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Stephen Allen, cholera, and the nineteenth-

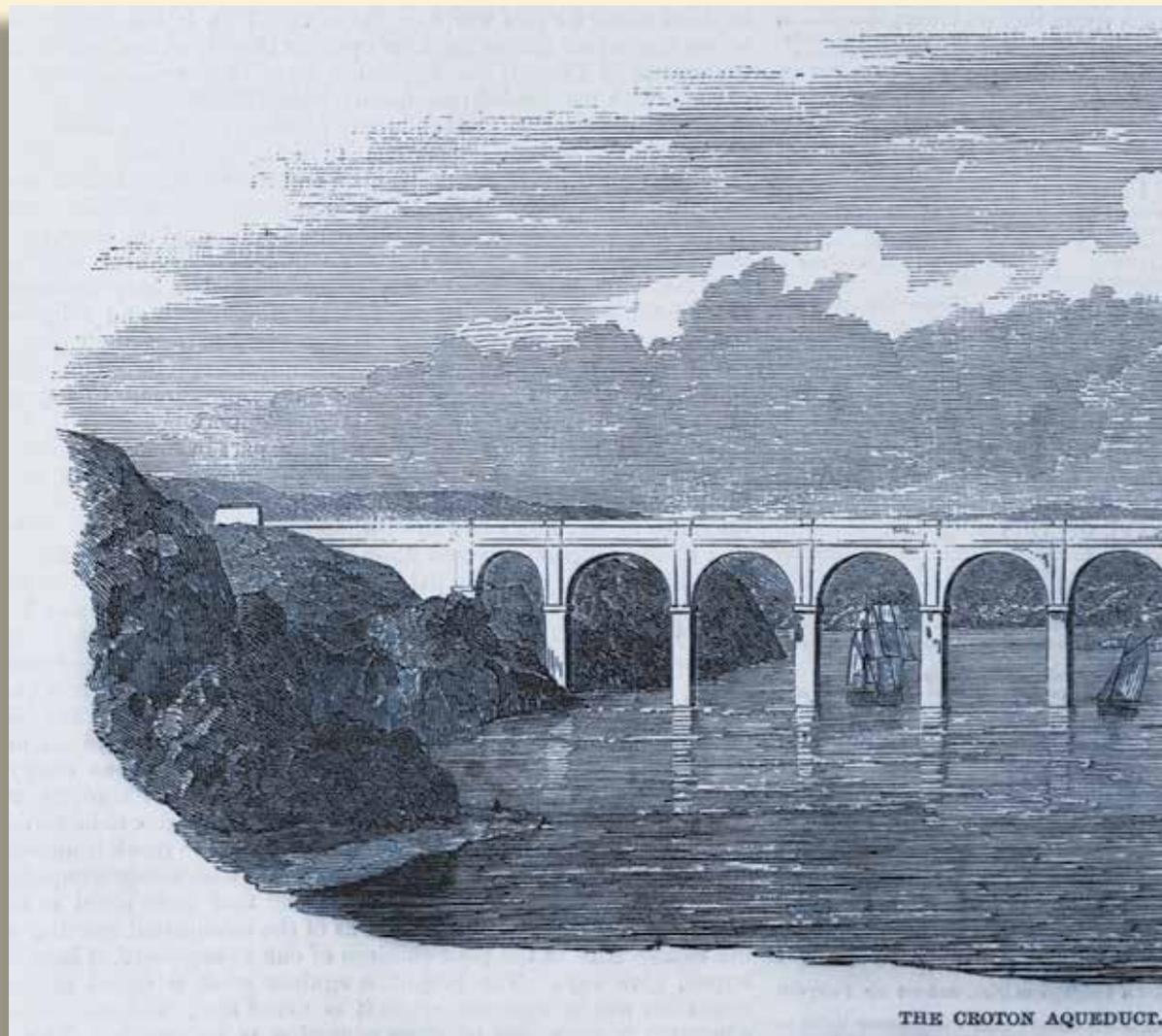
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In the mid 1800s, Stephen Allen, a man with no formal medical or scientific training, spearheaded one of the greatest public health initiatives nineteenth-century

America had ever seen—the rebuilding of the New York City water supply.

