

JOHN SNOW, PIONEER SPECIALIST-ANÆSTHETIST

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THE history of the development of anæsthesia is a complicated subject, and despite the fact that recently much has been written on various aspects of its progress during the past hundred years, the early period remains shrouded in mystery. The rival claims of the early workers in the field each have their respective supporters, and fresh evidence, while contributing to our knowledge, has occasionally clouded rather than clarified the picture. The contributions by Barbara M. Duncum¹ and by Thomas E. Keys³ present complete histories of the subject, with numerous figures clamouring for priority in various phases of the development of anæsthesia. The fact remains that there is honour enough for all, and that each was making his contribution, however small, to the progress of the most important discovery in the history of medicine. Certain persons desired to exploit the discovery for personal gain; others applied the knowledge rashly; but at least one realising the value of anæsthesia in surgery, but appreciating its dangers and shortcomings, decided to investigate in a scientific manner its potentialities. That man was John Snow, whose contributions during the early days of anæsthesia have been recognised as those of a pioneer, upright in character, a staunch scientist, and a man whose name is unsullied by the doubts and distrust caused by vain controversy over questions of priority.

John Snow was born at York on 15th June,* 1813, the son of a farmer, and at the age of fourteen was apprenticed to William Hardcastle, a surgeon of Newcastle-on-Tyne. During the cholera epidemic of 1831-32 Snow was sent by his master to attend sufferers at Killingworth Colliery, and it was here that he gained first-hand knowledge of the disease, to the eradication of which he was later to contribute. John Snow came to London in 1836, and in October of that year was studying at the Great Windmill Street School of Medicine, which had acquired fame from its connection with the Hunters. The following year Snow attended Westminster Hospital, and in May, 1838, was qualified as a member of the Royal College of Surgeons of England. It is of interest to record that his additional medical qualifications included the licentiate of the Society of Apothecaries (October, 1838), M.B., London (1843), M.D., London (December, 1844), and licentiate of the Royal College of Physicians (1850).

Soon after qualification John Snow set up in private practice, but he attracted few patients. He had been threatened with tuberculosis of the lungs, and in 1845 suffered from renal disease. In 1841 he had read his first medical paper to the Westminster Medical Society, entitled "On asphyxia, and on the resuscitation of still-born

* Snow's tombstone² and Sir D'Arcy Power⁸ give the month as March, but Richardson⁹ ¹⁰ consistently gives June. An extensive search has so far failed to settle the question beyond doubt.

children" (*Lond. Med. Gaz.*, 1841-2, pp. 222-227). This indicated his scientific trend of mind, which was obviously intended for research rather than the application of ideas formulated by others. In 1846 anæsthesia was first used in the United States to produce insensibility to pain during surgical operations, and it was quickly introduced into England. The methods of administration left much to be desired, as might be expected during the early stages of development.

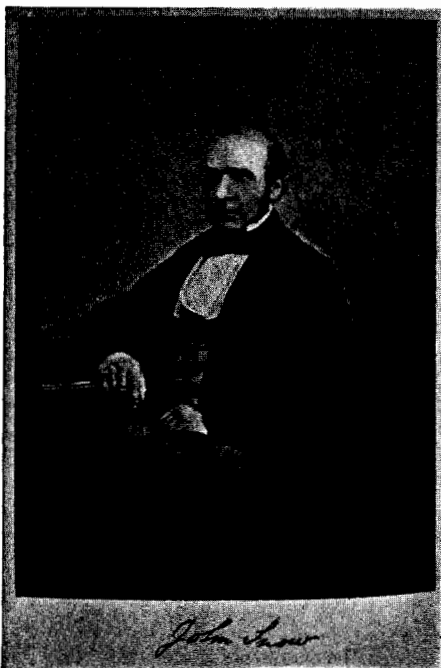


FIG. 1.—Portrait of John Snow taken in 1856.

One morning John Snow met a druggist with whom he was acquainted, carrying a large ether apparatus under his arm. Pleading great hurry, the man explained that he was "getting quite into an ether practice." Snow thought it rather peculiar that a man with no knowledge of physiology and chemistry should be able to make a living administering anæsthetics, and decided to specialise in that subject. He conducted numerous experiments on animals and upon himself, inventing an improved inhaler. With this he first administered ether for dental operations at St. George's Hospital, and then at University College, where he attracted the attention of Robert Liston, then the foremost surgeon in London. Liston was much gratified by the difference between the result of anæsthesia as administered by Snow, and that of less cautious anæsthetists, and with Liston's patronage Snow was soon recognised as the premier anæsthetist in London.

