

HENRY HILL HICKMAN a Shropshire Medical Practitioner*

Frederick G. Page

Henry Hill Hickman's place in the history of anaesthesia in Britain is based on a series of animal experiments performed in the 1820s, roughly midway between Humphry Davy's discovery of the effect of inhalation of nitrous oxide and the 'etherisation' work of James Robinson and John Snow in the 1840s. Hickman's chosen inhalant was carbon dioxide which induced a state of suspended animation during which painless surgery could be performed. This idea was probably not original but his systematic experimentation and clear statement of the objective of painless surgery deserve at least a footnote in the history books.

Around 1910, Henry S. Wellcome began to take an interest in historical aspects of pain relief throughout the ages. This led to the opening in April 1912 of the Wellcome Historical Medical Museum and the unveiling of hitherto unrecorded documents detailing Hickman's experiments with animals. These came from living relatives of Hickman and also from official archives in Paris. The material was accumulated and preserved and it seems probable that Dr Wellcome intended to bring to public notice a fully documented appraisal of

Hickman's life. This did not occur until 1930, the centenary of Hickman's death.¹ However in April 1912 there was published in the British Medical Journal an article by C.J.S. Thompson, entitled 'Henry Hill Hickman, a forgotten Pioneer of Anaesthesia (Communicated from the Wellcome Historical Medical Exhibition Research).² The author claimed to have based his paper on Hickman's hand-written notes and on material in the Paris archives. There seems little doubt that this was the first published account of Hickman's life and experiments.

Hickman the man

Henry Hill Hickman (1800-1830) was a general practitioner first in Ludlow (where he probably carried out his experiments), then in Shifnal who, after a visit to Paris, finally settled in Tenbury Wells. Ludlow and Shifnal are country towns in Shropshire and Tenbury is just over the border in Worcestershire. At the time of Hickman's admission to the Royal College of Surgeons in London on 5 May 1821, the term 'general practitioner', whilst in use in published literature from about 1820, would not have been how he was thought of by his patients. Even as late as the 1850s early Victorian novelists still used the label 'apothecary' or 'surgeon', in the manner of the eighteenth century.³

* Based on a paper delivered to a joint meeting of the Liverpool Medical History Society and the Liverpool Society for the History of Science and Technology, 12 October 1996.

¹ Wellcome Historical Museum, *Souvenir. Henry Hill Hickman centenary exhibition 1830-1930* (London: Wellcome Foundation, 1930).

² C. J. S. Thompson, 'Henry Hill Hickman — a forgotten pioneer of anaesthesia', *Brit. Med. J.*, i(1912), 843-44.

³ Irvine Loudon. *Medical care and the general practitioner, 1750-1850* (Oxford: OUP 1986) p.1.

When Hickman obtained his MRCS the candidate had to show evidence of having served a five year apprenticeship. The system of apprenticeship had been the norm in both the seventeenth and eighteenth centuries but by 1800 a greater emphasis on hospital training and experience was developing. From this evolved organised courses in the form of lectures, demonstrations, dissections and 'walking the wards'. It has not been established with whom Hickman served his apprenticeship but the notebook written in his hand and in the keeping of Dr W.H.H. Leslie confirms formal study of some kind.⁴ It is known that he matriculated at Edinburgh University on 1 November 1819 but there is no record of where he might have received his earlier education.⁵ During Hickman's period in Edinburgh he is known to have attended the lectures of T.C. Hope on chemistry and Professor James Home on material medica. Application to join the student body of the Royal Medical Society was made on 19 November 1819, but he did not stay long at the University, leaving without graduating some time during 1820.

Hickman's family, always centred upon the pleasing edge of the industrialised West Midlands or Black Country, were landowners and farmers for at least a century before his birth. It is from such families that people like Cromwell, Samuel Pepys and Humphry Davy sprang. Family associations with Stourbridge have been identified by Cartwright:⁶

Pepys dined with Henry Hickman, a non conformist divine, on August 21st, 1660. This Hickman taught logic and philosophy at Stourbridge and was a Fellow of Magdalen.

The grandmother of a Dorothy Hickman was the wife of Samuel Johnson's uncle, whilst Dorothy's father had proposed Johnson for the post of usher in Stourbridge School in 1730.

