of the action of the lungs and heart, and the consequent ceasing of the circulation of the blood. Though the circulation of the blood is necessary to the support of life, the living state of animals does not consist of that alone, but especially depends upon a certain condition in the nerves, and muscular fibres, by which they are sensible and irritable, and upon which the action of the heart itself depends. As long as this condition, which may be properly called *the vital principle*, subsists, though much weakened, it is presumed that the action of the heart and lungs, the circulation of the blood, and therefore all the functions of life, may be again entirely restored.'

There were many well attested reports of the recovery of persons who had been long in a seeming state of death, so we should not rashly set bounds to the possibility of the recovery of drowned persons. He points out that, in Amsterdam and Paris, no less than three-fourths of the whole number to whom the remedies have been applied have been recovered. Thus:

> 'Athough the drowned persons have lain for several hours in the water, attempts ought to be made for their recovery'.

Cullen continued with a discussion of the recommended resuscitative protocol. This was covered by Dr Hovell at the Glasgow meeting,[9] and since methodology is not the subject of this paper, it will just be mentioned that such apparently bizarre measures as tobacco smoke enemas were a means of stimulating both the irritability and the sympathy of the viscera.

Cullen suggested that attempts to resuscitate should be continued for some time, and the regulations adopted by the Board followed those of the London Society, which offered a reward of two guineas to those who persisted in continuous efforts for two hours, and four guineas if the patient recovered. Cullen made no mention of prognostic signs, nor were any criteria suggested for the diagnosis of death.

John Hunter, like Cullen, took the vitalist approach:[10]

> 'I shall consider an animal, apparently drowned, as not dead; but that only a suspension of the actions of life has taken place.'

This is similar, he says, to a person in a trance, so as long as the animal retains the powers of life, revival is possible, but when the vital spirit has departed, the situation ceases to be recoverable.

He goes on to discuss sympathy, pointing out that among the special sympathies, the heart sympathises immediately with the lungs. In drowning, the loss of the heart beat seems to arise from loss of respiration; therefore, most probably, the restoration of breathing is all that is necessary to restore the heart's motion:

> '.... for if a sufficiency of life still exists to produce that effect, we may suppose every part equally ready to move the very instant in which the action of the heart takes place, their actions depending so much upon it.'

Now, we need to be very clear about what he is saying here. We must forget about oxygen, and the chemistry of respiration - this was before Lavoisier's work with the ice calorimeter. Hunter is talking only about motion, as will be seen in a moment. Restoring motion to the lungs will, by sympathy, restore motion to the heart and, equally, by sympathy, 'in the very instant' as he says, to the rest of the body.

He goes on to cite an experiment, very similar to the famous one of Hooke and Lower about one hundred years earlier, in which a double bellows had been used to keep alive a dog whose chest had been opened. As long as the artificial breathing was maintained the heart continued to beat strongly. When the bellows was stopped the heart gradually became weaker and stopped, and the blood became darker, but restoring the artificial respiration restored the heart beat. However, while some people supposed that the loss of life in drowning is caused by vitiated blood, damaged by the want of action of the air in respiraton, being sent in that vitiated state to the vital parts, he is fully convinced that this is false, and he mentioned something that was to be a problem to physiologists for a number of years. During his dog experiment, as soon as the heart's action was restored, a large column of bad blood, occupying the pulmonary veins and the left side of the heart, was pushed forward without any ill effect being produced. Since there was no way that this blood could be changed until it passed through the lungs, restoration of the heart's action must depend on the application of air to the lungs, not upon the effects that the air has on the blood, and which the blood has on the vital parts: 'These are only secondary operations in the animal oeconomy.' A factor here was the contemporary belief that the blood circulated much more slowly than we now knew to be the case. Hence it was thought that it would be very many minutes before the resumption of respiraton would effect any change in the blood.

Hunter concluded by offering a list of proposals for resuscitative measures, all based on the principles of irritability and sympathy: 'Perhaps blowing air into the lungs may be sufficient to effect a recovery'. Here he adds his celebrated footnote, suggesting that Dr Priestley's dephlogisticated air might be more efficacious than common air, but really this is no more than a glittering novelty that might be picked up, without any understanding, by a magpie. Hunter, like Cullen, suggested no prognostic signs, and made no recommendations for the diagnosis of death.

Two prize essays

The Humane Society, as it became known in 1776, acquiring the prefix 'Royal' in 1787, established an essay contest on topics to do with resuscitation for which gold and silver medals were awarded. It also took over an old farm house in Hyde Park, and used this as a receiving

house for the resuscitation of the drowned until, in 1835, it built a new one on the north bank of the Serpentine. This was damaged during the war, and demolished in 1954.[11]

The Society's competition stimulated prize essays that substantially advanced the understanding of physiology, especially of respiration. Particularly notable was Goodwyn's essay, which won the gold medal in 1788.[12] In contrast to Hunt, Goodwyn concluded that:

> '..the chymical quality which the blood acquires in passing through the lungs, is necessary to keep up the action of the heart and, consequently, the health of the body.'

He defines life as: 'the faculty of propelling the fluids through the circulating system'. For this, a normal body temperature and respiration are necessary. But more relevant to the present subject is the essay of Charles Kite, which won the silver medal in the same year.[13]

Kite practised as a surgeon in Gravesend, on the south bank of the Thames estuary. (As Charles Dickens relates in *Our Mutual Friend*, bodies were still plentiful in the river more than half a century later). Kite's essay is much inferior to Goodwyn's. The physiology is antiquated, there is no research, and he relies on secondary sources. In his opening statement he conceives the distinction between apparent death or suspended animation and positive death to rest entirely on the presence or absence of irritability. When it is present, however strong may be the appearance of death, animation can only be said to be suspended, but when it is absent, the body is then to be considered as absolutely and irrecoverably dead.

Kite devotes a whole chapter to the consideration of the signs of life and death. He discusses all the signs and tests in detail, beginning with stoppage of the pulse and respiration, and concluding with putrefaction. In passing, he mentions as a reliable sign of death, that: 'air blown into the mouth passes without interruption through the whole alimentary canal'. This sign, he says, is especially useful, and more readily elicited in the stillborn, as one might imagine. But all this is leading to the new gimmick that he has up his sleeve. He is convinced that we are in possession of an absolutely reliable and certain test for the presence or absence of life. He prepares the ground by asserting that the only true distinction between life and death is irritability, or what has been called the vital principle.

He considers certain signs indicative of irritability, such as constriction of the pupil, and the sensitivity of the larynx. Then he goes on to introduce his certain prognostic test: it is electricity. Electricity is able to throw the muscles into strong contractions. It has been tried in a number of cases of drowning and in animal experiments, and in some cases it has stimulated muscle contraction. While this has not resulted in a cure, the effect has persisted for two or more hours, but in others, who had been immersed in intensely cold water for some hours, not the least effect had been achieved:

> 'From these considerations it appears to me that the electrical shock is to be the test of any remains of animal life, and so long as it produces contractions, the person be said to be in a recoverable state, but that when that effect has ceased, there can be no doubt remain of the party being absolutely and positively dead.'

Here, then, was an objective test for death being proposed, one that did not rely on the processes of time and decay. It was scientific, because electricity was involved, and the idea won Kite the silver medal, as is seen from Lettsom's introduction to the essay in its published form. Kite's introduction has been misinterpreted by those always on the lookout for nuggets of modernity; defibrillation was not in his mind. He was merely looking for an indication of when to give up, and in the light of his times, with the emphasis still on irritability as the sign of persistence of the vital force, and hence of life, he found it brilliantly.

Just a word about the thinking behind this. Von Haller, and Cullen after him, had elaborated the concept of irritability to encompass the nerve-muscle complex. An impulse passes down a nerve, and the muscle at the end of it contracts. The heart, as Harvey had demonstated, is a muscle. It contracts regularly and rhythmically. Hence it must be receiving an impule regularly down a nerve, and it was known that there are plenty of nerves going to the heart. This impulse obviously originated in the brain. Hence a beating heart indicated a functioning brain. Turning this argument upside down, the ability to re-start a stationary heart indicated, to them, that the brain was still able to generate these regular impulses, so was still functioning and viable.

Xavier Bichat - separation of brain death

All this changed some dozen years later, as a direct result of the researches of the great French anatomist and physiologist, Xavier Bichat (1771-1802). Bichat is celebrated today for the work for which he is most famous, his *Traité des Membranes*, in which he classified the tissues of the body. In the present context, however, his great, but less well-known contribution to neurological theory, or philosophy, is more relevant. This was his division of vital properties into the animal, which is concerned with the organism's relationship with the outside world and is mediated by the brain, and the organic, which encompasses such internal and automatic organ or tissue functions as digestion and secretion. He sets out this approach in his *General Anatomy*,[14] at the beginning of the chapter on the nervous system, pointing out that anatomists till now have considered the nervous system in a unified manner; but it is easily perceived that it should be regarded as two general systems, essentially distinct from each other, the first being the brain and its dependencies, and the second the ganglia. The brain appertains to animal life, being concerned with external impressions that produce sensations, and with actions that are performed by the voluntary muscles. The ganglia, distributed to the organs of digestion, of circulation, respiration, and the secretions, are concerned with the organic life, and act in a more obscure way. Bichat took another great stride forward in his *Récherches Physiologiques sur la Vie et la Mort.*[15] This is the book that starts with his famous definition of life:

> 'Life consists in the sum of the functions, by which death is resisted. In living bodies, such is their existence, that whatever surrounds them, tends to their destruction ....'

They survive only because they possess the principle we call life. Hence, to elucidate the meaning of life, one should study the modes of death. This Bichat set out to do, experimentally producing what he called death of the brain, death of the heart, of the lungs, and so on. He concluded that one could distinguish between death of the animal functions, mediated by the brain, and of the organic functions, mediated by the ganglia. Organic, or autonomic life, could

subsist without animal, or cerebral life, but animal life is entirely dependent on, and lasts not a moment longer than organic life. As an example, he cites the person who is struck with apoplexy. He may live internally for many days after the stroke, but externally he is dead.

So Bichat distinguished clearly between brain death and death of the tissues. What he was saying is that the brain is by far the most vulnerable organ, dying immediately if the other vitals, the heart or the lungs, are affected, whereas they can survive for a long time without the brain. It was, until then, accepted wisdom that the beating of the heart depended on a functioning brain, with the corollary that the ability to restore the heart beat indicated that the brain was still viable and working. Bichat, by showing that the heart would continue to function after the brain had been destroyed, clearly demonstrated its independence from the brain. Hence he was the first to set out clearly the idea of brain death, with survival of the vegetative functions of the body and the concept of suspending attempts at resuscitation even with a beating heart, would have presented no problem to him.

Confirmation by Brodie

Bichat's writings soon began to exert an influence. In 1810 Benjamin Collins Brodie commenced his physiological enquiries:

> '... having been led to do so chiefly by the perusal of those very remarkable books, for which we are indebted to the genius of Bichat.' [16]

Brodie's experiments were an attempt to determine the cause of death during drowning or strangulation, and in the course of them he showed that the heart continued to beat in decapitated animals, and that the circulation could be sustained for some hours by artificial respiration. Hence, as Bichat had already shown, the brain was not directly necessary for the beating of the heart.

By 1821 he could confidently state that death from drowning was similar to death from strangulation:

> '.... and the want of the due oxygenation or decarbonisation of the blood is the sole cause of the animal's destruction.'

Brodie had also secured information from the medical attendants at the receiving houses of the Royal Humane Society and this, together with his physiological investigations, supported his view that:

> 'The fact is, that there is no exception to the ordinary rule as to suffocation .... in all cases, as I have already stated, the circulation ceases within four or five minutes from the moment of the last inspiration.'

After this, all attempts at resuscitation were useless. He dismissed claims of recovery after prolonged submersion as extravagant fables imported from foreign and distant lands. Brodie

became a member of the Council of the Royal Humane Society, and for many years strongly influenced its recommendations.

Conclusion

For the sake of completeness it should be mentioned that inflation of the lungs through a tracheal tube was abandoned during the 1830s following reports from France of pulmonary damage, pneumothorax and surgical emphysema. The introduction of external methods of artificial respiration, such as Marshall Hall's and Silvester's in the 1850s and 60s, put the clock back for the best part of 100 years. Current ideas about brain death and the vegetative state, though first described by Bichat, became more relevant with the advent of transplant surgery, and of the life-support technology that has made it possible to keep the body alive indefinitely, although the brain is dead.

Summing up, it is part of the thesis of this paper that, during the last quarter of the 18th century, a period when the practice of medicine was based on theoretical systems of one sort or another, resuscitation was the one field in which practice soon became intimately associated with, and influenced by, not only empirical observations, but also the physiological researches that it gave rise to; and that the idea of brain death and the persistent vegetative state is not a modern one, but is almost 200 years old.

Acknowledgments

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DR JAMES CURRY AND THE NORTHAMPTONSHIRE PRESERVATIVE SOCIETY

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In the late eighteenth century Northampton was a thriving county town. In common with a number of similar provincial centres a hospital had been established by public subscription earlier in the century, and plans had been laid to build a new and larger hospital outside the town wall. Despite its position a hundred miles from the sea, near the centre of England, Northampton at that time depended for its communications on the River Nene and the recently completed link to the Grand Union Canal. This dependence on water transport meant that drowning was a relatively common cause of death, with the result that the success of the Royal Humane Society in fostering resuscitation skills was viewed with interest.

Formation of a local Society

A local squire, John English Dolben, proposed the formation of a group in Northamptonshire based on the principles of the Royal Humane Society. An advertisement was placed in the local newspaper outlining his proposals, giving some details of the success of similar organisations and estimating the potential demand for resuscitation in Northamptonshire. There had apparently been some argument about a name for the new organisation and it seems the idea of calling it the Northamptonshire Preservative Society was not Dolben's, and that he only accepted it with some reluctance. The advertisement generated some correspondence. It is interesting that this was as much inspired by the fear of premature burial as by the humanitarian and economic advantages of saving lives.