During his twenty years of public service after he became mayor of New York City in 1821, local merchant Stephen Allen made the conditions of the city’s water supply his personal and professional priority. In the midst of recurring epidemics of cholera, Allen’s belief in the connection between cholera and



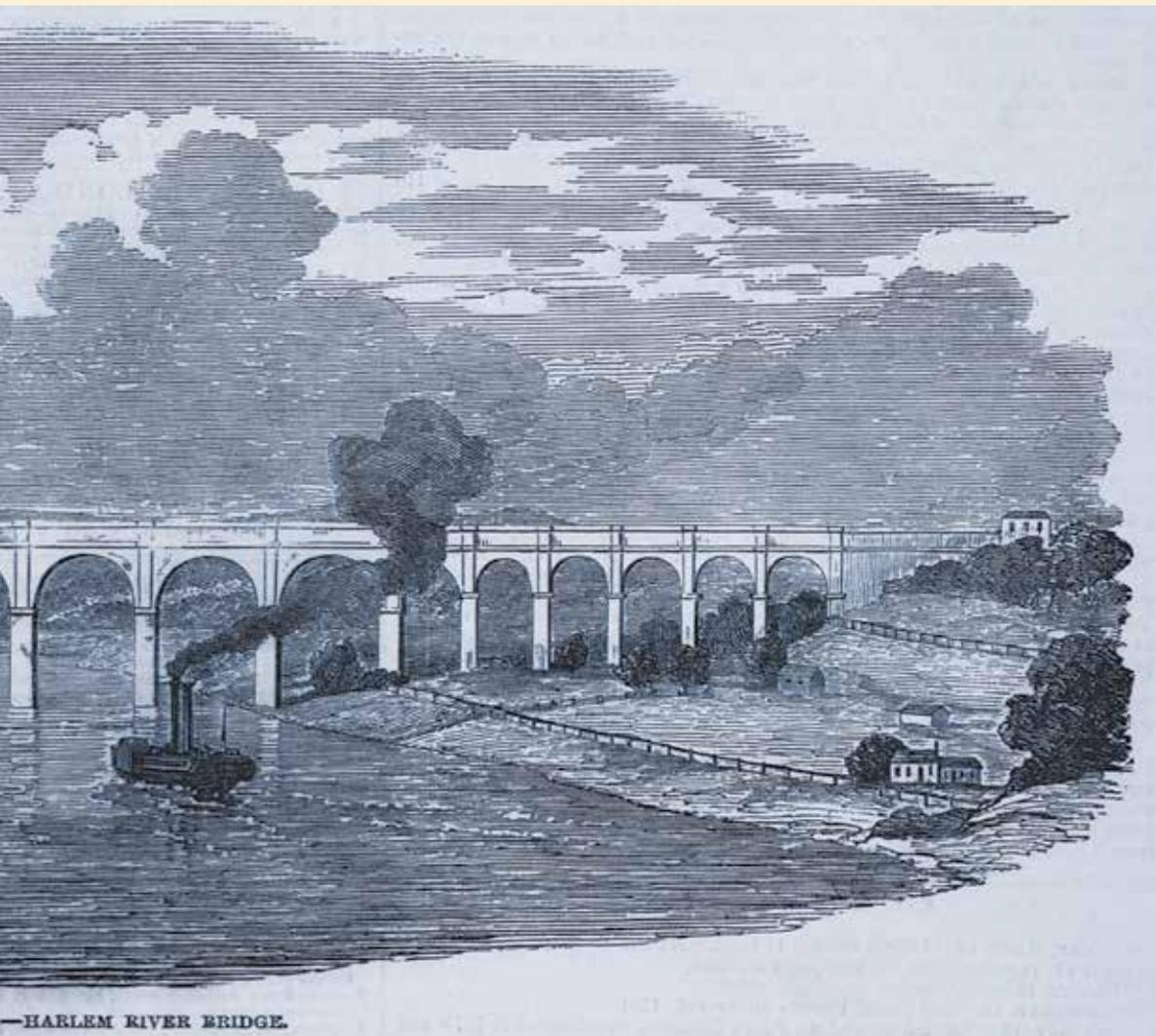
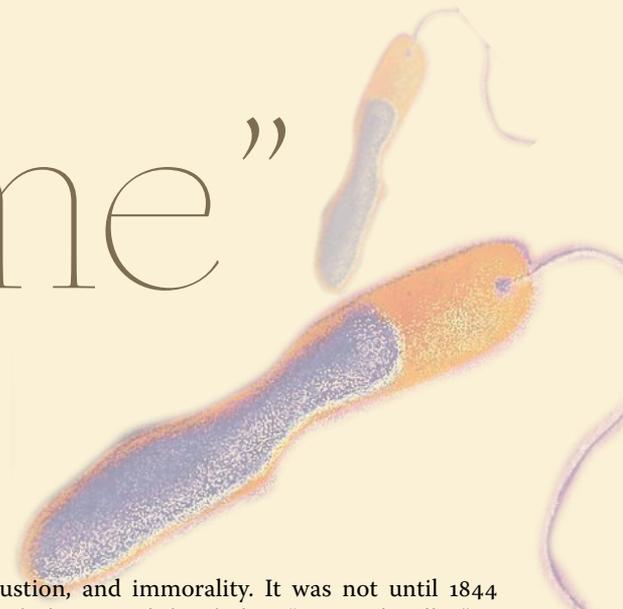
wholesome”

