Figure 1.
This figure was taken from 'The Great Stink of London' by Stephen Halliday by kind permission of the author and Sutton Publishing.
John Snow's name is forever associated with the cholera epidemic in the Soho area of London in 1854. There is even a pub named after him and a society that commemorates him. Popular folklore and medical mythology have it that Snow was responsible for the removal of the handle of the pump in Broad (now Broadwick) Street and that that action alone 'stayed' the epidemic. This is now known to be at best an over-simplification but that does not in anyway detract from the man's work on the epidemiology of cholera and indeed as a pioneer in anaesthesia. He is still held with very high regard, albeit in rather limited circles.

Early life
Snow was born in 1813 in York, one of nine children of a working class family. His father was a manual worker but by his own industry became a property owner in a small way and was able to give his children the education that he himself had been denied. John Snow was sent to a private school, where he became proficient in mathematics, Latin and history. This enabled him to enter the medical profession as an apprentice - the normal course for young men of limited means who could not afford to enter a university or attend one of the many private medical schools.

Medical studies and qualifications
It is pertinent here, in relation to Snow's medical qualifications and title, to note that the medical profession at that time was only just emerging from a strict tripartite system of physicians, apothecaries and surgeons. The physicians were the elite, being Fellows of the Royal College of Physicians and graduates of senior universities ('Oxbridge') although not necessarily holding a medical degree conferred by those institutions. They may have studied at one of the many private medical schools, received tuition from senior physicians at a hospital, or attended one of the European medical schools. Knowledge of Latin was an essential qualification to become a Doctor of Medicine (MD) and degrees and diplomas were often awarded after disputation rather than by examination.

Apothecaries were usually of hambler origin, having served an apprenticeship. After the passing of the Apothecaries Act in 1815 they were required to pursue a recognised course of study lasting for five years, attend courses of lectures and 'walk the wards' of a hospital for six months. They were examined by senior members of the Society of Apothecaries (founded ca.1630), and became Licentiates of that Society (LSA). In general, they served the poorer people. They were skilled in the treatment of ailments with herbs and other materia medica, but were expected to call in physicians when they considered it necessary. Some apothecaries studied at non-conformist medical schools (including the University of London) after the repeal of the Test and Corporation Act, in 1828, which permitted dissenters to set up and work in such institutions.

Until 1800 surgeons belonged to a guild - the Company of Surgeons - which then became their licensing body, the Royal College of Surgeons. Like apothecaries, they served a period of apprenticeship, sat examinations and then qualified as Members of the College (MRCs) Surgeons were the 'mechanics' of the profession, skilled at bone setting, amputation and the suturing of wounds. In the early part of the nineteenth century they did not usually treat and prescribe for medical conditions unless they were members of the armed forces. In the Army and Navy, where they were given the official title of surgeon, they were often skilled physicians, being more experienced than their civilian counterparts in diseases such as cholera, as a result of having worked abroad.

There was a considerable amount of rivalry between the three groups, even to the extent that at one time no apothecary could secure a license from the Royal College of Physicians without relinquishing his membership of the Society of Apothecaries and/or of the Royal College of Surgeons. The rigid tripartite system began to break down, however, in the 1820s. After the passing of the Apothecaries Act of 1815 it became possible for licensed apothecaries to obtain Membership of the Royal College of Surgeons and many did so.