As a result of his proposals, a meeting was held at the George Inn, Northampton, on 25 September 1789, at which it was agreed to establish the Northamptonshire Preservative Society, and the first formal meeting of the Society was held in the County Hall, Northampton on 9 October 1789. This meeting was attended by many of the leading members of the local community and its minutes were published in the *Mercury* shortly afterwards.

These events in Northampton are put into some historical perspective by the next item in that edition of the *Mercury*, which is a brief report from Paris dated 6 October 1789 describing 'a return of confusion and alarm in that capital of the most serious nature'. This was the day that a large body of Parisians, mostly women, marched on Versailles and laid siege to the royal palace. Fortunately Northampton was rather more peaceful and for some time provided an environment in which the Preservative Society flourished.

John English Dolben

John English Dolben, the founder of the Preservative Society was at this time in his late forties. He was the only son of Sir William Dolben of Finedon Hall, about 10 miles from Northampton, who was Tory MP for Oxford University and Northamptonshire at various times. The family had moved to Northamptonshire from Wales early in the 17th century and

had been squires of Finedon for two generations, being strong supporters of 'Church and King'. John English Dolben never stood for parliament himself but was active in local politics. He was educated like his father at Westminster School and Christ Church, taking his degree in 1774 and remaining a staunch supporter of the College and was a frequent attender at College dinners until the end of his life. His main interests were classical literature and antiquities and he was elected a Fellow of the Antiquaries Society in 1780. He was famous for wearing old fashioned clothes with numerous large pockets which he stuffed with books, and his obituary in the *Gentleman's Magazine* describes him as: 'alike remarkable for his venerable deportment and much harmless eccentricity'. He must, however, have been a man of some considerable energy because in 1820, at the age of 70, he set out on a grand tour of Italy accompanied by a Scottish artist. He cannot have been wholly conservative in his views as he employed the fashionable landscape architect Humphry Repton, to produce a plan for the improvement of his estate at Finedon. The plans, in the form of one of Repton's *Red Books* still exist but it is perhaps fortunate that they were never put into effect, as Repton proposed the demolition of the beautiful 17th century vicarage to improve the vista from the Hall.

Dolben was the main driving force behind the Preservative Society, and it seems likely that it was he who encouraged Dr James Curry, who had recently been appointed as one of the physicians at the hospital, to write a book on resuscitation. This was published in 1792 and is the most enduring monument to John English Dolben and his Preservative Society. Entitled: *Popular Observations on Apparent Death* the book is dedicated to the President and Vice Presidents of the Preservative Society, and runs to 113 pages. Five hundred copies were printed in Northampton and sold there and in London for two shillings, with the proceeds going to the Preservative Society. The majority of the copies were distributed within Northamptonshire to doctors, clergymen and others with an interest in the saving of lives, but some spread much further and a French translation was published some years later by a M.Odier in Geneva. A second enlarged edition was published by Curry in 1815 and dedicated to the Duke of Kent as patron of the Royal Humane Society. Although the two books are not radically different, the later edition reflects the rapid progress in chemistry taking place at the time.

James Curry

Many of the details of James Curry's life are obscure. He was born in Ulster and received his medical education at Edinburgh qualifying in 1784, which suggests that he must have been born around 1760. He worked for about 8 months in Bengal during which time he suffered from recurrent illness which led to his premature return to Britain, and from which he seems never to have fully recovered. He was appointed Physician at the Northampton General Infirmary in 1789, and in 1791 was made sole Physician-in-Charge of the Medical Department until the opening of the new hospital the following year. He took an active role in the planning and commissioning of the new hospital but in 1793 resigned and moved to Kettering where he practised for three years before moving to London. Conflict with his colleague, Dr Kerr, in Northampton may have led to his resignation from the Infirmary, which is said to have been as a result of his failure to compete with Kerr for private practice in the town. Both men's portraits hang in the boardroom of Northampton General Hospital, but that of Kerr (120cm x 180cm) dominates the smaller (45cm x 50cm), rather dark portrait of Curry.

He was appointed Assistant Physician at Guy's Hospital in 1802 and shortly afterwards a full member of the staff and Lecturer in Medicine. At this time he lived in Bridge Street, Blackfriars but when he first moved to London he shared a house with another of the Guy's physicians, Dr Thomas Babington, who also came from Ireland. Curry never married and he died in London in 1821 or 1822.

It was said of Curry that: 'His form was diminutive, his frame attenuated, and his countenance indicated a temper soured by ill-health and habitual dissatisfaction'. He did suffer from recurrent ill health and eye problems which he described in a paper read to the *Medical and Chirurgical Society of London* in 1812. Although he eventually attributed his cure to the use of opium it was only after trying a bewildering variety of other self-prescribed treatments including blood-letting, blistering and mercury. It is interesting to compare the rational physiological basis of his views on resuscitation with the totally unscientific approach to his own problems. He was famous at Guy's for being an enthusiastic user of calomel and for attributing most ailments to disease of the liver. He was known to the students as 'Calomel Curry' and was reputed to sprinkle calomel on his sandwiches at lunch in the belief that he was suffering from liver disease.

Like John English Dolben, he was a Fellow of the Antiquaries Society and it may well be that this common interest led to their cooperation in the Preservative Society. Curry was considered to be somewhat eccentric, with a great enthusiasm for auctions:

> 'Although penurious in some respects, he would purchase at these places quantitites of books which he would never unpack, electrical apparatus, microscopes, globes, folios of prints etc. and these, crowded together, would occupy every room in his house'. His greatest and most enduring achievement was his book on resuscitation which was based not only on his knowledge of the recent developments in chemistry and physiology but also on personal clinical and experimental experience.

Popular Observations on Apparent Death

The resuscitation handbook was intended for the general public as well as for a medical audience and he is at pains to avoid medical jargon. The first chapter is a brief description of the differences between absolute and apparent death and an encouragement to attempt resuscitation in all circumstances and to persist for what seem excessive times but which may well be appropriate for hypothermic drowned victims.

The next two chapters are a fairly detailed account of current views on cardiovascular and respiratory physiology and are a strange contrast between ideas which seem very modern and those which are surprisingly archaic. The mechanics of the circulation were reasonably well understood at the time but the rapid advances taking place in the understanding of the chemistry and physics of gases make the section on respiration particularly interesting.

It is apparent that Curry was aware of the work of Priestley and others and that even in 1792 he had a reasonable idea of the composition of atmospheric air although the nomenclature of the gases is archaic. In 1792 the prevalent phlogiston theory meant that he had some difficulty in understanding what was happening in the lungs and why oxygen or 'vital air' was

essential for life. By 1815, Lavoisier's work was better known and phlogiston had been replaced in the text by 'carbon'. This made the explanation of the processes of respiration much closer to our modern understanding. The minor nature of the changes in the text suggest that they were mainly changes in nomenclature rather than in the underlying concepts.

The relationship between 'animal heat' and respiration remained difficult to explain and this was not helped by Curry's adherence to a chemical theory of heat which considered that heat was a separate element with 'subtile' characteristics rather than a property of all substances. Although this makes the chapter on 'Animal Heat' rather difficult to understand, the crucial observation that ventilation of the lungs and the supply of oxygen or vital air are necessary for the continued production of 'animal heat', gave Curry the theoretical basis for his scheme for resuscitation. It is apparent from the book that Curry not only kept up to date with all the literature on the subject but that he had conducted a number of experiments himself and was an acute observer of clinical events.

The remainder of the book is devoted to practical advice on resuscitation for use in a number of different situations but concentrating on drowning, as this seems to have been the commonest cause of accidental death at the time. His recommendations seem remarkably modern and would not be out of place in a current protocol for resuscitation of near drowning.

He designed a set of resuscitation instruments some of which incorporated novel improvements and these are illustrated in both editions of the book. They included an endotracheal cannula made of silver which differed from previous such tubes in having a closed rounded end and two lateral openings to minimise the risk of damage to the larynx during its insertion. There was an adaptor to allow the cannula to be connected to a pair of household bellows to inflate the lungs. The cannula also has a side hole at the proximal end which is designed to be obstructed by the finger during inflation and then uncovered to allow expiration without a need to disconnect the bellows. The other instruments in the diagram which is taken from the first edition of the book are an oesophageal tube with a sliding bung of ivory for blocking the upper oesophagus, a nasal airway, and a syringe for introducing fluids into the stomach. The Preservative Society were responsible for the purchase and distribution of at least eleven such sets of equipment.

Curry describes a technique of blind oral intubation of the larynx using the fingers of the left hand to direct the tube into the correct position. I suspect this may have been easier to describe than to perform. It is of interest that in the 1815 edition he advises rescuers to concentrate on simpler methods for inflating the lungs.

As well as the oesophageal obturator, it is of particular interest to anaesthetists that he described cricoid pressure as a means of occluding the oesophagus and thus helping to ensure that the lungs are inflated. This is mentioned in the first edition of 1792, and the 1815 edition includes a more detailed description of the technique.

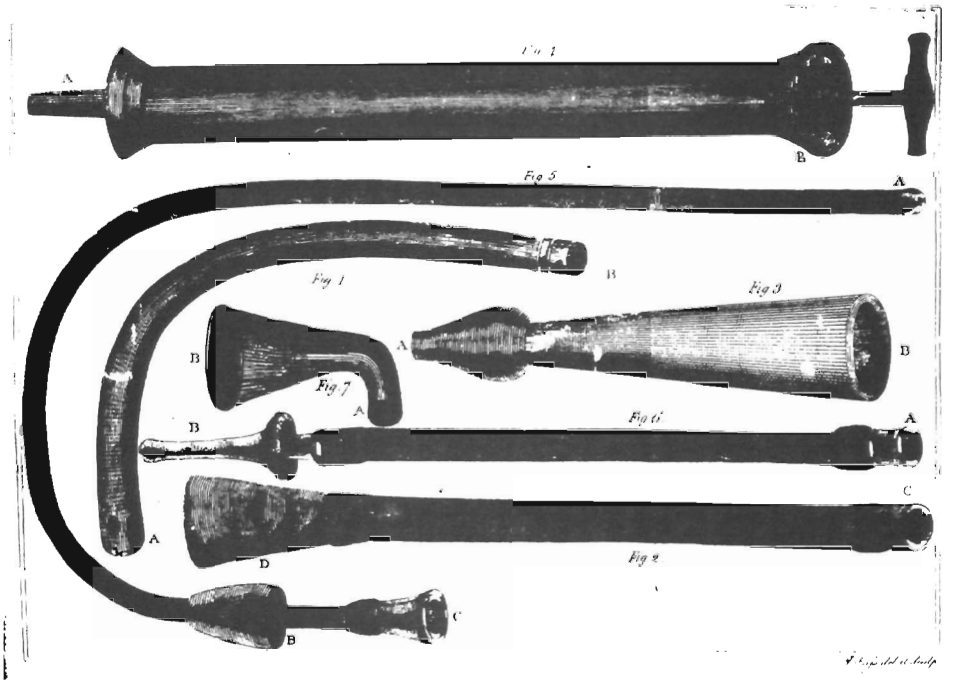

Figure 1 - Dr James Curry's Resuscitation Instruments

Fig.1 - Silver cannula to be introduced into the trachea. 'The cannula is round until within two inches of the end A, when it becomes flat, in order to accommodate it to the oblong opening of the windpipe.'

Fig.2 - Flexible tube with brass socket C, to fit to the end of B of the cannula. The leather funnel D is designed to fit round the nozzle of a common pair of bellows.

Fig.3 - Wooden tube for inflating the lungs by blowing into the nostril.

Fig.4 - Brass syringe for introducing fluids into the stomach using the flexible tube Fig.5. or the rectum using the tube in Fig.6.

Fig.5 - Flexible oesophageal tube of spiral wire covered with leather. The ivory sliding piece B is intended to block the upper oesophagus to prevent inflation of the stomach.

Fig.6 - Rectal tube with ivory end B.

Fig.7 - Brass mouth piece to be used as an alternative to the flexible tube Fig.2.

Page 90: *Popular Observations on Apparent Death 1792*

Figure 2 - Tracheal intubation and the use of the flexible tube with sliding ivory piece to block the upper oesophagus. (Page 205: *Observations on Apparent Death 1815)*

Many techniques which were current at the time but have since been abandoned, such as tobacco smoke clysters, are described and then dismissed, usually with good physiological explanations of why they should be avoided. There is a brief mention of the use of electric shocks as a means of resuscitation but little detail of how they should be used.

Later history of the Preservative Society

It is sad that the full records of the Society have not survived and information about it is rather sketchy, mostly depending on sporadic reports of its activities in the local newspapers. At first it seems to have thrived. The committee were successful in maintaining public interest by a variety of activities including annual services at which sermons were preached, and on at least one occasion a special anthem was composed. Regular reports were produced and published both locally and in the *Proceedings of the Royal Humane Society* giving details of the number of cases treated and often including accounts of particularly interesting cases.

Despite the initial enthusiasm, sadly the fashion for resuscitation in Northamptonshire did not survive for long. The annual report for 1799 includes a gloomy report on the lack of public interest and declining funds of the Society. It is not clear how long it survived but it seems not to have been active after 1806. However, the presence of a copy of James Curry's second edition in the library at Northampton General Hospital suggests that resuscitation had not been completely forgotten in Northampton.

The annual reports of the Society documented the numbers treated and the outcome. About 75% of the resuscitations involved drowning - many of these a consequence of suicide attempts. The numbers treated under the aegis of the Society were quite small, probably less than 10 per year, but the results were surprisingly good with about 90% of the victims

surviving, often after very prolonged resuscitative efforts. These successes, and the encouragement the Preservative Society gave James Curry to produce his handbook, which for a short time proved very influential, were the main products of the enthusiasm of Squire John English Dolben.

