

THE SOHO CHOLERA EPIDEMIC 1854

by Mr. W. R. Winterton

Cholera is an infection which has been endemic in many parts of the world for centuries. In India there is a statue of the time of Alexander the Great of a cholera victim but the first appearance of the infection in the British Isles is comparatively recent, only 150 years ago.

Cholera was thought to be caused by emanations from foul drains and that spread by contagion did not occur. Consequently it was not understood how it was conveyed from one major town to another which were only connected by roads. The traders who travelled these roads were not considered possible carriers.

There have been four major outbreaks of cholera in this country.¹ 1831 - 1833; 1848 - 1849; 1953 - 1854 and 1866. There has been none since. The first diagnosed case of cholera was in Sunderland in February 1831. This originated from an epidemic in Bengal which had spread overland through Russia to West Europe and was brought to England by seamen from Hamburg. From Sunderland it eventually spread to London in 1832. It died down during the winter of that year to reappear in the summer of 1833. Naturally it caused great distress and panic and there was an interesting number of theories as to how it arose. Since there was more overcrowding in the poorer parts of towns the incidence of infection was greater there and this led to the suggestion that the rich were deliberately poisoning the poor. *The Christian Observer* put the epidemic down to the prevalence of infidelity and profaneness, while *The Presbyterian Coventor* felt that it was a visitation of God upon England for having granted Catholic Emancipation in 1829!

This was some years before the study of bacteriology and nearly fifty years before Koch discovered the vibrio-cholerae in 1883. Records at this time were poor; the official registration of deaths did not begin until 1837.

In London the infection spread along the banks of the Thames which included the lower parts of Westminster. The Department of Health took some steps to deal with the outbreak and asked the hospitals, including The Middlesex Hospital, to admit cases of cholera but most of the

hospitals refused, sheltering behind their laws.

The Royal Free Hospital on the other hand opened its doors for the first time in order to help with this epidemic. This hospital began in 1828 as a dispensary on the ground floor of a four story building at 16 Greville Street, Hatton Garden, and was called the London General Institution for the Gratuitous Cure of Malignant Diseases. In 1832 the tenants of the upper floors at Greville Street were given notice to quit and the cholera sufferers became the first in-patients.² A point of particular interest is that William Stevens treated these cases by the administration orally and intravenously of up to four pints of saline.³ The Royal Free Hospital claims to have treated in this 1832 epidemic 566 patients with only 135 deaths. Stevens' treatment was much in advance of the accepted treatment even in the 1854 outbreak.

By some miracle cholera did not appear again until 1848 - 1849 and by this time London was to some extent prepared. Treatment mainly consisted of purging and emetics, in order to eliminate the poisons, astringents and alteratives (calomel). Records of this outbreak are more complete. It was the most widespread of the four, partly due to the freer movement of people as a result of improved transport.

During the summer of 1853 there had been some diarrhoea and in July the reports state that the diarrhoea as well as the common form of cholera became serious and some deaths were recorded, and beside the river a few deaths from cholera of the Asiatic form were registered. In the autumn the number of cases fell but the diarrhoea

continued and there were deaths throughout the first six months of 1854, but during the summer the death rate rose until at the end of August and beginning of September the numbers reached a dramatic peak. In October and November the numbers fell until in December they dropped to zero.

Diarrhoea and cholera are referred to as separate diagnoses, with the former sometimes progressing to the latter. Without bacteriological assistance an exact differentiation is impossible. The definitions used at the time and in the Board of Health report are as follows.

Diarrhoea

Simple: Stools faecal. No vomiting, no cramps.

Choleraic: Watery stools, but tinged with bile. Vomiting, no cramps.

Cholera

Rice water stools, colourless.

Cramps. No urine passed.

Temperature lowered. Poor pulse.

In London generally the 1849 outbreak was more severe than that of 1854 apart from the Golden Square - Berwick Street area of Soho. The total deaths in 1849 being 14,600, or 6.2 per 1,000 living, whereas in 1854 the death rate was 11,000 or 4.5 per 1,000.

