**Pioneers in Enteric Infections**

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**John Snow**

John Snow, (1813-1858), was the son of a coal-yard labourer in York, England. As a boy he proved to be an exceptionally bright, methodical, and an eager student. His mother used a small inheritance to send him to a private school, where he excelled. Snow studied in York until the age of 14, when he was apprenticed to William Hardcastle, a surgeon in Newcastle upon Tyne. It was there, in 1831, that he first encountered cholera, which entered Newcastle via the seaport of Sunderland and decimated the town. In Snow’s day most physicians believed that cholera was caused by “miasmas”, poisonous gases that were thought to arise from sewers, swamps, garbage pits, open graves, and other foul-smelling sites of organic decay. Snow felt that the miasma theory could not explain that their first symptoms had been digestive problems. Snow reasoned that the disease must be ingested with polluted food or water. By talking to local residents, he identified the source of the outbreak as the public water pump on Broad Street. Although Snow’s chemical and microscopic examination of a water sample from the Broad Street pump did not conclusively prove its danger, his studies of the pattern of the disease were convincing enough to persuade the local council to disable the well pump by removing its handle. Researchers later discovered that this public well had been dug only three feet from an old cesspit, which had begun to leak fecal bacteria. The nappies of a baby, who had contracted cholera from another source, had been washed into this cesspit. Nearly all the deaths had taken place within a short distance of the pump. There were only ten deaths in houses situated nearer to another street-pump on the opposite street. However, his theory about the spread of cholera had not gained any ground. The ‘miasmists’ still prevailed. Snow did not know that the bacillus that causes cholera had been discovered in 1854 by the Italian anatomist Fillipo Pacini, who used a microscope to examine the intestinal walls of people killed by cholera. Snow’s final vindication came in 1884, when German microbiologist Robert Koch rediscovered, isolated, and cultured the cholera bacillus, *Vibrio cholerae*. For his persistent efforts to determine how cholera was spread and for the statistical and mapping methods he initiated, John Snow is widely considered to be the father of epidemiology.

**George A Soper**

George A. Soper (1870—1948) was a sanitation engineer. He is best known for discovering Mary Mallon, or Typhoid Mary, a carrier of Typhoid who had no symptoms at all.

From 1900 to 1907 Mallon worked as a cook in the New York City area for seven different families. In 1900, she worked in Mamaroneck, New York, where, within two weeks of her employment, residents developed typhoid fever. In 1901 she moved to Manhattan, where members of the family for whom she worked developed fevers and diarrhoea, and the laundress died. Mallon then went to work for a lawyer; she left after seven of the eight people in that household became ill. In 1906, she took a position in Oyster Bay, Long Island, and within two weeks ten of eleven family members were hospitalized with typhoid. Mallon then went to work for a cook for the family of a wealthy New York banker, Charles Henry Warren. When the Warrens rented a house in Oyster Bay for the summer of 1906, Mallon went along too. From August 27 to September 3, six

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of the eleven people in the family came down with typhoid fever. The disease at that time was “unusual” in Oyster Bay, according to three medical doctors who practiced there. Mallon was subsequently hired by other families, and outbreaks followed her.

In late 1906, the Warren family hired George Soper to investigate. Soper published the results on June 15, 1907 in the *Journal of the American Medical Association*. He believed Mallon might be the source of the outbreak. He wrote:

“It was found that the family changed cooks on August 4. This was about three weeks before the typhoid epidemic broke out. She remained in the family only a short time, leaving about three weeks after the outbreak occurred. The cook was described as an Irish woman about 40 years of age, tall, heavy, single. She seemed to be in perfect health.”

He was unable to locate her because she generally left after an outbreak began, without giving a forwarding address. Soper learned of an active outbreak in a penthouse on Park Avenue, and discovered Mallon was the cook. Two of the household’s servants were hospitalized, and the daughter of the family died of typhoid.

When Soper approached Mallon about her possible role in spreading typhoid, she adamantly rejected his request for urine and stool samples. Since Mallon refused to give samples, he decided to compile a five-year history of Mallon’s employment. Soper found that of the eight families that hired Mallon as a cook, members of seven claimed to have contracted typhoid fever. On his next visit, he brought another doctor with him but again was turned away. During a later encounter when Mallon was herself hospitalized, he told her he would write a book and give her all the royalties. She angrily rejected his proposal and locked herself in the bathroom. Soper tracked her down doggedly and the New York City Health Department finally who took her into custody.

It was known at the time that typhoid could be spread by water or food products and people who were infected by the typhoid bacillus could pass the disease from their infected stool onto food via unwashed hands.

Soper’s detailed investigations brought to forefront the concept of a healthy carrier, which was unheard of at that time.

References