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THE DEVELOPMENT OF IMMEDIATE CARE SERVICES IN THE UNITED KINGDOM

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In my career I have witnessed many remarkable developments in medicine and, of these, one which has especially interested me is the provision of skilled resuscitation in the field for the critically ill patient. Whilst mouth-to-mouth resuscitation is mentioned in *Genesis* (chapter 2, verse 7), it was not until the mid 18th century that Tossack and others, through the *Proceedings of the Royal Humane Society*, promoted its widespread use. Sadly, it did not find lasting favour. When, in 1858, Silvester described his method of artificial respiration this, with modifications, remained textbook teaching for the next 100 years.

The scene in 1958

When I qualified in 1958 effective resuscitation in hospital was unusual, never mind in the field. There were no bleeps to summon a doctor quickly, flashing coloured lights in the corridors were the norm, and only anaesthetists had any real skill in resuscitation. To put up a drip one would use a metal Guest cannula or the giving set needle, a drip set made of red rubber and glass, and finally the rubber bung with its glass tube air inlet would be inserted into a glass bottle of saline. Rapid transfusions could only be arranged by pressuring the air inlet with a Higginson's syringe, more usually used for inflating air up a sigmoidoscope! Should the unfortunate patient require artificial ventilation, then the outcome was uncertain, since the 'new' mouth-to-mouth technique had not yet been adopted by everyone. If cardiac arrest supervened, the houseman might perform internal cardiac massage having opened the patient's chest with a scalpel carried in the top pocket of his white coat! There was no crash trolley in 1958, so it would be unusual for sophisticated equipment, say for intubation, to be available on the ward.

It goes almost without saying that resuscitation being so haphazard in hospitals, there was no system of immediate care in the field, other than from an ambulanceman or occasionally a doctor, both of whom, apart from administering basic first aid, would bring the patient to hospital with all haste.

Advances in the 1960s

All this was soon to change. Medical research and wartime experience had led to a better understanding of the physiology of shock, and of the benefit to patients of early fluid replacement. From 1957 Professor Gogler[1] of Heidelberg began treating autobahn casualties by means of a mobile resuscitation ambulance with its own medical team. The benefits of on-site resuscitation were dramatic.

The 1960s saw the arrival of motorways in the UK, and with them came the most serious road accidents this country had so far witnessed, commonly involving multiple pile-ups in fog. In 1967 Dr Easton,[2] a GP in North Yorkshire, with a team of 34 volunteer doctors, began to work with

ambulance crews to provide full resuscitation at the scene of major incidents of all kinds, day and night. His example kindled enthusiasm in many general practices around the UK with the result that, during the 70s, GP flying squads multiplied and became a valuable adjunct to the immediate care service, working in liaison with ambulance crews.

A second type of immediate care service based at hospitals developed in the mid 60s. Hall[3] in 1965 and Collins[4] in 1966, published details of separate schemes in which a docotor/nurse team was carried by the ambulance service to the scene of an incident. In 1967 Dr Snook[5] introduced an 'Accident Flying Squad' at Bath in which, using his own fully equipped car he himself attended the scene of major incidents to work with the ambulance service.

Advanced training for ambulancemen

The third system of immediate care centred around the advanced training of ambulancemen who, it was hoped, would then have the necessary skills to resuscitate patients without further assistance from doctors. In the first two schemes there had been the question of whether resuscitation given by a doctor in the field could be shown to be beneficial to the patient, whereas in the present scheme it was very much a question as to whether ambulance staff could be taught the skills and put them into practice in a way that would satisfy medical opinion. Three centres, one at Bristol led by Dr Baskett, the second at Brighton under Dr Chamberlain[6] and the third here with the Bournemouth Ambulance Service all began tentatively around 1970. There were differences in the details of the training programmes at the three centres, and also in emphasis with regard to their ultimate aims.

Whilst the schemes at Bristol and Bournemouth were dedicated towards teaching the skill of resuscitation, including intravenous infusions, intubation and ventilation of patients, the Brighton scheme developed directly as an extension of coronary care in hospital. The Brighton crews were primarily given expert tuition in the recognition of arrhythmias and were able to give intravenous lignocaine or atropine and perform external DC defibrillation, if necessary. Pain relief was provided in all cases by Entonox. Each scheme developed slowly and independently of the others. pilot schemes preceding the final training schedules which, in each case, consisted of two phases, firstly a pre-hospital period of theoretical study, then a period of a month or more of whole time practical training in hospital, culminating in an official final assessment examination and the award of a certificate of competence.

Other developments contributed towards the expansion of immediate care schemes. Firstly, there was the creation in 1963 of the Commission on Accident Prevention, the Rescue and Resuscitation Sub-Committee of which was later formed to foster and coordinate immediate care schemes. Chaired by Dr Bernard Lucas, an anaesthetist and engineer of great experience and vision in this field, this committee drew together many of those who were involved in immediate care, and became a regular forum for discussion of future policy. The Bournemouth Advanced Training Scheme in particular was instigated at the suggestion of Dr Lucas.

The immediate management of cardiac arrest had improved with the ABC of airway control, mouth-to-mouth respiration and external cardiac massage. This message was beginning to spread, and organisations such as the British Red Cross and St John's Ambulance were instrumental in

introducing these techniques to industry and the general public. Additionally, their members attended large gatherings where they could provide efficient immediate care pending the arrival of a doctor or paramedic.

Finally, in the field of equipment, plastics had arrived in the early 1960s heralding the era of disposable pre-packed sterile equipment including cannulae, drip sets and endotracheal tubes. Mechanical devices associated with resuscitation were improving, for instance, the Laerdal portable mechanical suction apparatus replaced foot operated equipment and miniature pneumatic ventilators had resolved a similar problem with continued artificial ventilation in the field. The electronics revolution was beginning with the introduction of reliable portable shock-proof equipment such as radio telephones and ECG oscilloscopes. The plasma substitute Dextran 70 supplemented simple electrolyte solutions. At first, both were presented in bottles which made rapid transfusions a problem. Later, drip sets with ball valves, soft packs of crystalloid solutions and Haemaccel, which were safe to pressurise, finally laid this problem to rest.

Expansion of the Advanced Training Schemes took place mainly in Wessex during this period, with anaesthetists undertaking the hospital training, whilst the pre-hospital phase of training became centralised, initially at the Ambulance Training headquarters at Bishop's Waltham, then later at their new headquarters at Chippenham. Within a year or two, at the instigation of the Commission on Accident Prevention, a similar training programme was launched for the London Ambulance Service. Over the following years the scheme slowly expanded to other areas in the United Kingdom.

Unfortunately, no support was forthcoming from the government for many years despite a formal request from the British Medical Association in 1967. The Department of Health remained unconvinced of the benefits of advanced training for ambulancemen until 1978 following a crucial meeting at Harrogate where representatives of those involved with schemes were asked to defend their views. Finally the government acknowledged the Advanced Ambulance Training Scheme and in 1986, through the National Health Service Training Authority (later to become the National Health Service Training Directorate), a standard national training programme was adopted, which incorporated the best aspects of all three initial training schemes including that for specialised coronary care. The training manual contains protocols for the management of particular emergencies, and since 1990 has provided for the administration of a range of specified drugs. Steering committees composed of doctors and senior ambulance staff oversee all local service needs and are free to vary local policy as seen fit. In this way there is scope for progress as new equipment and treatments evolve.

BASICS

In concert with the improvements in the ambulance service the GP flying squad schemes increased by leaps and bounds to the extent that, by 1977, so many 'daughter' schemes had been set up that they become autonomous as the British Association for Immediate Care (BASICS).

BASICS has flourished over the intervening years and now has a membership of some 2,000 volunteer doctors in practices distributed countrywide, each available on a call-out basis to join ambulance crews and supplement the immediate care service. The scheme is fully recognised by

the Royal College of Surgeons of Edinburgh, who have introduced an examination for the Diploma in Immediate Medical Care. Additionally, the following four organizations are affiliated to BASICS and contribute to the overall provision of immediate care:

1. British Aeromedical Practitioners Association
2. Medical Equestrian Association
3. Royal National Lifeboat Institution
4. British Association of Rally Drivers.

In 1990 Advanced-trained personnel were renamed 'Paramedics' and, at the same time, acquired their distinctive green uniforms. By this time it is interesting to note that there was a number of women Paramedics in the service. Since 1991, qualified Paramedics have doubled from 3,500 to 7,000 in 1995, and represent 42% of all ambulance staff. The 1990s saw the appearance of helicopters in various strategic locations, the first being one complete with medical team, which operates from the roof of the Royal London Hospital. Since then, others funded by public subscription have been located in Cornwall, Devon, Lincoln, Kent and Wiltshire. These now supplement the government-funded helicopter service in Scotland and the coastal air-sea rescue service.

As for the future, there are still parts of the UK that are inadequately covered by any of the immediate care schemes. The target of one paramedic per emergency ambulance has not been achieved nationwide and response times to major incidents fall substantially below target levels in some areas. The average doctor still lacks skill in resuscitation but this is being addressed by the expansion of Acute Trauma Life Support (ATLS) and Acute Cardiac Life Support (ACLS) courses.

In conclusion, I take this opportunity to thank those who have willingly given their time and expertise to help in the development of our local training scheme in Bournemouth during the past 25 years. I pay special tribute to the enthusiasm of the first ambulancemen who subjected themselves to a gruelling extra training programme for no financial or promotional reward. Finally, I thank my anaesthetist colleagues without whose help the scheme could never have started and would not have survived.

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Dr Ronald Albert Fisher was born on 3 June 1917 and educated at Herversham School, Cumbria, Downing College, Cambridge and the Middlesex Hospital, London, qualifying in 1943. He then became a Surgeon Lieutenant in the Royal Navy, first on convoy duties in the Western Approaches, then in Russian waters, Gibraltar and Java, becoming medical officer in the port of Surabaja in 1945-46. On returning home he commenced a career in anaesthetics, taking the DA in 1947 and later becoming Senior Registrar at the Royal Victoria Hospital, Boscombe.

In 1953 he was appointed Consultant Anaesthetist to the Bournemouth and East Dorset group of hospitals, the first appointment to the group of an anaesthetist who had received a recognised training in the specialty. Until that time all anaesthetics had been given by general medical practitioners on a part-time basis. He became a Fellow of the recently formed Faculty of Anaesthetists of the Royal College of Surgeons in 1954. He became Head of Department and then Chairman of the 'cogwheel' division. He was a member of the Medical Advisory Committee, which in turn became the Medical Executive Committee, serving as Chairman of that committee for six years. He was also a member of the Hospital Management Committee for 11 years, representing the eastern end of the district.

Fisher was the second Clinical Tutor to be appointed in the Wessex Region, the first being another anaesthetist, Dr Argent of Portsmouth. The post in those days was associated with London University. In his role as tutor he raised money to build the post graduate medical centre at the Royal Victoria Hospital, Boscombe, the Wessex Regional Hospital Board matching his fund-raising pound for pound. This was an early example of Dr Fisher's knack for fund raising which was to prove invaluable in years to come. Among colleagues appointed by Dr Fisher when chairman of the Anaesthetic Division, were David Morris whom he supported in setting up the first NHS-funded chronic pain clinic in Wessex in 1966, and David Benazon whom he involved in starting an intensive care unit in 1965.

As Chairman of the Medical Executive Committee and a member of the Regional Medical Committee he saw the rivalries between specialties, and between Bournemouth and Poole as undesirable, and worked to improve relationships. Much of the problem in his opinion related to availability of beds. Shorter in-patient stays would have contributed to an easing of this pressure but at least part of the problem was the number of dying patients who occupied beds for relatively long periods. During a meeting with the physicians at the Regional Board, John Revans, Regional Medical Officer, made the passing remark: 'What you need is a Terminal Care Unit'. This started Dr Fisher thinking.

The Hospice - old concepts, new ideas

Hospices have been in existence since the 4th century AD and have often been linked with religious foundations. St Joseph's, Hackney, was founded in 1905. It was run by the Irish Sisters

of Charity, whose founder, Mother Maria Aikenhead, had opened her first hospice for the dying in Dublin in 1879.

St Christopher's in South London, a charitable foundation caring for patients with advanced malignant disease, run by Dr (later Dame) Cicely Saunders, had opened in 1967. Ronald Fisher met Dr Saunders and invited her as a speaker when he was President of the Bournemouth and Poole Medical Society. He determined to set up a hospice on an NHS hospital campus, the first within the state system. Some of the support for what was initially seen as a 'terminal care unit' came from those who saw the opportunity to rationalise bed usage. Although in 1972 the minutes of an Anaesthetic Divisional meeting referred to 'the terminal care unit', Dr Fisher's own vision was somewhat wider. He felt that hospices should not just be for cancer, nor should they be purely terminal care units. There should be a strong element of rehabilitation. Respite care should be provided for the sake of relatives, as cancer is a disease with effects on families as well as victims. Day care facilities should be provided. Care should be taken into the home. Every patient would have an initial home visit. A home care sister would make a return visit bringing any prescribed drugs the next day. An aphorism of Fisher's was: 'Care of the dying is care of the living'.

Dr Fisher spent periods at St Christopher's, at St Anne's independent hospice in Manchester and at a Marie Curie unit studying their different methods, and evolving his philosophy for the proposed unit at Christchurch. The unit should have its own character. He considered St Christopher's to be 'too religious' but the religious aspect was not to be ignored. The post of chaplain was very important. Talking and listening, love and hope were vital. A garden was an essential part of the hospice: 'Capture as many moments of the patient's day as possible', and window sills should be low so the garden could be seen.

Good modern scientific medical and nursing care were to be the basis for the unit but humanity was to shine through. Realistic hope ('little miracles') should be offered, as should expertise in symptom control, counselling, drugs, social and spiritual care and, very importantly, the time to listen. Listening was to be supplemented by information obtained with the other senses: 'Listen with the eyes as well'. A phrase of Shakespeare's - 'give sorrow words' - was also to express the philosophy of the unit. The *quality* of life was to be of prime concern and sometimes out of this would arise an increased quantity of life.