John Snow published the results of his experience with ether as *On the inhalation of the vapour of ether in surgical operations: containing a description of the various stages of etherisation and a statement of the result of nearly eighty operations in which ether has been employed in St. George's and University College Hospitals, London, 1847*. Before it reached a wide public, Simpson introduced chloroform as a new anæsthetic. Snow, always ready to try new materials in his search for a perfect anæsthetic, turned to chloroform, although he crossed swords with Sir James Young Simpson over his method of administration, which consisted of sprinkling the material upon a cloth.

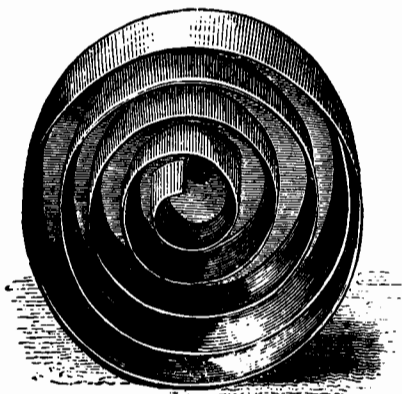


FIG. 2. Interior of Snow's Ether Inhaler. (From his *On chloroform and other anæsthetics*, 1858, p. 349.)

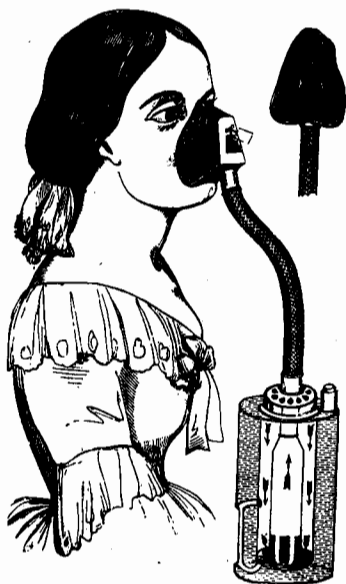


FIG. 3. Snow's Chloroform Inhaler. (From his *On chloroform and other anæsthetics*, 1858, p. 82.)

Snow's Ether Inhaler as used at St. George's Hospital was designed so that "ether vapour was inhaled by the patient through a mouth-tube fitted with cedarwood ball valves. Air was admitted to the vapour at one side of the apparatus and drawn over and round the spiral chamber depicted".⁶ He now adapted this as a Chloroform Inhaler, which consisted of "an outer metal cylinder for cold water surrounding an inner cylinder pierced with numerous air-holes and containing two coils of bibulous paper. Air-slots were cut in the paper and sufficient chloroform only to permit clear passage were poured in. The facepiece was of leather or sheet-lead, with inspiratory and expiratory valves".^{6 7}

Snow stressed that the administrator should have control over the concentration of the anæsthetic in the mixture administered to the patient, and his new inhaler was regulated to deliver a maximum of 5% chloroform vapour in the inhaled air. There were many deaths due to chloroform, and Snow wrote several articles investigating the cause of these. On 7th April, 1853, he administered chloroform to Queen Victoria at the birth of Prince Leopold, but according to Richardson, Snow did not use his inhaler on this occasion, but employed a handkerchief.⁹ Four years later, on 14th April, 1857, he officiated in a similar capacity at the birth of Princess Beatrice.

John Snow has been hailed as an epidemiologist for his work in connection with cholera, in which he had first interested himself during the epidemic of 1831-32. In 1849 he advanced the theory that cholera is water-borne, in a slender booklet entitled *On the mode of communication of cholera*. A second, greatly enlarged edition appeared in 1855, following a severe epidemic of cholera in London during the previous year, a German translation by A. P. W. Assmann being published in 1856. Snow investigated the London outbreak, paying particular attention to the mortality figures and the water supply of the infected area. He advocated the removal of the pump-handle in Broad Street, and the cholera epidemic subsided. John Snow wrote numerous papers on public health, including *On continuous molecular changes, more particularly in their relation to epidemic diseases [etc.]*, 1853, which, with the second edition of his other book on the subject, has been reprinted in the United States by the Commonwealth Fund as *Snow on Cholera . . . With an introduction by Wade Hampton Frost*, New York, London, 1936. His other important work on cholera was *Cholera and the water supply in the south district of London*, reprinted from the *Journal of Public Health* for 1856.

In 1855, John Snow was President of the Medical Society of London, and he was also a member of the Royal Medical and Chirurgical Society, the Pathological Society, the Epidemiological Society, and of the British Medical Association. Until 1839 he had lectured on forensic medicine at the Aldersgate School of Medicine, and was always ready to discuss problems with those interested. Despite an extensive practice, he never made more than £1,000 a year, and spent much of his income on conducting experiments, and furthering his ideas.