century New York City water supply

water quality drove him to tirelessly work to replace local wells and ponds with the Croton water source, a pipeline system completed in 1842 that serves the city to this day.

Allen's conviction that cholera and water quality were related preceded formal epidemiologic and microbiologic evidence by years. Most medical and scientific experts of the time attributed cholera outbreaks to weather patterns, atmospheric

changes, exhaustion, and immorality. It was not until 1844 that Robert Koch discovered the cholera “comma bacillus” in the feces of cholera patients, and 1892 when he identified the organism in the Elbe River and other water supplies. It was not until 1849 that John Snow published the work that later earned him the title of founder of the field of epidemiology; in the 1854 London cholera outbreak, he made his observations



The Croton Aqueduct at its crossing of the Harlem River, 1850. ©CORBIS

Background image: *Vibrio cholerae*. Credit: VEM/Science Source

about the clustering of cholera cases around the Broad Street pump, convinced officials to remove the pump handle, and effectively ended the epidemic.

The early New York City water supply

Until the mid-nineteenth century, New York, and New Amsterdam before it, obtained water directly from the numerous ponds, brooks, and streams that dotted the island of Manhattan, such as Sunfish Pond at Madison Avenue and 32nd Street.¹ Residents also depended on privately owned and operated wells. Lower Manhattan, however, did not provide an ideal setting. As Edward Hall described in his 1917 retrospective of New York’s waterworks:

the absence of a sewer system in the early history of the town permitted much unwholesome matter to find its way into the ground. When we read that “tubbs of odour and nastiness” were emptied in the street (Common Council minutes, 1700), it is not surprising that the wells were not only generally unpleasant to the taste, but, as we shall see, were also undoubtedly at times highly unsanitary.^{1p487}

Historian Gregory S. Hunter writes, “As early as 1748, New York’s well water reportedly was so bad that even horses balked at drinking it.”^{2p129}

In 1798, Dr. Joseph Browne, a city health officer, recommended the Bronx River as a potential source of good water. The Common Council appointed William Weston, a canal engineer for the state, to examine the site. In an essay dated July 2, 1798, Browne made a case for the role of clean water in maintaining the public health:

In a little treatise I have lately published addressed to the Citizens of New-York, on the Yellow Fever, I have endeavoured to shew that the disease is of a local nature, arising principally from a source which is pretty much in our power to prevent or remove, by an unremitting attention to *cleanliness*, to which purpose it is obvious that a plentiful supply of water is essentially necessary.^{3p9}

In 1799, New York City passed on the responsibility of constructing and maintaining a waterworks to the newly chartered Manhattan Company. The company, the brainchild of the improbable team of Alexander Hamilton and Aaron Burr, received from the state legislature a mandate to supply New York City with “pure and wholesome water.”^{2p125} Shortly before the company’s charter went into effect, Burr and some of his colleagues inserted a clause allowing the company to spend surplus capital in any way not against the law. While the citizens of New York, including the legislators who supported the charter, presumably thought this meant investing the surplus for future use on the waterworks, Burr instead created a bank. Hamilton opposed this move and ended the partnership. Five

years later, Burr killed Hamilton in a duel.