There were those who had doubts. Cicely Saunders did not think a hospice on an NHS campus would work. Some GPs and district nurses did not see the necessity. Senior nurses were concerned about the increased nurse/patient ratio required. It took time for the concepts to be understood. The Regional and District authorities however encouraged the idea, and support came from those colleagues who saw the unit as a method of introducing more appropriate use of acute beds.

Financing the new unit - Cancer Relief Macmillan Fund

The unit cost about £150,000 (roughly £1,250,000 in modern terms). Here Ronald Fisher's gift for fund-raising came into its own. The League of Friends of the Royal Victoria Hospital contributed a third of the total, and Fisher raised a similar amount from the public, through a

committee which included members of the local branch of the National Society for Cancer Relief. This Society was formed in 1911 by Douglas Macmillan, a civil servant whose father had suffered a distressing death from cancer. At the time of the planning for the Christchurch unit the chief executive of the National Society for Cancer Relief was Major Henry Garnet, and Fisher approached Garnet for support.

Until that time the National Society for Cancer Relief had provided funding for nursing care for the dying, some cash grants to patients, and in 1970 had given money towards independently funded hospices such as St Anne's in Manchester and St Luke's in Sheffield. They had not previously put money into NHS buildings. Dr Fisher persuaded Henry Garnet to change this policy, and the National Society for Cancer Relief agreed to donate the remaining £50,000 required for setting up the new unit. Garnet suggested that the hospice should be named after the founder of the National Society for Cancer Relief, Douglas Macmillan and so its name became the Macmillan Unit. It was not until 1988 that the Society incorporated Douglas Macmillan's name into their own title, becoming Cancer Relief Macmillan Fund.

Financial independence of the Christchurch unit was guaranteed when Dr Fisher set up the Macmillan Cancer Trust, a local fund with Dr Fisher as founder Chairman and Charles Hall, a local business man as administrator. The inaugural meeting of trustees of the Macmillan Unit was held on 28 August 1974. The Duchess of Roxburghe, chairman of the National Society for Cancer Relief, laid the foundation stone of the new unit on 18 May 1973. The Macmillan unit was opened on 24 February 1975 and Dr Fisher remained its director until his retirement from the NHS in 1982.

The opening of the in-patient facility of the Macmillan unit was preceded in January 1975 by the appointment of three home care sisters, Jenny Penson, Penny Mogg and Margaret Rapson. After a short time, Margaret Rapson took over the ward and was replaced on the home care team by Ann Newbury. Penny Mogg is now the sister in charge of the acute pain service at Bournemouth. Like Dr Fisher, these first Christchurch home care sisters spent time at St Christopher's before taking up their posts, and they became the forerunners of the Macmillan nursing service. There are, however, subtle differences between the service set up and still running at Christchurch, and the Macmillan nurses. The home care sisters from the Macmillan unit work with the consultant in charge of the unit and form part of an integrated team including physiotherapists and social workers, whereas Macmillan nurses are responsible to the senior nurse in charge of district nursing services and are attached to general medical practices. The Christchurch home care sisters are NHS funded whilst at least initially, Macmillan nurses are funded from Cancer Relief Macmillan Funds.

As well as inpatient and home care, a third element is day care. This has become of increasing importance since the Community Care Act, and is of particular value in providing relief for hard pressed caring relatives. St Luke's hospice run by Dr (later Professor) Wilkes and the Christchurch Macmillan unit, pioneered day case care at about the same time (1975-1977). Penny Mogg and Jenny Penson visited St Luke's, increasing the cross-fertilisation of ideas. Initially, patients were invited to 'come to lunch' on the unit. Care such as dressings, provision of company ('the loneliness of the cancer patient') and occupational therapy could then be provided and the progress of the patient's disease could be monitored.

Education

As the Macmillan unit developed, aspects of Dr Fisher's philosophy became clearer. Education was to play a pivotal role. An education centre was built as part of the unit. Much of the teaching was aimed at district nurses, stressing good pain control using regular medication and the analgesic ladder. Good home care in turn took the load off the hospital. One-week courses were run by Dr Fisher in Cambridge for European nurses and, later, a series of seminars for Macmillan and district nurses sponsored by Napp (the manufacturers of MST). These are now run by Dr Tim Hunt of Cambridge. Ronald Fisher and Jenny Penson produced a book *Palliative Care for People with Cancer*. Its second edition was published in 1995. At the time of writing this paper, another is with the publishers - *Palliative Day Care* - by Ronald Fisher and Pearl McDaid.

The NHS authorities asked Fisher to join a Council of Europe commission on 'Dying People' which was based in Strasbourg from 1977 to 1980. He became chairman of this group, and after his retirement from the NHS he became Honorary Consultant to the National Society for Cancer Relief and a member of its Executive Committee, visiting other units and lecturing at post graduate medical centres throughout Britain. His Justice of the Peace training helped when a 'trouble shooter' was required, as he had learned to listen before giving advice. The group of National Society for Cancer Relief experts which he headed became known as 'Ronnie's Circus'.

The Governor of Gibraltar invited Dr Fisher to advise on setting up a day care unit, and he visited and lectured in Malta, France, Belgium and Canada. The hospice at the Riverside hospital in Columbus, Ohio was founded by oncologist Dr Warren Wheeler and nurse Libby Bradford. Fisher was invited to open this hospice, the first in the USA, and when Ms Bradford died of cancer herself, he was invited back to deliver the first Libby Bradford Memorial lecture.

Conclusion

How has the vision of Dr Fisher and other pioneers in the hospice movement been realised, since the foundation of the Christchurch Macmillan unit in 1975? A consultant radiotherapist, Dr Robert Dickson, from Mount Vernon Hospital, and Dr Robert Twycross from Oxford, were early visitors to the Christchurch unit and they set up two hospices within the NHS within two or three years. Other visitors followed, and there are now some 14 purpose built hospices within the NHS.

Palliative care has been recognised as a specialty by the Royal College of Physicians, and its provision has been revolutionised. Until recently, purchasers had to have contracts with independent (charitable) providers of cancer care. Under recent legislation the Health Service's responsibility to the cancer patient is recognised, and the health commissions are obliged to purchase adequate services whether these be from the independent or public sector. They can thus review and balance the network of care. Cancer care in East Dorset is now provided mainly by the NHS. Even the Lewis Manning unit at Poole, whose building was donated as a charitable bequest, is half NHS funded. The new legislation is a fulfillment of the vision of Ronald Fisher.

THE MINNITT GAS-AIR APPARATUS

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Background

The first obstetric anaesthetic was administered in 1847 by James Young Simpson, Professor of Midwifery at Edinburgh. He used diethyl ether and then, later that year, chloroform for the same purpose. John Snow administered chloroform to Queen Victoria during childbirth in 1853 and 1857, without loss of consciousness of the patient. Nitrous oxide was probably first used in obstetrics by Klikowitz in 1881.

Robert James Minnitt was born on 25 October 1889 and graduated in 1915. He was a general practitioner who was also honorary anaesthetist to several Liverpool hospitals including the Liverpool Maternity Hospital. It was at the request of the clinical investigation subcommittee of the Medical Board of the Liverpool Maternity Hospital that Minnitt began his investigations to improve obstetrical analgesia.

The Apparatus

In 1934 he presented, with the help of Charles King, his first gas-air apparatus, employing nitrous oxide in air, for use as analgesia during labour. This apparatus fulfilled four main criteria which Minnitt considered important. It provided analgesia without prolonging labour, it was applicable to general practice, it could be used under the supervision of a trained midwife, and it was self-administered. The combination of nitrous oxide and air had been used in America, administered by a McKesson apparatus which delivered 70% nitrous oxide. Minnitt considered the unsatisfactory results to be due to too high a concentration of gas. His apparatus delivered approximately 45% nitrous oxide.

The original version consisted of a McKesson valve attached to a cylinder of nitrous oxide. Gas flowed from the cylinder via a pressure reducing valve to a rubber bag enclosed in a metal drum. The reducing valve maintained a pressure of 50-60 lb/in^2 as indicated by a pressure gauge. An automatic valve caused flow from the cylinder to cease when the bag was full. As soon as the bag deflated following inhalation, more gas was allowed to enter the bag. The outlet of the machine was divided into two channels - one for the passage of gas and the other for the admission of air through five small holes. The resultant mixture was about 45% nitrous oxide in air. Above the outlet channels a check valve intermitted the flow of the mixture, the whole action thus being controlled by the patient's inhalational force. In some models, a finger hole was cut into the holder fitted to the face mask, which had to be occluded by the patient during inhalation. When the finger was removed only air was inhaled. The nitrous oxide cylinder contained 100 gallons, and Minnitt estimated consumption to be in the region of 35-40 gallons per hour. He stressed that the apparatus was only to be used for analgesia and not for obstetric surgical procedures.

The machine was originally used by Dr Hilda Garry at the Liverpool Maternity Hospital and Dr John Elam at the Wellhouse Hospital in Barnet. Initial results were presented to the Royal Society of Medicine in August 1934, and the apparatus was endorsed for further use by the Liverpool Maternity Hospital. Portable models were produced. Minnitt investigated the effects of the gas-air mixture on the mother and foetus. He performed electrocardiograms and measured maternal and foetal heart rates, as well as estimating maternal and umbilical vein oxygen content. Despite the patient breathing about 11% oxygen, the only difference he found was a slight reduction in maternal blood oxygen whilst the umbilical vein oxygen content remained unaltered.

By 1936, 400 of the devices were in use. In Liverpool alone, the Minnitt apparatus had been used for 1,025 deliveries producing good analgesia in 92%. At this time the McKesson regulator was replaced by a reservoir bag with a pinchcock valve. The check valve became spring-controlled and the air holes of predetermined size. The apparatus was accepted by the Central Midwives Board. By May 1943, 1,785 midwives had been approved to use the machine, having undergone a series of four lectures, and demonstrated practical knowledge of its use.

Further developments

In 1937, the apparatus was further modified by the addition of the Chassar-Moir or CM attachment (*the meaning of the initials CM is disputed; see Peter Cole's comment, Proceedings of the History of Anaesthesia Society: Vol 16, p 65. Ed.).* This device consisted of a ring cut into the wall of the outlet pipe, connected by a small bore tube to the low pressure side of the reservoir bag. Nitrous oxide at 1 litre per minute passed into a 2.5 litre reservoir bag. A flap-valve separated the inlet on one side from the output to the patient on the other. This allowed the patient two or three breaths of 100% nitrous oxide. When the bag was exhausted, the usual gas/air mixture was supplied. The CM attachment gave a faster onset of analgesia, but invalidated supervision by midwives. However Minnitt machines modified to take this adaptation could still be used without it. Minnitt stressed the importance of ante-natal tuition, and of timing the inhalation of the mixture as pain started.

Minnitt's apparatus was used successfully in obstetrics for more than 25 years. It was superseded in the 1950s when trichloroethylene was administered in air, and ultimately by the introduction of Entonox. It was barred by the Central Midwives Board in 1970. Robert Minnitt died four years later at the age of 84.

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A RETURN TO THE HIPPOCRATIC OATH

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THE OATH

I swear by Apollo the healer, by Aesculapius, by Health and all the powers of healing, and call to witness all the gods and goddesses that I may keep this Oath and Promise to the best of my ability and judgement.

I will pay the same respect to my master in the Science as to my parents and share my life with him and pay all my debts to him. I will regard his sons as my brothers and teach them the Science, if they desire to learn it, wiothout fee or contract. I will hand on precepts, lectures and all other learning to my sons, to those of my master and to those pupils duly apprenticed and sworn, and to none other.

I will use my power to help the sick to the best of my ability and judgement; I will abstain from harming or wronging any man by it.

I will not give a fatal draught to anyone if I am asked, nor will I suggest any such thing. Neither will I give a woman means to procure an abc -tion.

I will be chaste and religious in my life and in my practice.

I will not cut, even for the stone, but I will leave such procedures to the practitioners of that craft.

Whenever I go into a house, I will go to help the sick and never with the intention of doing harm or injury. I will not abuse my position to indulge in sexual contacts with the bodies of women or of men, whether they be freemen or slaves.

Whatever I see or hear, professionally or privately, which ought not to be divulged, I will keep secret and tell no one.

If, therefore, I observe this Oath and do not violate it, may I prosper both in my life and in my profession, earning good repute among all men for all time. If I transgress and forswear this Oath, may my lot be otherwise.

Science and Western Medicine are founded on the Greek and Ionian philosophy of the 6th to 4th centuries BC. I studied this philosophy over several years particularly when exploring the interdisciplinary aspects of a programme for the treatment of nerve injury pain. The dramatic changes and ethical problems in anaesthesia today have prompted me to reconsider the Hippocratic Oath, which for some 2,400 years has offered doctors an ethical code of practice.

This paper considers only the opening line of the Oath and briefly explores the significance of Asclepius,* the founder of Greek Medicine, and Apollo the healer, son of Zeus and Leto and patron of poetry, music, art, mathematics, medicine and science. But first some reference must be made to Hippocrates himself - the physician to whom the Oath is attributed and who still represents the ideal of the dedicated, compassionate and discreet doctor.

Hippocrates

Hippocrates was born and worked on the island of Cos. He lived from about 469-399 BC. Among his contemporaries were Plato, Socrates, Pericles and Democritus - a physician reputed to have been one of Hippocrates' tutors, but better known as a philosopher who developed further the atomic theory of Leucippus.

Hippocrates introduced a rational system of enquiry into medicine and this he did by first rejecting the old verbal therapy and not concerning himself with the divine, the daemonic or the soul. He believed that Medicine should function independently of philosophical hypotheses and instead he emphasised the need for the rational interpretation of meticulous observation. The so-called Hippocratic Corpus consists of some 60 treatises written mainly between 430 and 330 BC which are thought to have been collected by scholars working in Alexandria in the 3rd century BC. There is nothing to confirm that any of them or the Oath were written by Hippocrates; however one treatise 'The Nature of Man' can it seems, with some confidence, be attributed to Polybus the son-in-law of Hippocrates and his successor as tutor to the students at Cos. This treatise considers health to result from the proper proportion of the four humours - blood, phlegm, black and yellow bile. Opposing factors, particularly hot and cold, wet and dry, were noted and incorporated into treatment. Hippocratic medicine believed the soul could be altered by the proper use of food and drink, exercise and baths.