Pneumatics

The therapeutic use of the inhalation of various gas mixtures was well advanced before Thomas Beddoes established the Bristol Pneumatic Institute in 1799. The chemical isolation of various gases which constitute the air we breathe enabled Beddoes to contemplate a clinical research programme to study the effects of excess or deficiency of its various components: oxygen, nitrogen and carbon dioxide. It was commonly believed that consumption was related to an excess of oxygen in the lungs. Common air was generally regarded as the best medium for healthy respiration but, by adjusting the proportions of the known constituents, Beddoes hoped to find a mixture beneficial to the recovery of sufferers.

It was whilst working at the Bristol Institute that Humphry Davy studied the effect of self-administered nitrous oxide inhalation, with near fatal consequences. In *Researches, Chemical and Philosophical; Chiefly Concerning Nitrous Oxide* published in 1800, it is clear that Davy had considered the analgesic properties of the new gas. It is possible that the dangers and difficulty of establishing an exact dosage inhibited further research; as late as 1844, Horace Wells's demonstration to sceptical colleagues of the use of nitrous oxide as an anaesthetic was marred when the patient cried out in pain when his

⁴ Personal communication from Dr. W.H.H. Leslie.

⁵ The extant records of Ludlow Grammar School date only from 1850 and there is no record of his having attended Shrewsbury School.

⁶ F.F. Cartwright. *English pioneers of anaesthesia* (Bristol: Wright, 1952), p. 271.

tooth was extracted. The nitrous oxide route to anaesthesia was eventually, after two Atlantic crossings, to prove safe and effective but in the 1820s the use of carbon dioxide, the first gas to be isolated and recognised as something apart from air, had equal potential. The dosage required to produce suspended animation by asphyxia was less critical and the dangers not obviously greater; thus Hickman's choice of gas was reasonable within the context of the knowledge and technology available to him.

During his medical education he would have heard about pneumatic medicine and may have known of the specific use of carbon dioxide as an inhalant. This had been suggested by Priestley in 1772 and Thomas Henry reported the results of carbon dioxide inhalation in *Experiments and Observations* (1773).⁷

Hickman's experiments

Hickman's experiments on animals, using carbonic acid gas (carbon dioxide) to reach a point of suspended animation and thus allow painless amputation, were set put in a pamphlet he published in 1824.⁸ The descriptions of the experiments are an extended version of a letter to T.A. Knight dated 21 February 1824, and so presumably the dates referred to in the pamphlet are in 1823 at the latest.

Experiment 1st March 20th

I took a puppy a month old and placed it on a piece of wood surrounded by water over which I placed a glass cover so as to prevent the access of atmospheric air; in ten minutes he showed great marks of uneasiness, in 12 respiration became difficult, and in 17 minutes ceased altogether, at 18 minutes I took off one of the Ears, which was not followed by haemorrhage, respiration soon returned and the animal did not appear to be the least sensible of pain; in three days the ear was perfectly healed.

Exp. 2nd.

Four days after the same puppy was exposed to a decomposition of the carbonate of lime by sulphuric acid. In one minute respiration ceased. I cut off the other Ear which was followed by very trifling haemorrhage, and, as before, did not appear to suffer any pain, in four days the wound healed. The day after the operation he seemed to require an additional quantity of food, which induced me to weigh him, and I found he gained 9 oz. 1 dr. and 24 grains in 9 days.

Exp. 3rd April 6th

I took the same puppy and proceeded as in Exp. 1st, and respiration was acted on in much the same manner. I cut off the tail and made an incision over the muscles of the loins through which I passed a ligature and made it tight. No appearance of uneasiness until the day following, when inflammation came on and subsequent Suppuration. The ligature came away on the 7th day, wound healed on 12th, and the dog is remarkably increased in size and now perfectly well.

Exp. 4th.

A Mouse was confined under a Glass, surrounded by Water by means of a small tube a foot long. I passed carbonic acid Gas very slowly prepared into the glass, respiration

⁷ Thomas Henry, *Experiments and observations* (1773), pp. 126-27, in *Essays physical and chemical* (London: Johnson, 1776).

⁸ H. Hickman, *A letter on suspended animation, containing experiments shoving that it may be safely employed during operations on animals ...* (Ironbridge: Smith, 1824).

ceased in three minutes, I cut all its legs off at the first joint, and plunged it into a basin of cold water, the Animal immediately recovered and ran around the table apparently without pain; the stumps soon healed and I kept it a fortnight, after which I gave it liberty.

Exp. 5th.