The report of the Committee for Scientific Enquiries set up by the General Board of Health⁴ investigated the epidemic in relation to density of population, Elevation, Atmospheric Influences and Water Supply, both the chemical content and microscopic content.

There had been a lower incidence of cholera in the St. James' area in the

1831 and 1848 epidemics than in many areas of London, 1.3 and 1.6 per 1,000, and it was regarded as a healthy place, probably because it was about 60 feet above Trinity High Water, although other conditions were not so good. When therefore the explosion of cases of cholera occurred there on the night of 31st August and 1st September, greater than anywhere else in London, some explanation had to be found.

The Golden Square and Berwick Street Subdistricts of St. James' Westminster with which this paper is mainly concerned had been fashionable in the early 18th century but had become much decayed by the mid-19th century. The houses were still considered of a good standard and were highly rated, but the overcrowding was great. In Broad Street the average number of inhabitants per house was 18. The St. James' district covered 164 acres with a population of 36,000. This was divided into three subdistricts, St. James' Square, Berwick Street and Golden Square. The two last covered an area of 80 acres with a population of 25,000, a rate of 300 persons to the acre, one of the highest in London at that time.⁵

Sewer Systems

There were three sewer systems to serve the area, the last two of which were put in during the three years before the 1854 outbreak. The third

was considerably older. Untrapped gullies drained into all the sewers and there were open ventilating grills. Most of the houses had privies in the basement yard, some were in the front area and a few were in the house. Many of these were untrapped and opened straight into cesspools. Every house had a cesspool which was rarely emptied and it was only the overflow from them which drained into the sewers. These cesspools should have been filled in when the sewers were connected but that had not been done. Many of the cesspool walls were of rotten bricks and leaked. The rarity of water closets and the small small volume of water meant that there was very little flow to flush the sewers while in addition the fall was only 1 in 250: as a result the sewers became silted up.

Following a doctor's complaint of the smell outside his surgery the sewer was opened up. A six inch channel carrying a trickle was found running through the silt of which 200 loads were taken away from a length of a few yards. The sewers emptied untreated into the Thames at the end of Northumberland Avenue and a high tide would wash the sewage back again. Many of the yards of the houses were unpaved and most were filthy. Children frequently used the yards rather than the privies, which were often without seats, only having a rail which was too high for them. Added

to this the corridors and stairs of some houses were occupied at night by those of no fixed abode, with insanitary consequences. The inhabitants of the attics emptied everything on to the roof so that the gutters became secondary cesspools.

The district was also considered bad from the point of view of ventilation because the streets were short and shut in so there was poor aeration. Apart from the smells from the drains, there were also outside nuisances. There were eight butchers, every one of which had his own abattoir and his own cattle shed. As well as these individual butchers there was one very large wholesale abattoir. Much of the blood of the animals went into the cesspools where it went bad while the intestines were left outside and supposed to be collected each evening by contract. There was also a tripe house, a bone boiling house and brewery, all very smelly affairs. At 38 Broad Street was a percussion cap factory owned by Mr. Eley.

Water Supply

The mains water was from two sources, the New River Water Co, and the Grand Junction Water Co. The New River brought its water from Hertfordshire while the Grand Junction took its water from the Thames at Kew where it is tidal and therefore polluted with sewage, although this water was by no means as heavily infected as some other supplies in London. The only attempt at purification consisted of no more than straining with wire mesh.