Symbolism in mythology

This extraordinary, artistically and intellectually creative century, the 5th BC, saw a fundamental change from an essentially mythological to a noetic logos. Scientific thought developed and philosophy changed from a study of nature to the study of the human soul, yet the Oath swears by Apollo and Asclepius. A few words from *The Iliad* take us at once to that earlier medical practice and the mythological involvement in healing.

* *Asclepius is the spelling from the Greek. Aesculapius is from the Roman interpretation of the name.*

From Chapter XV: 'Patroclus sat in the tent of brave Eurypylus and was making him glad with talk and on his cruel wound was laying herbs to medicine his dark pain.' In the next chapter Apollo answers the prayer of Glaucos by 'allaying his pains, staunching the blood of his wound and instilling courage into his spirit.'

The Greeks traced the origins of Medicine back to the founder Asclepius who was reputed to have had a daughter Hygeia and twin sons Machaon and Podalarius, mentioned by Homer as heroic physician surgeons at the battle of Troy. Since the battle is dated to the 11th or 12th century BC and Homer to the 8th or 9th century BC, the accuracy of this is in some doubt. Galen, born about 129 AD, reports that Asclepius assigned to patients the task of composing odes, comic skits and songs to correct the disproportion in their souls.

The symbolism in mythology holds its own logic and rationality and I would like to offer a brief account of the mythology associated with Asclepius. He is said to have been the illegitimate son of Apollo and Coronis, daughter of the founder of the city of Phlegyas. He was exposed at birth on Mount Titthion, famous for its medicinal plants, and here he learnt the arts of hunting and healing from Apollo and Cheiron. Athena is reputed to have taken two phials of blood from the gorgon Medusa: the one from the right side she used to destroy life and instigate wars, that from the left she gave to Asclepius to save life and to heal. After Asclepius had raised several people from the dead, Hades complained to Zeus that his subjects were being stolen from him and that Asclepius was being bribed with gold, so Zeus killed him with a thunderbolt.** In revenge, Apollo killed the Cyclops who was the armourer to Zeus, which so enraged Zeus that he banished Apollo to Tartarus, but his mother Leto pleaded for his forgiveness and promised he would mend his ways. His sentence was reduced to one year's hard labour tending the sheep of King Admetus. Apollo it seems carried out this task well and with humility, and thereafter preached 'moderation in all things' - thus recognising the sin of excess or 'hubris' so important in the ancient Greek culture. His watch words were 'Know thyself' and they were written over the gate to the Temple at Delphi.

I conclude by returning to the 20th century and quoting from the lively book *The Greeks* by H.Kitto:

> 'The doctrine of the Mean is characteristically Greek, but it should not tempt us to think that the Greek was one who was hardly aware of the passions, a safe, anaesthetic, middle-of-the-road man. On the contrary he valued the Mean so highly because he was prone to the extremes..... When he spoke of the Mean, the thought of the tuned string was never far from his mind. The Mean did not imply the absence of tension and lack of passion, but the correct tension which gives out a true and clear note.'

** *Some reports claim that Asclepius was later restored to life and deified by Zeus.*

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DR WEBBER AND HIS APPARATUS

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The DA examination, when I took it nearly fifty years ago, consisted of a paper and a viva. It was necessary to give evidence of having administered 1,000 anaesthetics, of which 500 had to be for major operations. In 1946, it was possible to read almost all the Anglo-American textbooks of anaesthesia. At the viva, there were two examiners sitting at a long table which was covered with pieces of apparatus, the majority of which had been loaned by Mr Charles King. If one was wise, one went a week or so before the examination to his shop in Devonshire Street in Marylebone, where he displayed and named all the equipment he was going to send to Examination Hall in Queen Square. It was hardly surprising that I was able to recognise Webber's modification of Boyle's bottles when I was shown it by Dr Archie Marsden, later the first Dean of the Faculty of Anaesthetists, and Professor Robert Macintosh.

I never saw it used, but seeing it again much later in the Charles King Collection at the Association offices, I was determined to find out a little more about it and about Webber himself. This proved more difficult than I expected.

Harald Norris Webber was born in Preston, Brighton, on 9 July 1881. The eldest son of W H Webber, he was educated at Brighton Grammar School and from there went to St John's College, Cambridge. He took the Natural Sciences Tripos in 1903, with an MA degree. He stayed on for another five years, working with W H R Rivers, who was Lecturer in Experimental Psychology there and was doing research into the effects of alcohol, caffeine and some other drugs on fatigue.[1] His work was the subject of his Croonian Lecture at the Royal College of Physicians in 1906, and in it Rivers paid warm tribute to Webber, saying that he had done much valuable work on the ergographic recording of muscle fatigue. He was able to devote more time to the practical work than Rivers, who found also that muscle pain restricted his ability to perform the necessary actions satisfactorily. He was apparently much less affected than Rivers by the stimulant effect of caffeine but, being a total abstainer, he acted as an excellent 'own control' before taking the required dose of 40 ml of alcohol!

On leaving Cambridge, Webber went to University College Hospital, qualifying in 1912. After two years' house jobs at the West London Hospital, he joined the RAMC in 1914, reaching the rank of major although, while in Egypt, he nearly died of typhus, which affected his health for many years afterwards. He returned to UCH in 1920 and, under the influence of Felix Rood, developed an interest in anaesthetics. It was about that time that he designed his modification of Boyle's bottles, but as he never appears to have published anything about it, the exact date is not known, and the details are gained from other sources.

Webber's modification of Boyle's bottles

In the textbook of anaesthetics published by him and Felix Rood in 1930, the only reference is as follows:

> 'If, however, the bottles are placed in parallel so that the stream of air and oxygen is divided between them, as in Shipway's apparatus *or modification of Boyle* [my italics], some approximation to a steady composition [of chloroform or ether] is obtained.[2]

In 1916, Sir Francis Shipway had designed an apparatus for insufflating either ether or chloroform intra-tracheally.

Chapters on anaesthesia written by Webber in two surgical textbooks, C Flemming's *Minor Surgery* in 1946 and in two editions of a book on minor surgery by Gwynne Williams, one with Dudley Buxton in 1930, and the other in 1936, make no mention of it. He does not appear to have published any papers and, even when President of the Section of Anaesthetics of the Royal Society of Medicine in 1940, gave no address and took no part in the discussions during that year. W R Merrington, in his *University College Hospital and its Medical School*, published in 1976, merely states: 'H N Webber introduced in 1925 an important modification of gas, ether, chloroform apparatus'.[3] There is hardly any reference to Webber in the Medical School Library or in the *Gazette*.

Bryn Thomas, in his textbook, *The Development of Anaesthetic Apparatus*, states that the Webber modification dates from 1920.[4] An illustration of a later model appears in the first edition of Langton Hewer's *Recent Advances in Analgesia and Anaesthesia* in 1932, and seems to be the same as that in the Charles King Collection dated 'c.1935'.[5] (Figure 1). Bryn Thomas gives a description of the 1920 apparatus, which obviously has some similarities to Shipway's bottles.

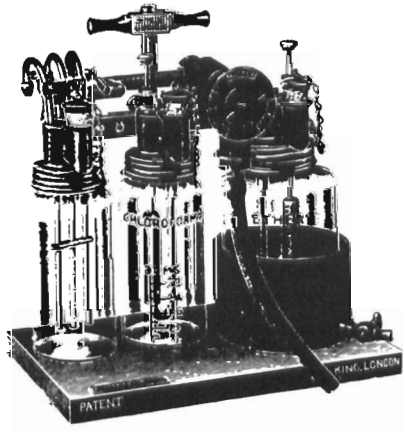

Figure 1. Webber's Apparatus (1925) ***(Recent Advances 1932)***

Briefly, the gases entering the bottles are controlled by a lever attached to a cock which allows them to be bypassed through the apparatus, or passed partly or wholly into one or other bottle, or into both bottles simultaneously, so that the air or gases do not allow chloroform vapour to contaminate the ether, or vice-versa. The original apparatus had a third bottle containing a water-sight feed. The control lever rotates an inner tube with ports which allow any concentration of vapours to be passed. A small-bore delivery tube lies below the control lever. Bryn Thomas suggests that this was attached to a Cattlin reservoir bag before the gases were passed to a face mask. Three gas inlets for N_2O, O_2 and CO_2 have separate water feed tubes, that for N_2O being U-shaped to allow for eleven side holes. The CO_2 and O_2 tubes each have five side holes, that for O_2 having a glass tube at the top, presumably to permit the passage of a large volume of O_2 if required. The tubes in the ether and chloroform bottles each have two small holes at their lower ends and one larger hole above.

Dr Charles Foster has kindly given me a photocopy of the specifications of the patent for an improved version taken out by Coxeter & Co in 1925. (Figures 2 and 3). As I can find no other description of Webber's bottles, the dates are confusing; the model dated 'about 1935' appears to be a later version of this. The ports and attachments are of a greater calibre, more appropriate for the wide-bore tubes of modern apparatus, and appear to have been intended to enable use of the equipment as a draw-over vaporiser, if required. The patent specification shows (**Figure** 2) a front view of the apparatus. A lever, its movement shown on a graduated scale, rotates an inner section. Figure 3 shows a section through A-A on Figure 2 to illustrate its working.

The inner tube 2a, 2b, 2c is rotated by the lever 3a over a graduated scale 11. In the position shown, the rotatable inner tube has its two ports 2a and 2b, which are separated by a partition, allowing gases from 13 to enter the chamber 5 and escape by 12 through 14 to the patient, thus bypassing the ether and chloroform. The tube 2 can be rotated so that its ports 2a and 2b allow gases partially to enter one or other, or both, of the bottles containing ether and chloroform, without one being contaminated by vapour from the other. The two tubes extending into each bottle are one for the entry and the other for the exit of the gases. The control on the '1935" model is basically the same, but the layout is more like the Boyle's apparatus (Figure 1). It was said to have been in use at University College Hospital as late as 1955.

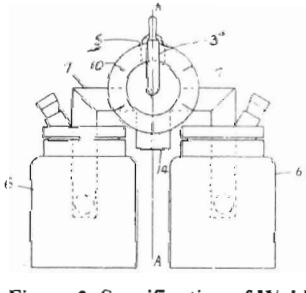

Figure 2. Specification of Webber's Apparatus (front view)
(Figs. 2 & 3 by courtesy of Dr C A Foster)

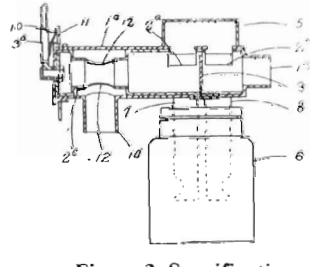

Figure 3. Specification of Webber's apparatus (vertical section through A-A on Fig.2)

Webber the man - conflicting memories

What about Webber the man? Unfortunately, little is known about him apart from what appears in his obituary notices. However, I have received some interesting letters from various members of the surgical staff of the hospital who remember him. In 1991, when I began my enquiries, none of the anaesthetists remembered him or had only the vaguest recollection of him. He does not seem to have made a great impression on his colleagues. Dr Brian Trotter, the late Wilfred Trotter's son, remembers him as a competent but not particularly inspiring teacher. Mr Bernard Harris recalls him as a tall, rather extroverted person, always with a cheerful word and a smile for the juniors and courteous to everyone. His bent was practical, not academic. On the other hand, Sir David Innes Williams remembers him on the day when he was bombed out of his flat in 1940, at a time when he gave anaesthetics for his father. To him he appeared as having a rather lugubrious, not to say hangdog, expression, with a mirthless laugh when recounting some disaster, but he was very impressed by his expertise as an anaesthetist. In his obituaries, he is described as being reserved in character, with a keen, but sardonic, sense of humour. He was scrupulously punctual and courteous to his patients, whom he always visited both before and after operation - not so very common in these days. Everyone agreed that he was a very skilled anaesthetist.[6-8]

Harald Webber died in University College Hospital, on Christmas Eve 1954, aged 73, from the complications of a major resection for carcinoma of the colon. His home for many years had been in Bricket Wood, near St Albans, but exhaustive enquiries failed to reveal where he was buried or cremated. The funeral was private, 'no letters, no flowers', as the notice in the *Times* stated. Webber was married, but I have found no evidence of any children and I do not know what happened to his wife, who survived him, and I have not been able to trace any of his siblings. Quoted in his obituary notice is his only epitaph: 'Semper fidelis'. I feel that many of us would be happy if we deserved that.

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THE BIG LITTLE PROBLEM

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The 'Big Little Problem' was the title of an editorial[1] in 1991 by Patricia Kapur from the University of California. The problem she wrote about was postoperative nausea and vomiting, or PONV as it is now abbreviated - one of the less euphonious of the current crop of acronyms. It is not of course a particularly euphonious subject. The problem has been with us since the beginnings of anaesthesia, and although it must be true that the incidence and severity is not what it was, the subject is still under discussion today with new and expensive anti-emetics, and the increasing demand for day case surgery. Prompted by a recent hospital audit, I looked through some textbooks to see how our predecessors dealt with the problem.

Some early remedies

Snow in his 1858 book[2] described doing nothing to start with, as the vomiting usually subsided. If it did not, he used a little cold brandy and water. For persistent vomiting he added opium.

Later authorities gave water at varying temperatures - usually hot, sometimes luke-warm, and sometimes as ice cubes - and in varying quantities from a few sips to a tumbler-full or more. Frequently sodium bicarbonate was added to the water. It has been remarked that a majority of patients vomit only once and then with benefit. Whether the induction of emesis by drinking is callous or unfeeling is a matter for argument. Rood[3] in 1917 picturesquely wrote that half a pint of warm water would be ejected together with any anaesthetic-sodden mucus. Alfred Lee in earlier editions of his *Synopsis of Anaesthesia* suggested that vomiting for more than 24 hours may be helped by the rapid swallowing of a pint of warm water containing a teaspoonful of sodium bicarbonate, which would probably be returned and would wash the stomach out with benefit. Washing out the stomach was common advice, to reduce gastric irritation from swallowed ether vapour; both Boyle,[4] and TAB Harris[5] of Guy's recommended this as routine before the end of the operation, using a Ryle's tube.