I took an adult dog and exposed him to carbonic acid Gas quickly prepared and in large quantity; life appeared to be extinct in about 12 seconds. Animation was suspended for 17 minutes, allowing respiration occasionally to intervene by the application of inflating instruments. I amputated a leg without the slightest appearance of pain to the animal. There was no haemorrhage from the smaller vessels. The ligature that secured the main Artery came away on the fourth day and the dog recovered without expressing any material uneasiness.

Exp. 6th.

I exposed a Rabbit to the same Gas as Exp. 5th, and cut off both Ears and I experienced a similar result.

Exp. 7th.

I filled a glass globe with the Gas exhaled from my own lungs; into it I put a Kitten. In 20 seconds I took off its Ears and tail; there was very little haemorrhage, and no appearance of pain to the Animal.

The word 'asphyxia' does not appear in any of Hickman's writings, rather he describes the unconscious state as 'suspended animation', or 'torpid state', or simply 'insensibility'. According to Cartwright,⁹ the fourth edition of *The Clinical Guide* published in Edinburgh in 1801 contained the following paragraph:

Accidents frequently occur from suffocation, drowning, and strangulation. which give an immediate check to the principle of life, but do not, for some time, entirely extinguish it. The morbid symptoms, therefore, which arise under these circumstances, and the means of restoring animation in the suspended state, form an important subject of practice.

Hickman may well have read these words inasmuch as the book was popular amongst medical students at this time. His use of the term 'suspended animation' was perfectly correct in its contemporary context and simply meant 'asphyxia'.

Stevenson has noted that in the first volume of the first series of the *Index Catalogue* (1880), the heading 'suspended animation' is given eight cross references:¹⁰

apnoea, asphyxia. drowning and artificial respiration, syncope, trance, catalepsy and apparent death etc.

Stevenson clearly regarded the contemporary use of 'suspended animation' as a very general label to indicate a wide range of states. Perhaps a modern dictionary definition of 'suspended animation' as a 'state of insensibility without death' is precisely what Hickman had in mind.

⁹ Cartwright, p. 286.

¹⁰ L.G. Stevenson, 'Suspended animation and the history of anaesthesia', *Bull.Hist.Med.*, 49(1975), 482-511.

Hickman's experiments were not entirely original or unique. In 1821, a short time before Hickman's work, Benjamin Collins Brodie — a surgeon considered as second only to the famous Astley Cooper — carried out similar experiments on living animals.

The search for recognition

Hickman obviously felt that his work might be applicable to humans but refrained from such experimentation, perhaps aware of a high mortality rate not mentioned in the pamphlet (he admitted selecting those trials which supported his case). To this end he endeavoured to publicise his work, first by means of a letter to Thomas Andrew Knight FRS of Downton Castle. Knight (1759-1838) had gained scientific recognition around 1795 and in 1803 was recommended by his brother to Sir Joseph Banks for the appointment of correspondent to the Board of Agriculture. In the same year, Banks introduced him to Humphry Davy and a close friendship developed between Knight and Davy. It is possible that Knight was known to the Hickman family as for the July 1818 meeting of Ludlow Races a 'Mr T.A.Knight' is shown as Steward with John Hickman, Henry's father, as Clerk of the Course.¹¹

Hickman's letter to Knight reads:

Dear Sir,

The object of the operating surgeon is generally considered to be the relief of his patient by cutting some portion of the human body whereby parts are severed from each other altogether or relieving Cavities of the aggravating cause of disease. There is not an individual who does not shudder at the idea of an operation, however skilful the surgeon or urgent the case, knowing the great pain that the patient must endure, and I have frequently lamented, when performing my own duties as a Surgeon that something has not been thought of whereby the fears may be tranquillised and suffering relieved. Above all, from the many experiments on suspended Animation I have wondered that some hint has not been thrown out, of its probable utility, and noticed by Surgeons, and, consequently, I have been induced to make experiments on Animals, endeavouring to ascertain the practicability of such treatment on the human subject, and by particular attention to each individual experiment, I have witnessed results which show that it may be applied to the animal world, and ultimately I think will be found used with perfect safety and success in Surgical operations. I have never known a case of a person dying after inhalation of Carbonic Acid Gas, if proper means were taken to restore the animal powers, and I have no hesitation in saying that suspended animation may be continued a sufficient time for any surgical operation providing the Surgeon acts with skill and promptitude; and I think it would be found particularly advisable in Cases where haemorrhage would be dangerous or the Surgeon is apprehensive of Gangrene taking place after the operation, as it is well known that carbon has a most powerful antiputrescent quality. It will be found if the means for suspended animation are slow and gradual, the return of the powers of life will be in the same proportion; if the means of suspension are sudden, it generally happens by application of certain agents that the return of life is equally so; and I think it very probable, if the Galvanic Fluid could be applied in Cases that have proved fatal, the persons may have been saved. From a number of others I have selected the experiments now sent; each is correctly noted in as few words as possible, which I think will prove a vast object. With great respect

I am Dr. Sir Your Obt. St.