In 1852 a law was brought in requiring filtration but the first proper filter beds did not come into use until 1856, two years after the epidemic. The mains water was only turned on for half to one hour a day and not at all on Sundays so it was a very precious fluid which was collected in butts and cisterns in the basement yards; there being not enough pressure for it to be delivered higher. The butts and cisterns were rarely cleaned and so added to the pollution, although they did act as settling tanks. After the

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earlier epidemic of 1848 - 1849, Dr. John Snow, of whom more later, carried out an investigation⁵ of the water supply of South London. In that area there were two supplies, the Vauxhall and Southward Company, which took its water from Battersea, and the Lambeth Company which took its water by Hungerford Bridge, almost opposite the Northumberland Avenue sewage outfall. The two companies were rivals and their mains ran along the same roads which made comparisons easy. Snow's investigation showed that there was a significantly greater incidence of cholera among those who took their water from the Lambeth Company, that is from Hungerford Bridge. In 1852 the Lambeth Company moved their works from Hungerford Bridge to Thames Ditton, which is above the tidal part of the river and above the London output of sewage.

In 1854 South London had 334 deaths from cholera. In those areas supplied by Vauxhall and Southwark there were 71.4 deaths per 10,000 houses while Lambeth had only 5.3 deaths per 10,000. That is, there were 14 cases of cholera among the houses supplied by the Southwark and Vauxhall Companies, taking water from Battersea, to every one case among the houses supplied by the Lambeth Company, taking its water from Thames Ditton above the tidal part. This was a fine piece of investigation by Dr. Snow.

In a letter to *The Times*, 7th July 1855, Professor Michael Faraday wrote how he had dropped white cards into the Thames which became invisible when they reached a depth of one inch below the surface.

Even in recent times, A.P. Herbert wrote of the Thames:

*Sweet effluent,
dear Father Drain
Whose generous bosom
doth contain
A lot of oil, a little rain
And all the muck
of Middlesex.*



FARADAY GIVING HIS CARD TO FATHER THAMES

And we hope the Dirty Fellow will consult the learned Professor.

Cartoon from Punch

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In 1853, a report on the 1849 epidemic was presented to the Royal College of Physicians by the distinguished authorities, Baly and Gull.⁶ The authors quote Dr. Snow's theory of spread by contamination of water supply by evacuations but state that "he gives no facts to prove that they have the power he attributes to them nor have we any evidence that they can excite the disease."

The other source of water was from wells, mostly shallow wells. The subsoil in the area is gravel and most of the wells went through the gravel but only as far as the clay, so that the water in the well came from the gravel above the clay. The important Broad Street Well was thirty feet deep and the level of the water was only seven to eight feet below the bottom of the cesspools. Since every house had a cesspool, often old with leaking walls, it can readily be seen where much of the water reaching the wells came from.

Dr. Snow was told by an engineer that a cesspool in clay had to be emptied every six to eight months, while one in gravel could go on for twenty years. That illustrated how porous the brick walls of the cesspool were. In general the water from the mains was used for making tea but for thirst quenching the cool water from the well was preferred. Those living on the Thames bank usually just filled their buckets straight from the river. This may seem to be an exaggeration but it is taken from official contemporary reports.

Dr John Snow (1813 — 1858)

Dr. John Snow was an interesting character.⁷ The son of a Yorkshire farmer he was born in 1813 and died in 1858 at the early age of 45. At fourteen he was apprenticed to a surgeon in Newcastle-upon-Tyne.

During the 1831 epidemic he was sent as an unqualified medical assistant to some coal mines where he noted the complete absence of any attempt at sanitation or washing facilities. In 1836 he decided to walk to London from Newcastle, which he

did through North and South Wales, calling on an uncle in Bath on the way. He studied at the Little Windmill Street School of Anatomy and did his clinical training at the Westminster Hospital. At this time he lived off Soho Square, in Bateman buildings. He then went into general practice at 54 Frith Street, also off Soho Square, later moving to Sackville Street. He became a vegetarian and remained so for eight years. When his health began to fail, he then decided that it was inconsistent to be a vegetarian and wear leather boots so he gave it up. He was a rigid teetotaler and it is perhaps unfortunate that his best known memorial in the area is the John Snow, Public House, in Broad Street.