Beverages mentioned are strong black coffee[6] (Langton Hewer), and tea with lemon[7] (Magill). There are references to effervescent drinks such as iced soda water and ginger ale. Fruit and fruit juices were popular. Hewitt recommended sucking a thin slice of lemon to remove the taste of ether.[8] The third edition of Wylie and Churchill Davidson in 1972 stated that pineapple was remarkably refreshing to the stomach, while oranges and grapefruit have also had their adherents. Maxsen recommended smelling salts or capsules of aromatic ammonia in spinal anaesthesia;[9] Flagg of the *Art of Anesthesia* and the Can, favoured the inhalation of strong perfume.[10] Vinegar fumes are often referred to. Gwathmey of New York, the first president of the American Association of Anesthesiologists, preceded ether induction by the inhalation of the vapour of essence of orange or 1% cologne, and claimed a reduction in postoperative vomiting.[11]

Rather more striking is the use of carbon dioxide. This seems to have originated with Levi of Florence in 1912. He used 10-15% CO_2 to shorten recovery time in chloroform anaesthesia, and noted an effect on post-chloroform vomiting.[12] He admitted his debt to the studies of Yandell Henderson, the Professor of Physiology at Yale University, who measured minute volumes of up to 70 litres in patients inhaling CO_2! De-etherisation using oxygen and CO_2 is mentioned in the first edition of Langton Hewer's *Recent Advances* of 1932. What is not clear is whether this or any of the other techniques were widely used, or whether they were effective.

Drug treatment

As far as drugs are concerned the role of scopolamine and atropine are well enough known; they were perhaps used more prophylactically than therapeutically. Of the other drugs which have been used, adrenaline[13] and cocaine[14] were probably more emetic than the reverse; nicotinic acid was thought to be of benefit in the sickness associated with pellagra and with radiation, but Mushin and Wood found it had no effect on postoperative sickness;[15] pyridoxine was used to treat hyperemesis gravidarum, and Bergmann of Colorado in 1947 claimed it eliminated vomiting in ether anaesthesia, but he only described 12 cases.[16] Tincture of iodine appears frequently and the basis for this is not obvious, since apart from its use in iodine deficiency it was generally regarded as an antiseptic and an expectorant. However I did gain the impression from an uncle in pre-war general practice that iodine preparations were the cortisone or prednisolone of the time, and used for just about everything.

There was a degree of serendipidity in the discovery of the anti-emetic properties of the anti-histamines and phenothiazines introduced in the late 1940s and early 50s. Dramamine was passed by the manufacturers to an allergy clinic at the Johns Hopkins Hospital for trials in hay fever and urticaria, and a pregnant patient claimed complete freedom from car sickness, which she had suffered all her life.[17] Chlorpromazine was originally used in 'artificial hibernation' anaesthesia, and its anti-emetic properties emerged later.

Empiricism and eccentricity

It was readily admitted that much early treatment was empirical, and the days of empiricism may not be quite over. In the 1984 edition of Wylie and Churchill Davidson, Dr Gregory of Charing Cross Hospital noted that: 'Even the special drugs failed to control sickness in some patients so that less specific and homely but nonetheless practical procedures may be beneficial. Sips of cold water to which a little bicarbonate or iodide has been added are often helpful.' There have been a few recent papers on zingiber officinale or powdered ginger root, the active constituents of which are unknown. Given preoperatively, it has been better than placebo, and as a postoperative anti-emetic, better than metoclopramide.[18]

For the sake of completeness one should mention the incidental benefit found by two anaesthetists who believed in the treatment of acidosis. Wesley Bourne of Toronto showed that ether anaesthesia increased phosphate excretion in the urine. He prescribed a solution containing

sodium bicarbonate, sodium phosphate and glucose.[19] RJ Minnitt of Liverpool compared the hyperglycaemia and ketonuria of the surgical patient with the diabetic state, and used intravenous glucose and insulin.[20]

Other techniques include preoperative suggestion, hypnotism and acupuncture. In 1963 Riding[21] described some forms of therapy as ingenious, fanciful and heroic. Reading more widely I am tempted to add surprising, eccentric and even callous. One way of looking at the problem is to pretend that it does not exist: 'When ether by the open method in conjunction with morphine is the anaesthetic employed vomiting is rare as a complication of abdominal operations. Since this anaesthetic has been the one usually adopted for my patients I do not think I have had to treat a single case of postoperative vomiting' - regrettably I have mislaid the source of this presumably surgical opinion. Hewitt thought he could identify the potential vomiters - rosy-cheeked children, young women of good colour and full lips, and flabby-looking individuals with unhealthy and dusky appearance. Some patients may have preferred their physician not to admit there was a problem. Lauder Brunton believed that hydrocyanic acid (HCN) lessened the irritation in the stomach.[22] It must be used in dilute solution, 5-8 minims of 2%. Overdose, he said, would tend to produce death.

Less lethal, but still unpleasant was the application of counter-irritants such as mustard to produce an epigastric blister. Counter-irritants were used in various forms of neuralgia, and because they were believed to divert blood flow from diseased parts, were applied in the treatment of pleurisy and tuberculosis. Hewitt mentions their use in his 1907 textbook, and the idea was probably just copied into subsequent texts. One commentator compared the blister to a third degree burn. Labat of New York in his *Regional Anesthesia* of 1923, said that if the patient tried to vomit his nostrils should be held tight by the fingers so as to compel him to breathe through the mouth, thus relaxing the abdominal wall and improving the condition.

One opinion was that vomiting is not an unmitigated evil, in that improvement in colour, blood pressure and respiration may frequently be seen after emesis during spinal anaesthesia. A surgical view was presented by Hamilton Bailey in the 1930 edition of *Emergency Surgery*. 'Vomiting occurring during the first 48 hours is not as a rule a matter for serious concern; this vomiting is no doubt related to local ileus. The treatment in the first 48 hours is: Nil by mouth, a quarter of a grain of morphine; after straining through gauze the vomited bile is mixed with normal saline and returned to the patient per rectum. I have used this method for two years. It is exceedingly difficult to say whether the ingested bile has any therapeutic effect but it certainly does no harm and is well tolerated. If vomiting continues for more than 48 hours a Ryle's tube is passed for aspiration and irrigation using two to three ounces of sodium bicarbonate with one minim of hydrocyanic acid, another quarter of morphine and a half cc of pituitrin; rectal saline and glucose are given. If vomiting recommences after this a serious view of the case must be taken. While we are most reluctant to reopen the abdomen a time is reached when in our judgement it is unwise to delay any longer. If the patient has been starved for some days an enema of brandy, eggs and milk may be given and the abdomen is reopened under gas and oxygen.'

Raising the head of the bed 12 inches was said to offer mechanical difficulty to vomiting.[21] The 1971 edition of Gray and Nunn's *General Anaesthesia* carried the advice that the nurse could assist by placing a hand on the epigastric region and applying gentle pressure. In this litiginous age such an action could well be misrepresented.

Conclusion

In Evans and Gray's textbook of 1965, Patrick Shackleton wrote of postoperative nausea and vomiting: 'It is an annoying and difficult problem. The attitude of medical and nursing staff varies from cool indifference to fussy solicitude, or even sometimes irritation with the unhappy victim.' It is possible to detect a hint of this latter in Magill's opinion that many patients make up their minds that they are going to be sick, and for them little or nothing can be done. A close parallel may be made with some cross-channel passengers. On the same theme, Gordon Ostlere wrote in 1949: 'Any patient who embarks on an operation prepared to vomit afterwards is certain not to be disappointed.'

Finally, and to save the best until last, a good champagne has been recommended over the years. It is mentioned by Hewitt, and one wonders if he gave it to the future King Edward VII. The disappointing news is that the dose advised is only a teaspoonful or at best a few sips.

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FRANCIS HOEFFER McMECHAN - 1879-1939

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Few British anaesthetists are today familiar with the name of Francis, or Frank, McMechan, but he was an important influence on the development of anaesthetic societies and publications. Though an American, born and bred in Cincinnati, Ohio, his influence was felt not only in North America, but also in Europe and Australasia.

McMechan's early life was important to his subsequent development and achievements. His father and grandfather were both respected physicians in Cincinnati. Born on 16 January 1879, he graduated from St Xavier College, Cincinnati, at the age of 17 and is said to have excelled in oratory, elocution, debating, dramatics and music, skills which he was to put to good use in later life. Too young for medical school, he spent three years as a reporter on the *Cincinnati Post* before entering the Medical School of the University of Cincinnati in 1900. His interest in dramatics continued and because of it he met his future wife, Laurette Van Varsevold, who was a student at a Cincinnati School of Acting. She happened to be a descendant of Baron Larrey, Napoleon's surgeon, and was a great help to him as he later became progressively crippled.

Francis McMechan practised general medicine in Cincinnati for some six years, developing a major interest in anaesthesia before his marriage to Laurette in 1909. Within 18 months he developed arthritis, and was forced to abandon clinical practice in 1911.

Triumph over disability

This would have been the end for most people, but not McMechan. In 1912 he attended the meeting of the American Medical Society on crutches and later became confined to a wheelchair or bed. Ralph Waters has described his appearance at the first meeting of the Interstate Association in 1915. At that time all joints appeared to be affected. He could manipulate a pencil only if it was put into his hand and he could eat using a special long-handled fork and spoon. Later on, as all the joints became ankylosed, he had to be fed. Despite these handicaps his brain was active and his speech was unimpaired until much later in life. The talents nurtured in his early education now bore fruit. Waters says that at a scientific meeting: 'in ten minutes he could present the major points made by each of the six previous speakers and the discussions all wrapped up in an intelligible package ready to take home'.

With help from Laurette, McMechan was able to turn his hand to publications and organisation of anaesthesia societies. These were the early days of anaesthetic publications in America. Waters has stated that at this time he was unaware of publications in England. The only texts available to him were the textbook of Gwathmey and Baskerville published in 1914 and the Quarterly Supplement of *Anesthesia & Analgesia*, with McMechan as editor, appended to an issue of the *American Journal of Surgery*, published in October of the same year. This was to be the official organ of the American Association of Anesthetists and of the Scottish Society of Anaesthetists! The link with the Scottish Society was shortlived. I am

grateful for the help of Alan Macdonald, the current President of the Scottish Society, who has looked up the old minutes. At their meeting on 18 April 1914 it was reported that the secretary had received a letter from the Editor of the *Journal of the American Association* conveying his good wishes to the Scottish Society. However, the outbreak of war led to some disruption of communications and, in the Proceedings of 29 November 1919, Dr Thomson reported that the arrangement was not working satisfactorily. The report which he had made to the paper upon the death of Dr McCallum (the first President of the Scottish Society) had been altered by the Editor (Dr McMechan) without any reference to him as writer of the memorial notice. The Secretary was then instructed by the meeting to terminate the special connection of the Society with the paper in question. The American Association met annually from 1913 to 1926, first under the secretaryship of Gwathmey and then of McMechan.

Important editorships

In 1916, the Surgery Publishing Company copyrighted the first of a series of *American Yearbooks of Anesthesia & Analgesia*, to be edited by McMechan. The first volume of nearly 500 pages was issued for 1915-1916. A similar volume was to be issued for 1917-1918, but owing to war-time difficulties did not appear until 1920 and no further volume was printed.

About this time discussions were taking place to form a National Anesthesia Research Society, soon to become the International Research Society, with McMechan as permanent Secretary-General. The first meeting was held in 1922, and in August of the same year the journal *Current Researches in Anesthesia and Analgesia* appeared under the editorship of McMechan who was to continue as editor until his death, after which Laurette McMechan continued its publication with Howard Dittrick as Editor.

McMechan corresponded with many anaesthetists both at home and abroad. He played a significant part in the formation of many regional societies in America, and of the Canadian Society, attending and speaking at many of their meetings. He is credited with the first appearance in print in the *Quarterly Supplement* of 1920, and in the *Year Book*, of the word 'premedication'.

Overseas influence

In 1926, the old American Association of Anesthetists became the Associated Anesthetists of the United States and Canada, serving as a parent organisation to many regional societies. That year the *Quarterly Supplement* was discontinued, but its last number announced a trip for American anaesthetists to attend a meeting of the Section of Anaesthetics of the British Medical Association in Nottingham, England, in July. The McMechans accompanied and directed the party. McMechan visited Europe again in 1928 and Australia and New Zealand in 1929. He was able to address audiences in French or German when the occasion demanded.

In Britain he would have met all the leading anaesthetists of the day, but societies were already evolving without his help. On the continent of Europe he made less impact in countries where the anaesthesia services were dominated by surgeons.

It was in Australia that he had the greatest influence outside America. He had written suggesting that a Section of Anaesthetics be included in the Australasian Congress (BMA) to be held in Dunedin in 1927 and he attended the meeting held in Sydney in 1929, reading a paper on 'The evaluation of surgical risk'. His meeting with the then young Geoffrey Kaye persuaded him to travel to America, and on his return to Melbourne in 1931 Kaye's activities led directly to the formation of the Australian Society of Anaesthetists.

In 1937 McMechan was not well enough to attend the Sixteenth Annual Congress of Anesthetists in Chicago, when a presentation was made to him. He and Laurette in their loving and hard-working partnership had made a tremendous impact on the world of anaesthesia. He died on 29 June 1939.

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MRS ATKINS AND THE FIRST DEATH WITH METHYLENE ETHER

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Methylene ether was introduced into anaesthetic practice by Benjamin Ward Richardson in 1872. He claimed it was safer than methylene. The *Lancet* greeted its arrival with the comment: 'Of devising new anaesthetics, as of writing books, there is no end'.