(signed) H. H. Hickman

Ludlow, Feby. 21st, 1824

¹¹ Personal communication from John Norton of Bromfield, Curator of Ludlow Museum.

T. A. Knight. Esqr.

This would appear to be merely a statement of his ideas, with no specific request to pass on the information to Davy or the Royal Society. There is no record of any response from Knight. After a lapse of six months, Hickman tried again. In a second letter dated 14 August 1824, which takes the form of the printed pamphlet with an extensive introduction referred to earlier, there is some enlargement of his views and a rephrasing of certain points, but no evidence of new experimentation. The only indication of any reaction on the part of Knight is in the wording of the introduction:

At the particular request of gentlemen of the first rate talent, and who rank high in the scientific world, it is, that the author of the following letter is induced to lay it before the public generally he submits his observations ... in the form of a letter to a private gentleman ... who with others, thought them worthy to be laid before the Royal Society.

After a further four years, still apparently unable to elicit the response he sought at home, Hickman turned to France. In April 1828, whilst living at Shifnal, he took the somewhat surprising step of composing a 'memorial' to Charles X with a view to having his work put before the Académie de Médecine. It is impossible to say whether this action was Hickman's own idea or whether he was prompted and assisted by others. Even if he sensed overwhelming failure (which seems doubtful), this was a rather grand gesture when there were still unexplored avenues in Britain. It is equally unknown whether Hickman composed the memorial himself.¹² Whilst a masterpiece of flowery writing, it contained little additional information to that given in the pamphlet, and nothing to indicate further experiments had been made.

Hickman took his letter to Paris in person and, as soon as possible, it was presented to the King. By 7 August 1828 it was passed to the office of the Ministry of the Interior and on 31 August reached its final destination, the Section of Medicine of the Académie Royale de Médecine, to which M. Gérardin reported on 28 September:¹³

Painless Operations. - M. Gérardin reported on a letter written to His Majesty Charles X, by Mr Hickman, a London surgeon, in which that gentleman asserted he had discovered a means of performing the most troublesome and dangerous operations without pain. The method consists of producing temporary insensibility by the methodical introduction of certain vapours into the lungs. Mr Hickman had made numerous experiments on animals and was desirous of obtaining the cooperation of the leading physicians and surgeons of Paris, in order to make the same experiments on the human subject.

This resulted in the nomination on 21 October 1828 of Dubois, Richerand, Mérat, Segallas and Ribas to form an investigative committee.¹⁴ However, the committee members failed to report back and no further action was taken on the matter.

¹² The original letter in Hickman's hand is held at the Wellcome Institute for the History of Medicine, London.

¹³ There are minor differences in translation by various investigators. The version quoted is that given by Thompson (see note 2 above). When the question of inhalation anaesthesia was reopened in 1847, Gérardin searched the archives of the Académie and on 2 March stated that Hickman had recommended the use of 'several vapours'. This evidence led Thompson to claim Hickman had suggested nitrous oxide as an anaesthetic gas.

¹⁴ Archives Générales, Paris, vol. XVIII, first series, p. 453.

After waiting some months for a reply, Hickman left France at the end of 1828 or early in 1829. He returned not to his former practice at Shifnal but to Tenbury Wells. He died on 2 April 1830, possibly from consumption, and was buried at Bromfield three days later. Through the efforts of the Anaesthetic Section of the Royal Society of Medicine, a tablet to Hickman's memory was placed in Bromfield parish church, St Mary's, and unveiled on 5 April 1930, the anniversary of Hickman's burial.

ACKNOWLEDGEMENT

I am grateful to Dr W.D.A. Smith for his help in my original researches and for allowing frequent use of material from his several publications (particularly *Brit.J.Anaesth.*, 38(1966), 58-72; *ibid.*, 42(1970), 347-53; *ibid.*, 42(1970), 445-58).