Dr. Snow is remembered for two entirely separate achievements. He was a pioneer anaesthetist, beginning within a few weeks of the first reported anaesthetic which was given in Boston U.S.A. in October, 1846. He administered anaesthetics to Queen Victoria for the births of Prince Leopold and Princess Beatrice. Queen Victoria thought it was wonderful, but there was an outcry because the Bible says "in pain shalt thou travail."

Snow's other great achievement was to prove that cholera was a water borne infection contrary to the then held view that it was airborne and therefore impossible to eradicate.

He gave up his general practice in 1848 in order to investigate the spread of cholera. He argued that since cholera began with diarrhoea and vomiting the poison must be acting on the alimentary canal by direct contact. Emanations on the other hand would first enter the lungs, then the blood stream before it could get to the gut, in which case there would be general symptoms, temperature, rigors, headache and rapid pulse. From his own experience during the 1831 outbreak he knew that the miners worked ten hours a day, brought their own meals and had no opportunity to wash their hands and since there were no sanitary arrangements there would be every chance that faeces could be on the hands and so conveyed to the

mouth. Added to this there were his convincing investigations and comparisons of the two water supplies, Vauxhall and Southwark, taking in polluted Thames water from the lower reaches, and Lambeth from pure Thames Ditton water, with the figures of 71 cases of cholera in the former and 5 in the latter, per 10,000 houses.

The Epidemic

The outbreak of cholera began in July, 1853 in Southampton. An unusual number of cases of diarrhoea were admitted to The Middlesex Hospital from surrounding districts, with an occasional death. In London, generally, there were 600 deaths in October and November 1853. It then settled down until July 1854, although diarrhoea persisted and so another outbreak was expected.

One of the difficulties is a definition of cholera. In The Middlesex at this time there were four diagnoses made⁸; diarrhoea, which had a definite mortality; choleraic diarrhoea; Anglican cholera and Asian or Malignant cholera. There is no way of sorting these out so that the cases labelled diarrhoea have been omitted from the figures although the Medical Council considered that these cases were mild cholera which had a mortality of 8%.

During August 1854 there was increased infection in this area with an average of about seven deaths a week, and then without any preliminary build up came the explosion of cases on the night of 31st August — 1st September. At The Middlesex Hospital which had two hundred beds, a hundred and twenty cases were admitted in three days; eighty per cent of these cases were from St. James' Westminster, of whom two thirds died. Others were admitted to University College Hospital and Charing Cross Hospital and the Workhouse, but the majority died at home. To read the short but descriptive notes of these patients a hundred and twenty-five years later, fills one with pity and horror for the terrible sufferings that must have occurred. Whole families,

or perhaps even worse, large parts of families, were wiped out. The death rate in the two subdistricts was 21 per 1000 — three times that of the rest of London. It was probably considerably higher than that as hundreds fled from the area and deaths were registered in the parish in which they died. For instance, those who died in The Middlesex Hospital were registered as Marylebone and not Westminster.

The number of admissions to The Middlesex Hospital fell after the first week to about seven a day and in the third week to three a day. This rapid falling off in numbers was partly due to the fact that three quarters of the inhabitants had left the district. Snow estimated that 200 died on 1st/2nd September and over 500 from these two Soho subdistricts then and later.