The *Lancet* was bored with the subject of new anaesthetics. Other subjects which did excite its interest at this time were the possibility of women becoming doctors and the acceptability of foreign medical degrees. My paper is about a woman doctor with a foreign medical degree, and the first death with the new anaesthetic. It begins with an account of what is now known as affirmative action.

Affirmative action in 1872

In June 1872 the *Lancet* published an item about the Birmingham and Midland Hospital for Women. It read:

> 'Our readers may have noticed an advertisement in *The Lancet* for a resident medical officer and secretary for the above hospital. The diploma or degree may come from almost anywhere. It looks as if the promoters designed to have a lady house-surgeon. Only such a design could explain such looseness as to the qualifications required. The medical staff ought to demand that the officer appointed be registered. After late accounts of the sources of many foreign diplomas, it would be unjust to patients to be satisfied with anything not registrable.'

I cannot be certain of the exact wording of the controversial advertisement as the *Lancet* of 1872 was bound without advertisements, but similar notices appeared in the general text of the *British Medical Journal* and the *Medical Times and Gazette*, and escaped destruction. In the latter, the advertisement read:

> 'Birmingham and Midland Hospital for Women. Resident Medical Officer and Secretary. Candidates must be duly qualified. Applications with testimonials to Arthur Chamberlain, Esq., 8 The Crescent, Birmingham, on or before July 15th.'

The first lady Resident Medical Officer

The appointments committee met on 23 July 1872. There were three candidates: two men who possessed registrable qualifications and a woman who did not. Next morning, the *Times* reported:

> '... the choice of the committee fell on the lady, Mrs Louisa Atkins, who has recently obtained her M.D. diploma at Zurich, after five years study at that University. **This is the first instance in the country of a lady being chosen for a similar post.**'

The *Lancet* reported the event with a different emphasis:

> 'The Committee of the Women's Hospital have as was expected, appointed a lady doctor, Mrs Louisa Atkins, M.D. of Zurich, house-surgeon. It was so well understood that any lady applicant would be preferred by the Committee, if not by the medical staff, that it would have been only fair to the two gentlemen who were also candidates to have told them at the commencement of the election to withdraw their application, as they had not the least chance of being elected to the post.'

A *Lancet* correspondent claimed Mrs Atkins' appointment was illegal under Clauses 36, 37 and 40 of the Medical Act, but no legal proceedings were taken.

Mrs Atkins the anaesthetist

One of Mrs Atkins' duties was the administration of anaesthetics for the very busy surgical practice of the hospital. Among her surgeons was Lawson Tait who did more abdominal surgery than any other surgeon of the period. He said of Mrs Atkins' role as anaesthetist that he 'never saw a more competent and careful administrator'. And Tait, who had been taught anaesthesia by Sir James Young Simpson, was a difficult man to impress.

On Saturday 28 June 1873, Mrs Atkins anaesthetised a women aged 62 years for the removal of a large multilocular ovarian tumour. The anaesthetic used was methylene ether. It was given by the open-drop method through a single fold of a towel. The patient took the anaesthetic readily and quietly, and after five drachms had been administered she seemed so satisfactorily unconscious that in a few seconds the operation would have begun. Suddenly the pulse stopped and the pupils dilated. Respiration ceased. Resuscitation began. Silvester's method of artificial respiration was used. Strong ammonia was applied under the nostrils, and a strong stimulant enema was given. Other means, such as rubbing the chest with a brush, and dashing cold water over it, were tried unavailingly. They concluded that the cause of death was heart failure. A post-mortem examination revealed nothing of significance. Tait immediately sent a report of the case to the *Medical Times and Gazette*, including the name of the anaesthetist. It was published with a commentary by Dr Richardson in which he stated that this was the first fatal case under methylene ether. No blame was attached to the anaesthetist or the anaesthetic. The *Lancet* also reported the case stating the anaesthetic was given by the resident medical officer without giving her name.

General professional status

Mrs Atkins' professional work at the hospital earned her great respect. In the Annual Reports of the Hospital, the Chairman, Joseph Chamberlain, recorded the many favourable reports Mrs Atkins had received. The minutes also record that he thought the hospital was to be congratulated on having been the first to appoint a woman and that the medical staff of the hospital were to be congratulated upon having risen above prejudice by receiving a lady as a colleague.

The committee were so pleased with Mrs Atkins that when she left Birmingham to join Elizabeth Garrett Anderson on the staff of her New Hospital for Women, they appointed as her successor another unregistered woman, Mary Edith Pechey. Much has been written about Edith Pechey, but I have found little on Louisa Atkins except a note published in the *British Medical Journal* shortly after her death. This stated that she was highly connected by birth, implying that this may have influenced her career, but gave no detail about these connections.

The *British Medical Association* archivist has no information about Mrs Atkins or her controversial appointment. I have tried to trace her family to see if they could have influenced her first appointment.

Family connections

Louisa Catherine Fanny Atkins was the daughter of Robert and Henrietta Bell of Hull, but she was born in France and had a continental upbringing. Her maternal grandmother was the only child of Sir Thomas Horton of Chadderton in Lancashire: he was the 3rd baronet. But as a female she could not inherit her father's title and it became extinct. She was also the niece of Edward Stanley, the 12th Earl of Derby. Louisa's brother was christened Edward Stanley which suggests the family valued their connections with the aristocracy.

Louisa left home as a young girl and went to India, where her brother was a lieutenant in the Bombay Army of the East India Company. Soon after arriving there she married her brother's commanding officer, a Captain Atkins. Within two years he died and she was left a widow whilst still a minor. As a minor Louisa could not administer her husband's estate though it was only 5,000 rupees. Her father had died; her mother had remarried and started another family. Louisa chose her maternal grandfather, Col George Pollard, of Stannary Hall, Halifax, to act as her legal guardian. This was a difficult time for Louisa. Within a short period, came the deaths of her brother, her stepfather and her grandfather, so Louisa had little of her family left to assist her when she began her medical studies in 1867. At this time no British medical school would accept women, so she went to Zurich, and graduated MD in 1872. (To put her achievement into perspective, she was two years younger than Sophia Jex-Blake but obtained her MD five years before her.)

The 'fixed' appointment

The appointment in Birmingham which followed her graduation was, as the *Lancet* alleged, clearly designed for a woman. Who were the promoters who designed to have a lady house-surgeon? Lawson Tait, who was to become a committed supporter of women's rights, was not yet in a position of power. The powerful people at the hospital were the Chamberlains. Arthur Chamberlain, brother of Joseph Chamberlain, had played the major role in establishing the hospital and continued to exercise control in his post as honorary Secretary. There was, of course, a management committee. Its 18 members were elected by the Governors. But the rules of the hospital required the governors to vote for 9 women and 9 men and to sign their ballot papers.

Inevitably, the Chamberlain 'caucus' was well represented on the committee. Their philosophy is illustrated by Joseph Chamberlain's public attack on the medical school for refusing to admit women. He said that the attitude of the medical profession 'seemed to amount to trades-unionism of the worst kind'. The profession protested at the insult and continued to refuse women admission to the medical school. All the evidence is that the appointment of Mrs Atkins was achieved by the political manipulations of the Chamberlains rather than by her aristocratic connections or any change in attitude of the medical profession. I think it is noteworthy that Mrs Atkins remained a life-long friend of Arthur Chamberlain.

Louisa Atkins achieved registration with the *General Medical Council* in 1877 when the Irish College of Physicians opened its registrable qualification to women. She died in 1924 at the age of 82. It was her wish that her death should not appear in the obituary columns of the papers but a tribute was published in the *British Medical Journal*. She should be remembered as one who overcame exceptional difficulties to achieve her place in the profession.

BERNARD LUCAS'S HAND OPERATED RESUSCITATOR

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B G B Lucas was a local Dorset boy, who lived near Swanage, and was briefly apprenticed to Vickers Supermarine at a time when they were making the Schneider Trophy winning seaplanes, later to be developed into the Spitfire. Because of the depression in engineering, he changed to medicine, but in his own words he was 'an engineer first and a doctor second.' He served throughout the war in RAF medical research, largely on high altitude problems. After the war he became an Anaesthetic Consultant at University College Hospital, the National Hospital for Sick Children, Great Ormond Street, the Brompton Hospital and the National Heart Hospital. His interesting background and many achievements were documented in obituaries in the *Times* of 10 October 1994, and the *British Medical Journal*[1].

In 1951, when I was Anaesthetic House Officer at University College Hospital, Bernard Lucas was Consultant Anaesthetist to the professorial surgical unit. His approach to anaesthesia was practical, even unromantic. He did not suit all his colleagues, but his interests were wide: 'Anaesthesia has a lot of interesting facets', he said, 'It impinges on so many aspects of medicine'. He combined medicine with engineering in his later commitments to medical automation and biomedical engineering, and as consultant to several commercial equipment firms as well as to organisations such as the Chemical Defence Establishment at Porton Down, the Fire Service and St John's Ambulance. So pre-eminent was he in the field that eventually he became President of the Institute of Hospital Engineers (1973-75).

Lucas pursued his causes in many committees, by writing and editing, and as expert witness in the courts. He delighted to recount the occasion when learned counsel unwisely asked if he was familiar with a certain chapter in a standard textbook; this elicited the answer: 'Yes, I wrote it.'

A pioneer in teaching and resuscitation

In anaesthesia he was concerned with the early work on surface cooling for cardiac operations, and with the establishment of intensive care. So of course were many others at that time but, more originally, by the time I knew him, Lucas had instituted both pain relief work and regular weekly teaching meetings. It seems strange now to realise that these latter were by no means universal at that time; indeed, when we as juniors started them ourselves at St Bartholomew's in 1961, it was to copy Lucas's pattern, already 10 years old.

At one of his seminars in the '50s we discussed resuscitation. This was certainly the first time I had considered it as a separate concept. We spoke perforce of internal cardiac massage, for this was well before Kouwenhoven's seminal article in 1960 on closed chest massage.[2] In modern techniques of ventilation, however, Lucas was a pioneer. Peter Safar published his account of mouth-to-mouth respiration in 1958[3] and it is he who is usually credited with the re-introduction of positive pressure ventilation in resuscitation. However Lucas also published work in 1958[4] on

the effectiveness of both the anaesthetist's exhaled air and his portable resuscitator in maintaining oxygenation of the apnoeic patient. I remember seeing this study of mouth-to-mouth respiration going on as early as 1951.

Thus Lucas was early alive to the twin problems of resuscitation. He was also aware of the deficiencies of the mouth-to-mouth method. He pointedly remarked: 'If it's Uncle Bill who collapses, you just have to put up with his beery breath'. A beery exhalate is an inconvenience to the attendants, but the method had also real dangers of cross infection. The Danish polio epidemic of 1952, reported by Lassen, showed the value of IPPV given by medical students using ordinary anaesthetic equipment, but for emergency services a device was needed which was readily portable and could be effective in laymen's hands and distance them from the patient. My colleague, Bruce Foster, who was Lucas's registrar, confirms that it was Lucas's connection with the Fire Service that prompted his development of just such a conveniently portable apparatus for inflation of the apnoeic lungs with air.

The Lucas Resuscitator and Case

An article published in 1958 showed Lucas's Portable Resuscitator to be superior, in 8 subjects, to either manual methods or mouth-to-mouth resuscitation, in regard to CO_2 oxygen, and anaesthetic requirement. In a further 53 patients undergoing surgery under thiopentone-curare anaesthesia for 30 minutes and upwards: '... it was in no case possible to distinguish their clinical condition from that obtained with ordinary controlled ventilation'. A full account of the resuscitator was published in 1959[5] with the comment: 'The device has been thoroughly tested during the past 8 years .... on a large number of unconscious subjects .... and has been found entirely satisfactory'. That publication date and duration of testing puts its origins in 1951, well before Henning Ruben's non-return valve[6] and self-inflating bag.[7]

The device was in three parts: facepiece, valve, and bellows of 3 litres capacity. They screwed together with threads so devised that it was impossible to misassemble them. The screw connections made the whole unit firm and substantial in use, but meant also that the parts were not compatible with the standard anaesthetic fittings of the time; this may have contributed to the device's eventual replacement. To quote mainly from the 1959 publication:

> 'The facepiece consists of a rubber oronasal mask which has been specially designed for the resuscitator to meet the requirements of a close pressure-tight fit on as wide a range of faces as possible, coupled with support of the lower jaw. The fit on the face is achieved by a large anatomically shaped pneumatic cushion, which is formed integrally with the wall of the mask. .... Attached to the front of the mask is a female screw adaptor which is so positioned that when the facepiece is connected to the rest of the apparatus it is at the correct angle to thrust the patient's jaw upwards when the bellows are operated. .... the jaw was automatically held up, thus ensuring a clear airway.'

The Lucas Resuscitator

The exhalation valve unit was: '... a dual purpose valve which permitted air to enter the face mask during the compression of the bellows, and allowed the subject's expired air to escape into the atmosphere during expansion'. The rubber bellows had an inlet valve at the end distant from the patient, concealed and protected under a perforated metal plate. This perforated plate, and the valve assembly, bring to mind the wartime gas mask; perhaps that was its parentage, particularly in view of the fact that the resuscitator in my possession has the label 'Porton Down' on the inside of the carrying-case. The instructions for the use of the device were:

'1. Place the mask firmly on the patient's face with the lower rim under the chin, and the upper rim as high on the bridge of the nose as possible.'

The chin's actually going inside the mask, together with the built-in cushion, was designed to make the mask a universal fit, and to hold up the chin by the very act of applying the mask. That fit was perhaps helped by the mask's shape, which closely resembles the Everseal mask, later introduced for anaesthesia.

'2. Work the bellows steadily at about 16 strokes per minute. The thrust of the bellows should be upwards on the face so that the jaw is kept up.'