Under Burr’s direction, the Manhattan Company moved ahead rapidly. The directors first met on April 11, 1799, they contracted for pine logs for water pipes on May 6, and the company bank opened for business on September 1. While the Manhattan Company pulled out of the water business within fifty years, the bank remained, surviving today as the multinational giant Chase Manhattan. Historian Gregory S. Hunter comments:

Burr and at least some of his Republican associates planned to concentrate on banking from the beginning of the incorporation campaign. Therefore to increase the amount of “surplus” capital available for banking, the company consistently tried to furnish “pure and wholesome water” at the *least expense possible*.^{2p126}

Well water delivered through pine logs was neither sufficient nor good enough for New Yorkers. As they had for over two hundred years, citizens pressed for more, and cleaner, water. In 1810, Henry B. Livingston, possibly an entrepreneur, wrote to Henry B. Remsen, president of the Manhattan Company, with a business proposal:

When last in the City of New York, altho’ in the Winter Season, I found nothing so disagreeable as the water, even in the most elevated parts. This impurity I perceive has been increasing with the Population and will continue to grow, untill it renders a great part of its inhabitants a prey to epidemical diseases if not attended to and prevented.

To avert so dreadful a calamity, that must eventually arise, from the Inhabitants literally in their water drinking a proportion of their own evacuations, as well as that of their Horses, Cows, Dogs, Cats and other putrid liquids, so plentifully dispensed in the different yards, streets, and alleys, of that City not to mention the cemeteries another great source of corruption—I beg leave to make to the Company over which you preside a proposal to supply the City, with the water of the Croton or Bronx Rivers, as shall be thought most eligible.⁴

Increasingly, scientists and the public were taking an interest in the role of sanitation in disease spread. Aware of the growing concern, the city throughout the early 1800s made a series of unsuccessful attempts to regain control of the waterworks, but the Manhattan Company held tightly to the terms of its charter. Meanwhile, developers, engineers, and entrepreneurs continued to propose ways to bring water from cleaner and more plentiful sources, most of them off the island of Manhattan.

Stephen Allen: New York mayor and merchant

Those efforts received a critical boost in 1821, when



Eng^d by J. Rogers.

Stephen Allen
Methodist in 1821 & 1822
Population of the City 120,000

Stephen Allen. Collection of the New York Historical Society, PR052 (Portrait file), Box 3, Folder Allen, K-S.

Stephen Allen became mayor of New York. In the summer of 1822, less than one year after Allen took office, yellow fever arrived in New York. Allen immediately turned his attention to the communicable qualities of the disease, focusing on sanitation and quarantine laws. He questioned whether it made sense to quarantine foreign ships before they docked, while at the same time bringing the ships’ goods to the city’s wharves without inspection. As recorded in the anonymous account, *The Life of Stephen Allen*,

The health officer and resident physician, both medical men, insisted that the disease was endemic, and could not be brought from abroad. Mr. Allen’s remonstrances were therefore disregarded.^{5p25–26}

Throughout his years in office, Allen’s beliefs repeatedly clashed with those of many medical experts, adding to the numerous obstacles he faced in the attempt to carry out his civic projects.

During that first summer of yellow fever, Allen visited the unsanitary districts of New York, pointing out nuisances and personally seeing to their removal. The epidemic ended on November 1, 1822. On November 25, Allen presented a written communication to the Common Council “on the subject of the late sickness and the probable means of averting its return to the city.”^{6p98} Allen put forth a number of suggestions, concluding with,

And that connected with the health and prosperity of the city was the bringing in of good and wholesome water, which ought never to be lost sight of until its accomplishment was consummated.^{6p98}

The editor of Allen’s memoirs, one of Allen’s grandsons, points out that

The italics are Mr. Allen’s. This is his first mention of a subject which was thereafter to be the chief object of his life, namely the introduction of Croton water to the city.^{6p99}

Allen was born in New York City on July 2, 1767, the youngest of five children. Two years after his birth, his father died of yellow fever while working on the construction of an army barracks in Pensacola, Florida. Allen began an apprenticeship in sailmaking at age twelve, a business he pursued for most of his life. After several years as a successful merchant, he became mayor of New York in 1821. Under Allen, the city’s water supply came to occupy political center stage. Shortly after his election, he established a committee to investigate the matter. Allen lost his reelection bid in 1824, and received a commission to inspect the conditions of state prisons. He retired from the mercantile business the following year.

Allen made his greatest contribution to New York’s water

supply and public health in the years following. In 1826, he became a member of the Assembly of the State of New York, chairing its committee on water. He was elected to the state senate in 1829. Meanwhile, New York City slowly edged toward improving its water supply. In 1829, a 233,000-gallon reservoir was constructed on Broadway between 13th and 14th streets. Project organizers intended the reservoir water to be used for fighting fires, but they foresightedly argued for iron pipes so that when potable water became available the pipes could still be used. As had happened every time the question of upgrading of the city’s water supply came up, there was no lack of proposals for importing water from distant sources including Rye Pond (the source of the Bronx River), the Passaic River in New Jersey, the Housatonic River in Connecticut, and the Croton River in Westchester County.⁷ And just as before, little came of them. It took cholera epidemics—and Stephen Allen’s response to them—to catalyze the city’s stagnant plans and revamp the waterworks.