The Broad Street Pump

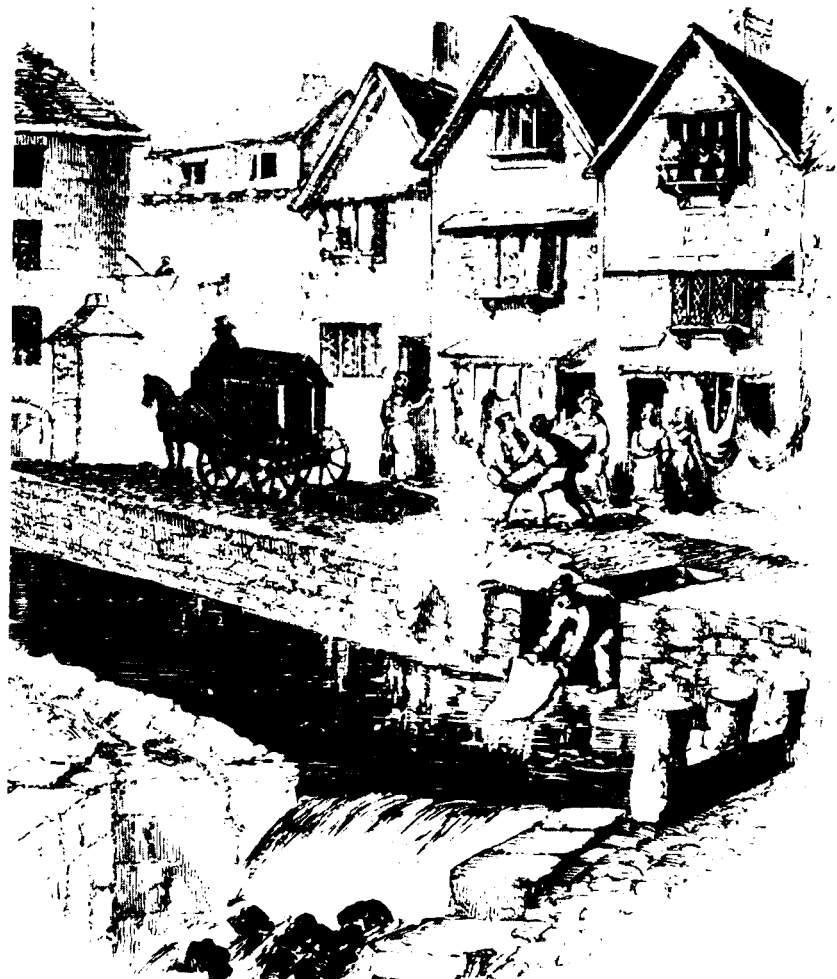
Snow visited the place daily, taking water from the Broad Street pump on the 3rd September. At first it was clear, but on the fifth day there appeared “small white flocculent particles and the water smelt on standing.” He had these particles examined microscopically — they were structureless and probably decayed organic material.

The Broad Street pump had a reputation for particularly good water, better than the other seven pumps in the area and people came from some distance to get it. The fact that it was infected, as judged by the organic content and numbers of protozoa seen on microscopic examination, was confirmed the following year. The water was used in public houses, dining rooms and coffee shops and was sold in shops to mix with sherbet to make fizzy drinks. Snow considered that the well must be the source of trouble, having been infected by the evacuations of someone living nearby and that the well had later cleared itself. On the evening of September 7th Snow went to St. James Vestry and asked permission to give his views. He begged them to remove the handle of the pump. To their credit, though

somewhat unwillingly as it was against all the accepted theories, they removed the handle of the pump on 8th September. The result was not so dramatic as is often stated, as the outbreak had already passed its peak. It would, however, be unfair to detract from the famous story, as later it proved how right Snow’s simple but brilliant deductions were. Snow wrote a report on his investigations in which he pointed out that many of the inhabitants preferred well water generally for drinking, and the Broad Street well in

particular, while using the mains water for teamaking and washing. The Workhouse with 536 inmates had only five deaths apart from those brought in already infected, but they had their own well.

In the brewery in Broad Street no one died, except the proprietor, though no water was ever drunk. They also had their own deep well. At the Eley percussion cap factory, 38 Broad Street, which employed 200 people, 18 died. Their drinking water was brought from the pump and stood



Washing shirts in drinking water as victims taken to the cemetery

stored in tubs. Snow also mentions a man from Brighton who came to visit his brother in Poland Street. His brother was dead by the time he arrived, and he did not see the body, but he had a brandy and water. The water came from the pump, and although he stayed only twenty minutes, he died 48 hours later. Another case was Mrs. Eley, widow of the percussion cap factory proprietor, she lived in Hampstead where there was no cholera. She never went to Broad Street but liked the pump water and a bottle was brought to her on 31st August. She drank it that day and died of cholera on 2nd September. A niece who was visiting her also drank some, she returned to Islington, where there was no cholera, and she also died.