Medical Sciences History Vol 19. 2003

13
In 1827, when he was fourteen years of age, Snow began his apprenticeship with a surgeon in Newcastle. After six years there he continued his studies at Burnnepfield for one year and at Pately Bridge for two. He then spent a short time at horse before leaving for London, where he commenced further medical studies at the Hunterian School of Medicine and Westminster Hospital. He also enrolled at London University, which by then had a medical school. In 1838 he qualified as a Licentiate of the Society of Apothecaries and a Member of the Royal College of Surgeons. He thus joined the ranks of the newly-emerging general practitioners. At that time only physicians who held a university degree in medicine enjoyed the title of Doctor; apothecaries and surgeons were known as Mister (surgeons still are!). It was not until 1843 that Snow was awarded the degree of MB by London University and so became Dr. Snow. The following year he was awarded the MD. He had to wait until 1850, however, before he was admitted as a Licentiate of the Royal College of Physicians. It is interesting to note that although his LSA and MRCs licensed him to practice medicine and he therefore did not need these further qualifications, he was driven to study and to improve his status as a student. Snow had lived in Bateman’s Square, Soho and he continued to live and practice medicine in that area, first in Frith Street and later in Savickes Street. In addition to this practice he worked at the Westminster Hospital. He joined the British Medical Association, the Royal Medical, Chirurgical and Pathological Society and the Epidemiological Society. His closest relationship, however, was with the London Medical Society, of which he became President in 1855. During this period he performed and reported on a number of his investigations in several branches of medicine, including cholera and anæsthesia.

Snow and cholera

In 1849 Britain experienced its second epidemic of cholera. This aroused Snow’s interest as he had already worked, as an unqualified assistant in the north of England, among the victims of the first (1832) epidemic. In London the new epidemic affected, in particular, the area south of the River Thames. At a scientific meeting he suggested that the disease might be spread by water, as had been described by William Budd, who had investigated typhoid fever in the Bristol area some years earlier. In 1854, over a four-week period, Snow and an assistant visited every house where a person had contracted cholera. They found that the numbers of deaths per 10,000 houses were: Southwark and Vauxhall Water Co. supply, 71; Lambeth Co. supply, 5: Best of London, 9.

Snow also tested the sodium chloride content of water supplied by the two companies. That of the Southwark Company’s water contained 37.9 grains per gallon, whereas that of the Lambeth Company contained 0.95 grains of NaCl per gallon. The difference reflected the influence of the tidal flow on the extraction points. The Thames was highly polluted with sewage on account of the policies of the ‘Sanitarians’ whose policy was to abolish cess pools and send all excrement into the sewers, and hence into the River Thames, leading to the ‘Great Stink’ of 1858. Further investigations, carried out by William Farr, of the Registrar-General’s office and John (later Sir John) Simon, Medical Officer to the Privy Council, confirmed Snow’s findings and added fuel to the controversy about the cause of cholera and fever in general. One the one hand there were the sanitarians, who believed that fevers were caused by the inhabitation of effluvia from rotting organic material; on the other hand were the contagionists who believed that fevers were passed from person to person, directly or indirectly.

In 1854, during the third epidemic of cholera in Britain, there was a serious, localised outbreak of the disease in the Broad Street area of Soho. More than five hundred people who lived or worked in the area died within about ten days.

As a result of public concern that linked cholera with sewers (the missoma theory) the Commissioner for Sewers for that area initiated an investigation by a surveyor. This man constructed a map that indicated the houses affected by cholera, the route of the local sewer
and the position of the gully holes from which surface water drained into the sewer. It showed that the houses nearest to the gully holes had no more deaths from cholera than any others. There were, in fact, two sewers, one old and one fairly new, but the number of deaths was no greater in houses served by one than in those served by the other.

The Chairman of the Commission concluded that the sewers were not the cause of the cholera; that they were in no way connected with the disease and that the real cause of the calamitous occurrences in the locality was the filthy and undrained state of the houses.

As this outbreak was on Snow’s own doorstep (he lived in Fifth Street) it diverted his attention from the South London epidemic. His earlier investigations, published in 1849, had led him to formulate a theory that cholera was a localized disease of the intestines, the symptoms being due to fluid loss. He reckoned that the causal agent entered by the mouth, multiplied in the gut, and was then spread to other people by the faecal-oral route. It could be spread by contact but over longer distances by drinking water contaminated by sewage containing the specific cholera poison. When he turned his attention to the Soho outbreak he obtained, from the Registrar General’s Office, the names and addresses of eighty-nine fatal cases of cholera and made inquiries into their circumstances. He noted that very few cases of cholera had been reported from the Golden Square area, where piped drinking water was supplied from an unpolluted part of the River Thames. Nearly all the affected people lived within a short distance of a pump in Broad Street. He established that at least sixty-nine of them had drunk water from that pump. When he examined the pump water he found that it was clear, but a local inhabitant told him that a day or two earlier it had smelled offensive.