The 1832 cholera epidemic and early theories on cholera transmission

Cholera came to North America in 1832, apparently transported on a ship arriving in Quebec in early June.⁸ The disease reached Montreal on June 14 and New York City on June 25. Anxious citizens looked to local medical authorities for explanations and reassurance. The Board of Health established a Special Medical Council during the epidemic, which promptly began informing the public through educational pamphlets. The council recommended:

Among articles wholesome in any common season, but found to predispose to attacks of Cholera in this city, are all common green garden vegetables and fruits. There can scarcely a vegetable be named, that will not be found among those which have been reported to your honourable Board as having been the cause of Cholera. . . .

In regard to temperance, we can only say, that the slightest excess at this time, either in eating or drinking, appears, from much experience, to be attended with great danger.

The clothing should be warm; it should be so regulated, as to prevent the danger of a chill, and at the same time, not to exhaust the system by excessive perspiration. The covering should be particularly warm about the bowels, and flannel worn next the skin.

The regular hours of sleep should be, as far as practicable, observed; and the body should by no means be exposed, during sleep, to a draught of night air.^{9p12}

While many observers attributed cholera’s predilection to attack the lower socioeconomic classes to lack of sanitation, the six physicians on the Special Medical Council seemed to believe that cholera chose its victims more for their character than for their condition. When asked by the Board of Health if



New York City pedestrians observing fire wagon on way to fire, circa 1875. © Bettmann/CORBIS.

cholera could be driven from the city, they replied that

The grand result embraced in this question, involves, we fear, several impossibilities; for the mass of mankind are, and there is reason to fear, ever will be, insensible to the operation of great moral principles.

As the attacks of Cholera are brought on, for the most part, by incurable follies, and imprudence, we despair of expelling it from our city, while the present predisposition to the disease exists.

Still there is no reason to doubt, that among the decent and orderly portion of the community, an exemption from an attack of Cholera may be obtained in a great degree, by a strict and prudent attention to the rules above laid down.^{9p14}

Allen as water commissioner

Throughout the cholera epidemic, Stephen Allen remained focused on the city's water supply. Similar concerns reverberated throughout the city. On November 29 in a report to the Board of Aldermen of the City of New York, Timothy Dewey and William Serrell discussed connecting the Croton River, in distant Westchester County, to the Sawmill and Bronx Rivers,

a project that would require costly machinery to elevate the water. On December 22, U.S. Corps of Engineers Colonel Dewitt Clinton, appointed on November 10 by the Committee on Fire and Water to examine the feasibility of bringing water from the Croton River, reported that New York would need the Croton's water for an adequate supply.¹⁰ Colonel Clinton's assignment demonstrates that, in addition to concerns surrounding water *quality*, the issue of water *quantity* (specifically in regard to firefighting) played a key role in expanding the city's water system.

In May 1833, Allen became chief water commissioner, a position created during the previous legislative session. While Allen and the other water commissioners made plans for pipeline projects, another suggestion emerged. Civil engineers John L. Sullivan and Levi Dusbrow proposed boring into the deep rock under Manhattan. Sullivan's repeated correspondence and meetings with Allen and the other water commissioners provide evidence of a close association between the 1832 cholera outbreak and New York's rekindled interest in finding good water. Sullivan wrote the following year:

That under these circumstances after the epidemic had



“Central Park.” Printed by F. Heppenheimer. © Museum of the City of New York/CORBIS.

passed over the City last year, and we had seen the successful defense which some other cities were able to make against it . . . the committee on water took up the subject anew.^{10p4}

Nothing apparently came of the proposal. It would take another two years—and another cholera epidemic—before work began on expanding and improving the city’s water supply.

The 1834 cholera epidemic and the Croton project

In 1834, cholera returned to New York. Allen maintained his belief that poor water quality was responsible for the epidemic. As he wrote in his June 1839 reflection on the 1834 outbreak:

There is one fact which I must take the liberty to refer to in support of the opinion that where the water is good epidemic diseases are less virulent than when it is bad or indifferent. In Philadelphia where the water is supplied in abundance, and of a good and wholesome quality, only 740 persons died by the cholera in 1834, while in New York with the climate full as healthy if not more so, the deaths by that

disease during the same season amount to 3,515.^{6p167}

Within months of the outbreak, New York City (which at the time still relied on the Manhattan Company’s wells and wooden water mains) began planning for construction of the Croton pipeline.