Mr. Gould, the famous ornithologist, had been out of London and returned home on 2nd September. He sent for some of the well water and he was surprised to find that although it was clear it had an offensive smell and so did not drink it. His servant however did drink it and developed cholera, but she was lucky, she recovered.

There was a number of theories on the causation of the outbreak of the disease which were dismissed. One was that putting in the new sewers a few months previously had disturbed latent infection in the soil. The Broad Street sewer was put in in 1852. Another theory was that the old plague pit by Carnaby Street had been disturbed. This however was outside the area.

An extremely important investigation was carried out in 1855 by the Rev. Henry Whitehead⁹, the curate of St. Luke's Berwick Street, who was then aged 29 and had been appointed curate in 1851. Snow had presented him with his book on his 1849 investigations on cholera, but Whitehead was not convinced and wrote to Snow and told him so. Whitehead then set out on his own very searching enquiries prejudiced against Snow's hypotheses. However his figures showed that of those who drank the water from the Broad Street pump a ratio of 80 to 57 had been

affected while among the non-drinkers it was only 20 to 279. Whitehead showed that the greatest pollution was on 31st August and partial purification had occurred by 3rd September. This was followed by his most dramatic discovery. On 2nd September an infant of five months whose attack of cholera began on 28th August had died at 40 Broad Street. The importance of this rests on the fact that this house was the nearest to the pump and the date of the onset, allowing 24 - 36 hours incubation matched the major outbreak. The mother of the dead child had washed its napkins and emptied the pails into the cesspool in front of the house and this was less than three feet from the well. Whitehead reported this to the Committee who thereupon ordered an inspection of the cesspool. This inspection showed that the brickwork was very decayed and also showed that there had undoubtedly been seepage into the well. The child's father contracted cholera on the 8th September, the day that the handle of the pump was removed. This man also died and could well have started another outbreak if the handle had remained on the pump allowing the well water to be used. By this time Whitehead had himself become a strong supporter of Snow.

Whitehead interviewed those who had recovered, relations of the dead and those who never contracted the disease. He showed overwhelmingly by statistics that the well water was to blame.

Enquiries

The members of the Council of Enquiry set up by the Board of Health the year following the epidemic in 1855 reported¹⁰ that they still could not understand this sudden rise in the incidence over the two days, 31st August and 1st September, although admitting that the sanitary conditions were appalling. The report states that the atmosphere was offensive with effluvia from ill-conditioned sewers, from defects of drainage and cleanliness in the houses and from unreg-

ulated slaughtering and other offensive trades. There was some of the worst overcrowding, but they asked why it should select particular foci for extreme outbreaks. They had the Snow and Whitehead reports before them and referred to Dr. Snow's theory of the well in Broad Street but reported "we do not find it established that the water was more contaminated nor that the inhabitants using the well were particularly affected." Their only explanation was that "the trouble depended on other organic impurities participated in the atmospheric infection of the district."

The following quotation taken from the report gives the view of Dr. Hassall, one of the members of the Scientific Committee who carried out the microscopic examination of the different waters. The examinations were carried out at St. Thomas's Hospital and the following extract gives the views of the time:

"Many of the public believe that everything we eat and drink teams with life, and that even our bodies abound with minute living and parasitic productions. This is a vulgar error and the notion is as disgusting as it is erroneous."

The St. James Vestry also held an enquiry headed by Dr. Lancaster, three local doctors and Whitehead.¹¹ They had Snow's and Whitehead's reports before them, both of which were included in the Committee's published findings. Unlike the Board of Health Enquiry they accepted these theories, perhaps not quite wholeheartedly. Their recommendations show:-

1. That there should be flushing of the sewers.
2. The wells should be closed and artesian wells dug.
3. Cisterns should be abolished.
4. There should be stand-pipes on water mains.