Snow was never satisfied with the anæsthetics employed, but was constantly experimenting with new agents and with various methods of administration. In 1856 he heard of amylen, which had been discovered by Balard two years previously, and Snow tested it on himself before using it in his practice. He employed it with success until his 144th case which succumbed in April, 1857, and another fatality (his 238th case) occurred in the following July.

Although amylene was used widely on the Continent, and these two deaths appear to be the only recorded fatalities, the use of this agent was largely discontinued because the deaths had occurred in patients to whom John Snow had administered the anæsthetic.

Snow first described the phenomenon of intercostal paralysis in 1858,¹¹ and in the same year employed endotracheal anæsthesia in an animal: "John Snow . . . apparently was the first to produce endotracheal anesthesia in an animal. He performed tracheotomy on a rabbit and into the resultant opening he inserted a wide-bore tube. The animal was made to breathe through this tube and into and out of a bag filled with the vapor of chloroform."⁴

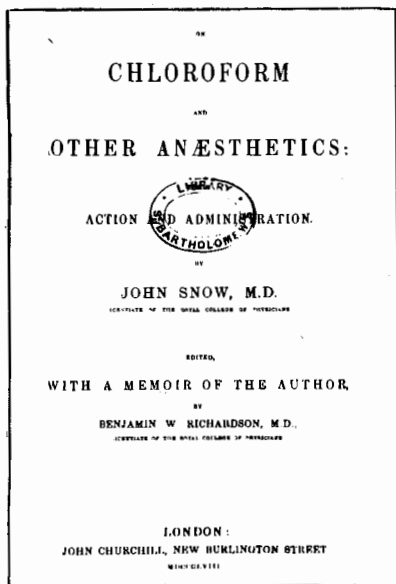


FIG. 4. Title-page of John Snow's posthumously published book, *On chloroform and other anæsthetics*, 1858.

Soon after qualification John Snow had suffered from ill-health, possibly contributed to by the peculiar ideas on diet that he put into practice, and it is obvious that his frequent experiments upon himself had an adverse effect upon his constitution. He was the first to carry out experiments on the physiology of anæsthesia, and did not spare himself in investigating every possible substance that might be employed as an anæsthetic. While nearing the completion of his greatest contribution to the literature of anæsthesia, John Snow suffered a slight stroke, and a few days later, on 16th June, 1858, his full life was brought to an untimely end, as he was completing the final paragraph¹². His mother survived him, and was

still living at York, his birthplace. Snow was buried at Brompton Cemetery, and over his earthly remains, friends erected a suitable monument, which is now in need of renovation².

Snow's great friend Sir Benjamin Ward Richardson prepared a memoir of the pioneer anæsthetist, which he appended to the book on chloroform. This appeared in 1858 as *On chloroform and other anæsthetics: their action and administration [etc.]*, and represents Snow's summary of the development of anæsthesia, and of the state of knowledge of the subject at that time. The book is now rare, but is a fitting memorial to the achievements of John Snow, and represents an important land-mark in the history of anæsthesia. Richardson's memoir was later reproduced in *The Asclepiad*,¹⁰ and later biographies are largely dependant upon this material.^{5 8 13}

REFERENCES

- ¹Duncum, B. M. (1947), *The development of inhalation anæsthesia, with special reference to the years 1846-1900*, London [etc.].
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³Keys, T. E. (1945), *The history of surgical anæsthesia [etc.]*, New York.
⁴Keys, T. E. (1945), *Op. cit.*, 64.
⁵Keys, T. E. (1946), *J. Hist. Med. & Allied Sci.*, 1, 551-566.
⁶King, A. C. (1946a), *Brit. Med. Bull.*, 4, 133.
⁷King, A. C. (1946b), *Brit. Med. J.*, 11, 536-539.
⁸Power, Sir D'Arcy (1898), In *Dictionary of National Biography*, 53, 207.
⁹Richardson, Sir B. W. (1858), In Snow, J. *On chloroform and other anæsthetics [etc.]*, London, xxxi.
¹⁰Richardson, Sir B. W. (1887), *The Asclepiad*, 4, 474-300.
¹¹Snow, J. (1858), *On chloroform and other anæsthetics [etc.]*, 42.
¹²Snow, J. (1858), *Op. cit.*, 423.
¹³Tubbs, F. (1946), *Brit. Med. Bull.*, 4, 143.