Figure 2.
Part of Snow’s map of cholera deaths in the Broad Street area. The dotted line encloses the area primarily served by the Broad Street pump. Broad Street is now Broadwick Street and Cambridge Street is now Lexington Street (see Fig. 3)

Medical Sciences History Vol. 19. 2003 15
On the 17th of September, the vestrymen of St James parish met to discuss the situation and Snow requested a hearing. He told them of his findings and recommended the removal of the handle of the Broad Street pump. Although they were incredulous, they had the good sense to follow that advice. It is not clear why, but perhaps they were grasping at straws. Anyway, in the words of the Medical Officer to the Vestry: ‘...the pump was closed nevertheless and the plague was stayed.’

In 1855 Snow produced a further, and much enlarged edition of his book of 1849. Referring to the Broad Street pump he stated that: ‘...there had been no particular outbreak or increase of cholera, in this part of London, except among the persons who were in the habit of drinking the water of the above-mentioned pump well. The deaths either very much diminished, or ceased altogether, at every point where it becomes decidedly nearer to send to another pump than the one in Broad Street.’

Snow gave some examples to support his claims. Seven workmen employed at a dentists' materials workshop at Nos. 8 and 9 Broad Street and who drank water from the pump all died, although they lived away from the district. Two other people, who lived on the premises but who did not drink the water were not affected. None of 70 men who worked in a nearby brewery but who drank only the water from the company’s own well became infected. On the other hand, he noted that, unlike brewery workers, sailors, dockers and coal heavers, who drank river water, were more at risk, and so were women because they drank more water than men.

There was a workhouse in Poland Street, near to Broad Street. Five of the 535 inmates there died of cholera. A statistical estimate, comparing that number with the morbidity rate outside might have placed the figure at more than one hundred if the institution had not had its own pump well instead of drawing water from that in Broad Street:

A particularly striking incident concerned a widow, formerly a resident of Soho, but who had moved to Hampstead. She preferred the Broad Street water to that available locally and had a bottle of it delivered daily to her new home. A visiting relative of this lady also drank of the water. She returned to her residence in a high and healthy part of Islington and was attacked by cholera and died.

After he had formulated his hypothesis about the water carriage of cholera Snow sought to prove it. He did not, however, distort the facts as determined in his investigation. The second edition of his book included a dot map showing where the cases of cholera had occurred. This map represented his deductions from his theory that cholera was an intestinal disorder. The arguments in this second edition had both social and commercial implications. He said that acceptance of his water-borne theory implied simple measures that would not interfere with social and commercial affairs. In that, he reconciled both with the contaminist theory.

Snow was not the only person who investigated the Soho outbreak. Apart from the inquiry by the Vestry Committee, there were other inquiries by public authorities and private organizations. The arguments in this second edition had both social and commercial implications. He said that acceptance of his water-borne theory implied simple measures that would not interfere with social and commercial affairs. In that, he reconciled both with the contaminist theory.

Snow was not the only person who investigated the Soho outbreak. Apart from the inquiry by the Vestry Committee, there were other inquiries by public authorities and private organizations. The arguments in this second edition had both social and commercial implications. He said that acceptance of his water-borne theory implied simple measures that would not interfere with social and commercial affairs. In that, he reconciled both with the contaminist theory.