'3. Watch the chest .... If the chest does not rise and fall:
First - make sure the mask is tight on the face; Then - listen to the bellows during the stroke. If a whistling noise is heard, the patient's throat is blocked and must be cleared. Insert a finger, covered with a handkerchief, down the throat to clear the obstruction.'

Was that audible warning another Lucas innovation?

The history of one unit

Part of the 8 years' testing to which the device was subjected before publication, was to distribute a number of units to specific consultants at other teaching hospitals in London (and, for all I know, elsewhere, though none, I believe, reached Manchester). At Bart's, one came to Dr Frankis Evans, and hence to me as his registrar. Together we tried it on a number of patients. The bellows and valve worked well, but I have to say we were not impressed by the mask. We found it difficult to get a good seal, nor did it seem to hold up the chin for us as it was supposed to do. Indeed, the fact that the chin was inside the mask seemed to make matters worse, in that one could not get at it to hold it up, as one can with the ordinary facemask. However, it is possible that a layman, lacking the anaesthetist's 'educated hand', might find it an improvement on other equipment.

Mr Keith Hollis of the Moreton Fire School, kindly instituted enquiries there, but despite their library facility, has failed to discover any documentary evidence of the device's use and

effectiveness. However, from his memory, it seems certain that it was used over a considerable period, and was replaced only when automatic portable gas powered ventilators became available.

Incidentally, Bernard Lucas was rather put out that Frankis Evans did not return the device to him after testing. Frankis was a man with a certain sense of his own importance, and regarded its retention as his pay for his informed opinion. He thought the request for its return to be impertinent, although he did not actually want it himself. Whatever we may think of that vignette of personalities, after Frankis's retirement to sail in the local waters hereabout, the two men became friends. It remains ironic that, only because he did not return it, nor retain it, but gave it to me, do I still have a specimen to contribute. This has been accepted for display in the Museum of the Association of Anaesthetists - a rightful acknowledgment that the Lucas Portable Resuscitator was an important landmark in the history of resuscitation.

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GUEST LECTURE

A BRIEF HISTORY OF POOLE AND ITS HARBOUR

Mr Ian Andrews

Mr Ian Andrews, formerly Chief Executive Officer of Poole Borough Council, gave a plentifully illustrated and informative guest lecture. His major theme was the harbour. A log boat dated about 395 BC was dredged from its bed in 1964. The harbour was used by the Romans, and as Fromemouth was frequently mentioned in the Anglo-Saxon Chronicle.

Cabot's voyage from Bristol in 1497, during which he discovered the fishing potential of Newfoundland, was to prove of great significance to Poole. Merchants and fishermen followed his route and made fortunes. In the 17th and 18th centuries tiny ships took out supplies and returned with salted codfish to sell to Catholic countries in Europe. Merchant Benjamin Lester's house at Trinity, Newfoundland, now a ruin, is the oldest brick house in North America, its bricks shipped out from Poole. A charity has been formed to get it rebuilt in time for the 500th anniversary of Cabot's voyage.

After the defeat of Napoleon the price of Newfoundland cod halved. Many were ruined and the town learned the lesson never again to rely on a single source of wealth creation. Steam shipping, a cross channel ferry, and the railway came. Clay became a key to the future - Purbeck clay, vital for Wedgwood and other Staffordshire potteries, and clay for the building boom in nearby Bournemouth, fast becoming a fashionable seaside resort. Poole Pottery was established, and an ironworks in the Old Town area made steam locomotives.

In the modern era, Marconi carried out his early wireless telegraphy experiments from the Haven Hotel and his yacht *Elettra*. Imperial Airways formed a flying boat base, which became important during the Second World War. Many war-time landing craft were built, and Poole became the base of Combined Operations and later the Special Boat Squadron. American forces were deployed in the area prior to the D-Day invasion of Omaha beach.

Following the post-war depression, Ian Andrews was recruited to reshape and diversify the economy. Fifteen thousand new jobs were created in areas as diverse as communication equipment, steel mills, biscuits, insurance and banking. The port was modernised with roll on - roll off facilities, and ferries to Cherbourg and the Channel Islands. The largest on-shore oilfield in Europe lies beneath the heathland, harbour and Poole Bay, and is serviced from Poole. The Government has recognised the long and proud tradition of independence of Poole. In 1997 it will become a unitary authority, enjoying sole care of its public affairs 'according to the custom of Poole'.

OUR MOST RECENT HONORARY MEMBER - DR F F CARTWRIGHT

At the 1995 Annual General Meeting in Glasgow, on the recommendation of Council, Dr Frederick Fox (Ferdie) Cartwright was elected to Honorary Membership.

Dr Cartwright was born on 18 May 1909, and was one of the successful candidates at the first DA examination* in 1935. He had a distinguished anaesthetics career, becoming Senior Anaesthetist and Director of the Department at King's College Hospital. He was the author of numerous publications on the history of medicine, and of five books.[1-5] These were all successful and established his name as a medical historian. He became Chairman, and then President of the Faculty of the History of Medicine of the Society of Apothecaries of London, and President of the History of Medicine Section of the Royal Society of Medicine.

In retirement, Dr Cartwright lives quietly with his wife at Flat 31, Swallowfield Park, Reading RG7 1TG. Although troubled with a painful back, he is mentally very alert, and still writing. He is flattered and amused that almost a quarter of a century after its first publication, *Disease and History* has been translated into Japanese.

Books by F F Cartwright

1. *The English Pioneers of Anaesthesia (Beddoes, Davy and Hickman).* Bristol: John Wright and Sons Ltd, 1952.
2. *Joseph Lister - The man who made surgery safe.* London: Weidenfeld Nicolson (Educational) Ltd, 1963.
3. *The Development of Modern Surgery.* London: Arthur Baker Ltd, 1967.
4. *Disease and History* (In collaboration with Michael D Biddiss). New York: Thomas Y Crowell Company, 1972.
5. *A Social History of Medicine.* New York. Longman Group Ltd, 1977.

* **A note on the first ever exam for an anaesthetics qualification.**
At the request of the Association of Anaesthetists, the Conjoint Board of the Royal Colleges of Physicians and Surgeons established the Diploma of Anaesthetics, the DA (RCP Lond.& RCS Eng.), in 1935. Forty six candidates, including eight women, passed the first historic examination in November 1935. The pass list included AI Parry Brown, FF Cartwright, Noel A Gillespie, John Gillies, Ronald Jarman, and Michael Nosworthy.

Sixty years later, I persuaded Dr Cartwright to dig deeply into his memories of the time. He was then 26, and the Senior House Officer in Anaesthetics at Kings College Hospital, with two juniors below him. The exam was held in Queen's Square - the paper on one afternoon and the oral some days later. He thinks the pass rate was about 50%. The oral was quite long, nearly an hour, and his examiners were HEG Boyle and HN Webber. He was given a grilling on current theories of

anaesthetic action, and on spinals. Then the start of a long tradition - the examiners chose from a stock of equipment, and placed different items on the table for discussion. One such was a cardiac puncture needle. Another was 'what looked like a Boyle's Machine, but different'. This was the Webber modification described in this volume by Douglas Howat. Dr Cartwright thinks it was at this time that he learnt from Boyle that his original model used one pound honey jars, and this was the size that was retained for the water sight flow meter and the ether and chloroform jars. He also remembers that at that time Boyle was nicknamed 'Heggie' rather than 'Cocky'. His best memory, however, was receiving the news later the same afternoon that he had passed. Years later, he donated his diploma to the Anaesthetics Department at King's College Hospital.

AMB

DR OSWALD PETER DINNICK FRCA
AN APPRECIATION

Oswald Peter Dinnick, affectionately known as OPD, died suddenly on September 15th after suffering a major stroke. He was born in Cornwall where his father was a surgeon. He maintained this connection, and at one time was President of the South West Region Society of Anaesthetists. He was educated at University College School, and the Middlesex Hospital, qualifying just before the outbreak of the war in 1939. By 1940 he had obtained the DA, then the only professional qualification in anaesthesia. That same year, during the 'blitz' he became the senior of only two resident anaesthetists. His junior later commented: 'we worked hard, and of course surgery was much quicker in those days'. He served as a specialist anaesthetist in the Royal Air Force in North Africa, and Italy, where he met his wife, Margaret. At the end of the war he was a Squadron Leader, and returned to be appointed to the Consultant staff of the Middlesex Hospital, Drs Crampton and Apperley having retired. His referee was Air Commodore Robert Macintosh.

When Bernard Johnson died suddenly at the early age of 54, Peter became Senior Anaesthetist at the early age of 42, and for most of the next 23 years ran what was a very happy and successful anaesthetic department. In addition to this he was a busy clinical anaesthetist, on one occasion anaesthetising Sir Winston Churchill when he broke his hip. He also found time to be active in the Association of Anaesthetists, which he served as Vice President; he was awarded the Pask Certificate, and was elected an honorary Fellow. He was also President of the Anaesthetic Section of the Royal Society of Medicine.

Peter was a car enthusiast, on one occasion driving to Stuttgart to have his Mercedes serviced. Later, he drove a pre-war Bentley. He always had a screwdriver in his breast pocket to come to the aid of hapless colleagues whose engines were giving trouble in the hospital car park.

He served for many years on British, European and International Standards Committees which have contributed so much to greater safety, and which gave him a wide circle of friends. He was interested in the history of anaesthesia, and wrote papers on Tomes, the first dentist on the Middlesex staff, who gave the first anaesthetics there in 1847, and on his teachers at the Middlesex - 'Daddy' Crampton, 'Pop' Idris and Raymond Apperley. He was a founder member of the History of Anaesthesia Society and read several papers at its meetings. One of his early papers was as co-author of the confidential enquiry into morbidity and mortality, appearing in *Anaesthesia*.

He put down his roots in the village of Empshott, Hampshire, where he had his country home well before retirement, and was active in his local church, as church warden, was on the parish council and was a member of the Deanery Synod of the Diocese of Portsmouth. '*Ave atque Vale*'

WKP
PJB

BOOK REVIEW

I AWAKEN TO GLORY: ESSAYS CELEBRATING THE SESQUICENTENNIAL OF THE DISCOVERY OF ANAESTHESIA BY HORACE WELLS *

Richard J Wolfe and Leonard F Menczer, eds.
Boston, The Francis A Countway Library of Medicine, in
association with the Historical Museum of Medicine and Dentistry,
Hartford, 1994; pp xvii, 442.illus.$28.95 (0-88135-161-X)

This volume of twelve essays by ten Wells enthusiasts was published to coincide with the sesquicentenary of the first use of nitrous oxide as a general anaesthetic. Horace Wells has not had a good press in recent years. The current view was much influenced by Stanley Sykes, who described him as careless, over-confident, irresolute and wayward. These authors set out to redress the balance. By recording aspects of Wells' life and times not previously explored, they have succeeded handsomely.

The chapter on Wells' dental practice and the complete transcription and analysis of his day book, show that he was a very successful dentist, attending many eminent local citizens, and attracting patients from as far away as 150 miles. His income was substantial. He invented dental instruments. He had an interest in orthodontics, and was a conservationist, advocating dental hygiene and castigating candy. He ran what must have been one of the most successful and financially rewarding practices in the country. Unfortunately, he became associated with W T G Morton, whom he quickly found to be without any principle, deceitful, a liar, and with a strong liking for drink. Wells' distrust of him was such that, as seen in the day book, all Morton's debts to him were certified by a notary.

Wells' contribution to the introduction of general anaesthesia is fully analysed. How much was he likely to have known about Davy's work on nitrous oxide? A search of early 19th century chemistry textbooks leads to the conclusion that the surgical world was unaware of Davy's proposal that nitrous oxide might provide pain relief in surgery. But this author overlooks the account, cited by both W D A Smith and Thomas Keys, of William Allen who, in March 1800, in the presence of Astley Cooper and others, inhaled nitrous oxide until his appearance caused such alarm that the experiment was stopped. Is it not possible that this closed the book on the use of nitrous oxide in surgery for several decades?

It is concluded that Wells had no knowledge of the analgesic effects of nitrous oxide before 10 December 1844: hence his recognition of its potential is all the more creditable.

* This review originally appeared in *Medical History*, January 1996; **40**: 126.

Furthermore, unlike Morton, he had no intention of benefiting financially from his discovery, believing that anaesthesia should be 'as free as the air we breathe'. Applying the test of causality in its simplest form, we may ask whether things would have been different if Wells had not existed. From what we know of Morton and Jackson it is impossible to conclude that either of them would have played the part they did in the introduction of general anaesthesia, in the absence of the stimulus provided by Wells.

Wells has been criticised for choosing the wrong agent, and Morton praised for selecting the right one. But Wells did try ether and concluded, quite correctly, that nitrous oxide was more suitable for his purpose, which was the provision of the brief period of anaesthesia required for dental extraction. Also, after his inadequately prepared and unconvincing public demonstration, he and other dentists continued to use the gas successfully, but as regards his reputation, and any reward for his discovery, he fell among thieves.

There is a most interesting chapter about Wells' friend and confidante, John Riggs, who thought Wells a genius and always regarded him as the discoverer of general anaesthesia. Riggs was a pioneer of the active treatment of 'scurvy of the gum', *Pyorrhoea Alveolaris,* also known as Riggs' Disease. Mark Twain was one of his patients, and endured operative treatment sessions lasting nine and five hours on successive days. There is an essay also on C S Brewster, the fashionable American dentist who befriended Wells in Paris, and his successor T W Evans, who reintroduced the use of nitrous oxide to England. The topics range widely. They include accounts of how Wells' correspondence was discovered and collected by W Harry Archer, one of the Archers of Ambridge, Pennsylvania, and descriptions of his portraits and statues, and their provenance.

The book is well produced, well referenced, and well illustrated. Two of the essays are blemished by misspellings, and one author, by his use of a tense that might be called the unconditional prophetic - 'in a few years Beddoes would give up his researches on gases' - has neatly disposed of the argument as to whether all historical knowledge is in the past or in the present. For him, at least some of it is in the future.

This book is strongly recommended as essential reading for all interested in the history of anaesthesia or dentistry.

David Zuck