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Hospital Care

The Apothecary to The Middlesex Hospital wrote a full report of the outbreak from the hospital point of view. He stated that he was most impressed by the devotion of the nursing staff (at a time when nursing was not what it is today). He was also impressed by the porters who had to carry the patients to the wards, (there were no lifts,) and the hundred or so bodies back to the Dead House.

Each patient was given a warm bath by the nurse, rubbed over with mustard, and hot bottles were put along the sides of the patient in bed. Turpentine fomentations were put on the abdomen and the limbs were massaged to allay the terrible cramps, such a feature of cholera. A purge and an enema were given, frequent brandies, constant changing of linen, the giving of other medicines and the last attentions to the dying patients surrounded by lamenting relations. All this must have been a tremendous strain. It must be remembered that the normal nursing complement was one sister and one nurse to each ward of twenty beds by day and only one nurse for some wards at night. (Other wards had no nurse at night). Neither sisters nor nurses had received any training. During this time of stress, with some difficulty, six to nine day nurses and eight to eleven night nurses were hired to help. Among the extra nurses was Florence Nightingale who was then superintendant of a nursing home in Harley Street. We know little of her experiences except a letter quoted by Mrs. Gaskell¹². Speaking of cholera in The Middlesex Hospital, she said; "The prostitutes come in perpetually, poor creatures staggering off their beats. It took them worse than any." This is probably Victorian sanctimonious rubbish. The notes of the time supply no evidence for this and Snow definitely states that the mortality appears to have fallen equally amongst all classes. Florence Nightingale also said, "three students came in smoking cigars, had one look and went away," yet Dr. Sibley gave great praise to every member of the

staff and students of The Middlesex Hospital in what must have been a terrifying experience. He states specifically that no one ran away.

Large pans were put in each ward generating chlorine gas as a disinfectant and the windows were all kept open. An interesting part of the preventative care for the nurses was to send them by cab to the nearest piece of country for fresh air and recreation each day. Every resident in the hospital was given two chops and three ounces of brandy extra daily.

Only one patient who was already in the hospital when the epidemic began developed cholera and she recovered. One nurse died of cholera and another was affected but she recovered. A laundry assistant also developed it and recovered. When one thinks of all the handling of infected linen by nurses and laundry staff it is a remarkable achievement.

There was another outbreak of cholera in 1866.¹³ It was largely confined to the East End of London and along the banks of the Thames. It lasted for about 1 — 15 weeks and resulted in 7,000 deaths in London, a rate of 3.6 deaths per 1,000. Dr. Snow was dead (he died of a stroke in 1858), but Henry Whitehead, still a curate, was asked to help. He showed that it was due to the East London Water Company of Lee Bridge Road using unfiltered polluted water from

the River Lee. As the epidemic began the St. James's Committee chose this time to replace the handle on the Broad Street pump.

Whitehead moved to Carlisle in 1870 and to his dying day he had a picture of Snow on his desk. At his farewell banquet before departing to the north he replied to his toast with a three hour after-dinner speech describing his work in London.