SELECT LIST OF JOHN SNOW'S WRITINGS ON ANÆSTHESIA

1847

A lecture on the inhalation of vapour of ether in surgical operations. Delivered at the United Service Institution, and addressed to the medical members of the Institution, on May 12th, 1847. *Lancet*, 1847, 1, pp. 551-554.

On the inhalation of the vapour of ether. *Lond. Med. Gaz.*, 39, 1847, pp. 498-502.

On the inhalation of the vapour in surgical operations: containing a description of the various stages of etherisation and a statement of the result of nearly eighty operations in which ether has been employed in St. George's and University College Hospitals, London, 1847.

1848

Chloroform and other narcotic vapours. (Royal Medico-Botanical Society).

Lond. Med. Gaz., 41, 1848, pp. 606-607.

On the inhalation of chloroform and ether. With description of an apparatus. *Lancet*. 1848, 1, pp. 177-180.

On the inhalation of chloroform and ether, with remarks on benzin. (Westminster Medical Society). *Lond. Med. Gaz.*, 41, 1848, pp. 74-76.

Remarks on the fatal case of inhalation of chloroform, including additional explanation from Dr. Maggison. *Lond. Med. Gaz.*, 41, 1848, pp. 277-278.

On narcotism and the inhalation of vapours. *Lond. Med. Gaz.*, 41, 1848, pp. 850-854, 893-895, 1074-1078; 42, 1848, pp. 330-335, 412-416, 614-619, 840-844, 1021-1025; 43, 1849, pp. 228-235, 451-456, 983-985; 44, 1849, pp. 272-277; 45, 1850, pp. 622-627; 46, 1850, pp. 321-327, 749-754; 47, 1851, pp. 622-627. [A series of papers from May 19th, 1848, to April 11th, 1851, which were issued as reprints in two parts; Parts 1-7, London, 1848; Parts 8-16, London, 1851.]

1849

Death from chloroform; means to be employed to prevent fatal effect from an overdose. (Westminster Medical Society). *Lond. Med. Gaz.*, 43, 1849, pp. 692-695.

On the discussion respecting chloroform, in the Académie de Médecine of Paris, *Lond. J. Med.*, 1, 1849, pp. 324-326.

On the fatal cases of inhalation of chloroform. *Edinburgh Med. & Surg. J.*, 72, 1849, pp. 75-87.

On the use of chloroform in surgical operations and midwifery, *Lond. J. Med.*, 1, 1849, pp. 50-55.

1850

The alleged employment of chloroform by thieves. *Lond. Med. Gaz.*, 45, 1850, p. 327.

Further remarks on the employment of chloroform by thieves. *Lond. Med. Gaz.*, 46, 1850, pp. 834-835.

1851

Letter to the Right Honourable Lord Campbell, Lord Chief Justice of the Court of Queen's Bench, on the clause respecting chloroform in the proposed "Prevention of Offences Bill". [Review and abstract of:] *Lond. J. Med.*, 3, 1851, pp. 353-356.

On the inhalation of various medicinal substances. *Lond. J. Med.*, 3, 1851, pp. 122-129.

1852

Death from chloroform in a case of fatty degeneration of the heart. *Med. Times & Gaz.*, 26, 1852, pp. 361-362.

On the cause and prevention of death from chloroform. *Lond. J. Med.*, 4, 1852, pp. 320-329, 415-423, 564-572.

1853

On the administration of chloroform during parturition. *Assoc. Med. J.*, N.S. 1, 1853, pp. 500-502.

1855

The breathing and the pulse under the influence of chloroform. *Assoc. Med. J.*, N.S. 3, 1855, pp. 313-318.

On the employment of chloroform in surgical operations. *Lancet*, 1855, 11, pp. 361-363, 383-385.

1856

Further remarks on the cause and prevention of death from chloroform. *Lancet*, 1856, 1, pp. 148-150.

1857

Case of death from amylene. *Med. Times & Gaz.*, 36, 1857, pp. 133-134.

Further remarks on amylene. *Med. Times & Gaz.*, 35, 1857, pp. 332-334, 357-359, 379-382.

On chloride of amyle. *Med. Times & Gaz.*, 35, 1857, p. 457.

On the recent accident from chloroform. *Med. Times & Gaz.*, 35, 1857, pp. 282-283.

On the vapour of amylene. *Med. Times & Gaz.*, 35, 1857, pp. 60-62, 82-84.

1858

On chloroform and other anæsthetics: their action and administration. Edited, with a memoir of the author by Benjamin W. Richardson, London, 1858.

The recent death from chloroform at Bristol. *Brit. Med. J.*, 1858, 11, pp. 223-225.

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