Snow was not the only person who investigated the Soho outbreak. Apart from the inquiry by the Vestry Committee, there were other inquiries by public authorities and private organizations. The arguments in this second edition had both social and commercial implications. He said that acceptance of his water-borne theory implied simple measures that would not interfere with social and commercial affairs. In that, he reconciled both with the contaminist theory.
After the epidemic had subsided the General Board of Health ordered an inquiry into the event by its Scientific Committee. This Committee studied the reports of both Snow and the Whitehead. It flatly rejected the pump theory in favour of 'noxious atmospheric influences emanating from purefying organic matter.' In 1855, however, The Lancet reviewed the Report of the Committee as well as Snow's book and Whitehead's report. It noted that it was Whitehead's searching enquiry that established that the water from the Broad Street pump was responsible for the deaths from cholera. But Snow remained the hero of the day, and for many years afterwards, because he had recommended the removal of the pump handle. But whether the removal of the pump handle really did stay the outbreak or if the story was a myth that passed into medical folklore awaited reconsideration. After one hundred years the matter was revived at the centenary of the publication of Snow's book. At a meeting of the Epidemiological Section of the Royal Society of Medicine, its President, Professor (later Sir Austin) Bradford Hill, discussed the pump handle story. He said 'Though conceivably there might have been a second peak in the curve, and though almost certainly more deaths would have occurred if the pump handle had remained in situ it is clear that the end of the epidemic was not dramatically determined by its removal. The deaths had already been declining from a marked peak for at least five days.'
Figure 4
The John Snow public house on Broadwick Street
[Frerichs-UCLA website]

Figure 5
The John Snow portrait in the public house
[Frerichs-UCLA website]

Figure 6
The replica Broad Street handleless pump.
[Frerichs-UCLA website]
Professor Bradford Hill added that Snow recognised this and had never occupied the flimsy pedestal upon which some would place him. This is indeed borne out by Snow’s own publications.

Snow and anaesthesia

The epidemiology of cholera is not the only work for which John Snow is remembered. He was a pioneer of anaesthesia in this country. He assessed the relative merits of ether and chloroform and invented an improved mask for their administration. In spite of his quite lowly position in the medical hierarchy he was called upon to give anaesthetics to Queen Victoria at the births of Prince Leopold and Princess Beatrice.

Snow’s private life

Not a great deal appears to be known about his private life in spite of the attentions of biographers and friends. He never married, although he liked children. He was a confirmed vegetarian and total abstainer. He was a kindly, quiet and reserved man but could, on occasions, relate humorous anecdotes. He lived frugally, and it is said that he never earned more than £1000 a year. He died in 1858 at the age of 48 years.

Commemoration

Although John Snow and his work are largely unknown to many people there are still some, in both this country and the United States, who remember and recall him with respect. There are not many medical scientists whose name is commemorated by and at a public house. In 1955, the centenary of Snow’s researches in Soho, the former ‘Newcastle Arms’ aka ‘The Newcastle on Tyne’, at the corner of Broadwick Street and Lexington Street, was renamed ‘The John Snow’. His portrait is on the pub sign and, of course, inside, in an upper room where other Snow memorabilia are displayed. Nearby is a replica of the Broad Street pump without its handle, at the base of which is a commemorative plaque. The pub itself is the spiritual home of the John Snow Society, an informal organisation of epidemiologists and other interested persons which holds an annual ‘Pump Handle Lecture’ usually delivered by a distinguished medical scientist on a topic of a current epidemiological concern.

In the USA Professor Freericks of the School of Public Health at the University College of Los Angeles has prepared a substantial multiple website on John Snow and his work. The magazine of the School of Public Health at the University of Alabama is entitled ‘The Handle’ in recognition of Snow’s contributions to public health.

Snow is also remembered for his work on anaesthesia. The Association of Anaesthetists has placed a plaque on a wall at the location of his former home in Frith Street. It reads ‘Dr John Snow, 1813-1858, Pioneer Anaesthetist and Epidemiologist, lived in a house at this site.’

Principal sources


Richardson, B.W. (1965) in Snow on Cholera. Hafner


Medical Sciences History Vol 19 2003 19