Conclusion

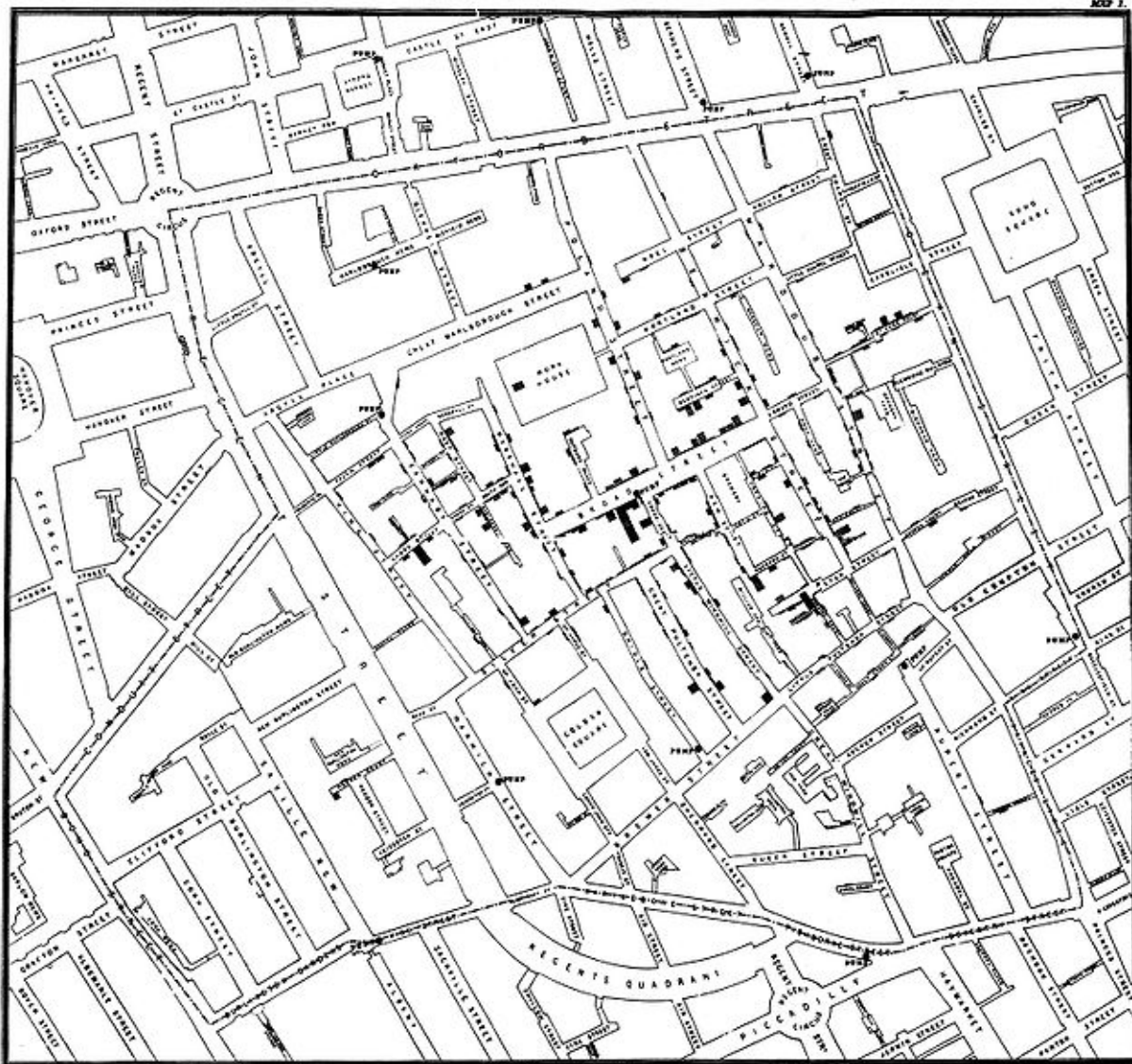
This is a fascinating but horrific story of Dickensian London but it is an illustration of what two dedicated and intelligent men, John Snow and Henry Whitehead, achieved by simple observation and without laboratory help. Though official obstinacy existed then as now, thanks to the work of these two men the whole attitude to sanitation and water supply eventually changed in this country. Unfortunately there are still some parts of the world where 1854 conditions still exist.

Finally to quote some down-to-earth Victorian practical sense from Lord Palmerston. When asked by the Presbyterian of Edinburgh for a day of fasting and humiliation to check the progress of cholera, he replied: "Only when Edinburgh frees itself of the gaseous exhalations arising from overcrowded dwellings and undisposed filth would it be time to ask the Maker of the Universe to interfere." ■

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John Snow's 1854 map of the area of the Golden Square area of London



Published by C.F. Cheffins, Lith, Southampton Buildings, London, England, 1854 in Snow, John. On the Mode of Communication of Cholera, 2nd Ed, John Churchill, New

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