In 1835, by popular vote of 17,330 to 5,963, New Yorkers agreed to raise \$2.5 million of “water stock.” The vote attested to strong support of the Croton project, though perhaps not as strong as Allen remembered in an 1839 diary entry: “The unanimity manifested by the citizens of New York on the subject of a supply of pure and wholesome water has perhaps never been exceeded on any question heretofore decided through the ballot boxes.”^{6p162} In 1836, pipeline construction began. As he had for over ten years, Allen celebrated the qualities of Croton water:

Now the work we are engaged in will not only bring to the city a plentiful supply but a pure and wholesome article. The purity of the Croton Water is unquestionable. . . the lakes and ponds from which the Croton proceeds are themselves reservoirs answering all the purposes of filterers, by purify-

ing the water before it discharges itself into the channel of the main stream.^{6p167}

In 1837, construction began on a dam six miles from the mouth of the Croton River. The dam raised the water forty feet above the level of the aqueduct head and 166 feet above sea level, creating a 400-acre, five-mile-long reservoir. Simultaneously, a masonry aqueduct was constructed from the reservoir through Sing Sing, Tarrytown, Dobbs Ferry, Hastings, and Yonkers, reaching the Harlem River 32.88 miles later.

On March 17, 1840, Governor William Seward removed Allen from the office of Water Commissioner. The following month, a frustrated and dismayed Allen wrote that his dismissal was not

on account of any neglect of duty or want of ability to perform my engagements. The whole cause was political, proceeding from the most rancorous and malignant party that ever existed in this country. They style themselves Whigs, but consist of the disappointed of all parties . . .^{6p170}

Allen watched the final stages of his dream from the sidelines. Construction of the Croton Dam, Aqueduct, and Reservoir was completed on June 1, 1842. Even then, though, there was no guarantee that water could travel from the Croton River to New York City—a distance of almost forty miles—in a tube (in contrast to the Roman aqueduct model, which was open at the top). On the aqueduct's test day, June 22, 1842, curious and hopeful New Yorkers gathered at the Yorkville Reservoir between 79th and 86th streets, the first Manhattan stop-off of the Croton water. Water gates at the Croton Dam opened at 10:00 AM, with the arrival of water in Manhattan expected at 3:00 PM that afternoon. At 3:00, Stephen Allen, who had last served in an official capacity on the project more than two years before, stood at the mouth of the pipeline in anticipation. Thirty minutes later he was still waiting. William A. Cook's reminiscence in the June 15, 1917, *New York Tribune* brings the moment to life:

At 3:30 there was no sign of water and Mr. Allen said that he was almost in despair, when suddenly moisture appeared at the bottom of the aqueduct, and in a few moments "a stream of water not larger than a pencil was distinctly visible."

S.A.'s face must have been a study, as this stream "increased in size rapidly," and the cheers and congratulations of the sceptics, as well as the supply of Croton water, poured in.^{6p200}

New York celebrated in style. The *Croton Maid*, which could hold four people, sailed through the entire aqueduct and arrived at the Yorkville Reservoir on June 27, 1842. A thirty-eight-gun salute (one for each mile traveled) greeted

it. Later that year, Croton water arrived at the Murray Hill Reservoir (on the present site of the New York Public Library on 5th Avenue between 49th and 42nd streets) and at City Hall Park, where it spouted up to fifty feet into the air through the Croton Fountain. A seven-mile procession of more than 20,000 people coursed through the streets. After almost a century of trying, New York had found good water—at a cost of \$14.5 million.¹¹

Over the years, the Croton system underwent a number of modifications. High Bridge—1450 feet long, 144 feet high, and 21 feet wide—carried Croton water over the Harlem River into Manhattan starting in 1848. In 1852, Manhatta Lake, which followed the natural contours of its Central Park setting, added over one billion gallons of storage capacity.^{11p66} The Manhattan Company, which had overseen New York's water since 1799, left the water business to focus solely on banking when the Croton Aqueduct replaced local wells in 1842. Stephen Allen went on to serve as Receiver General of the State of New York. He resigned after one term and in 1852 died a "victim of the dire catastrophe on board the ill-fated steamer *Henry Clay*" in the Hudson River—a fire that consumed the boat.^{5p62}

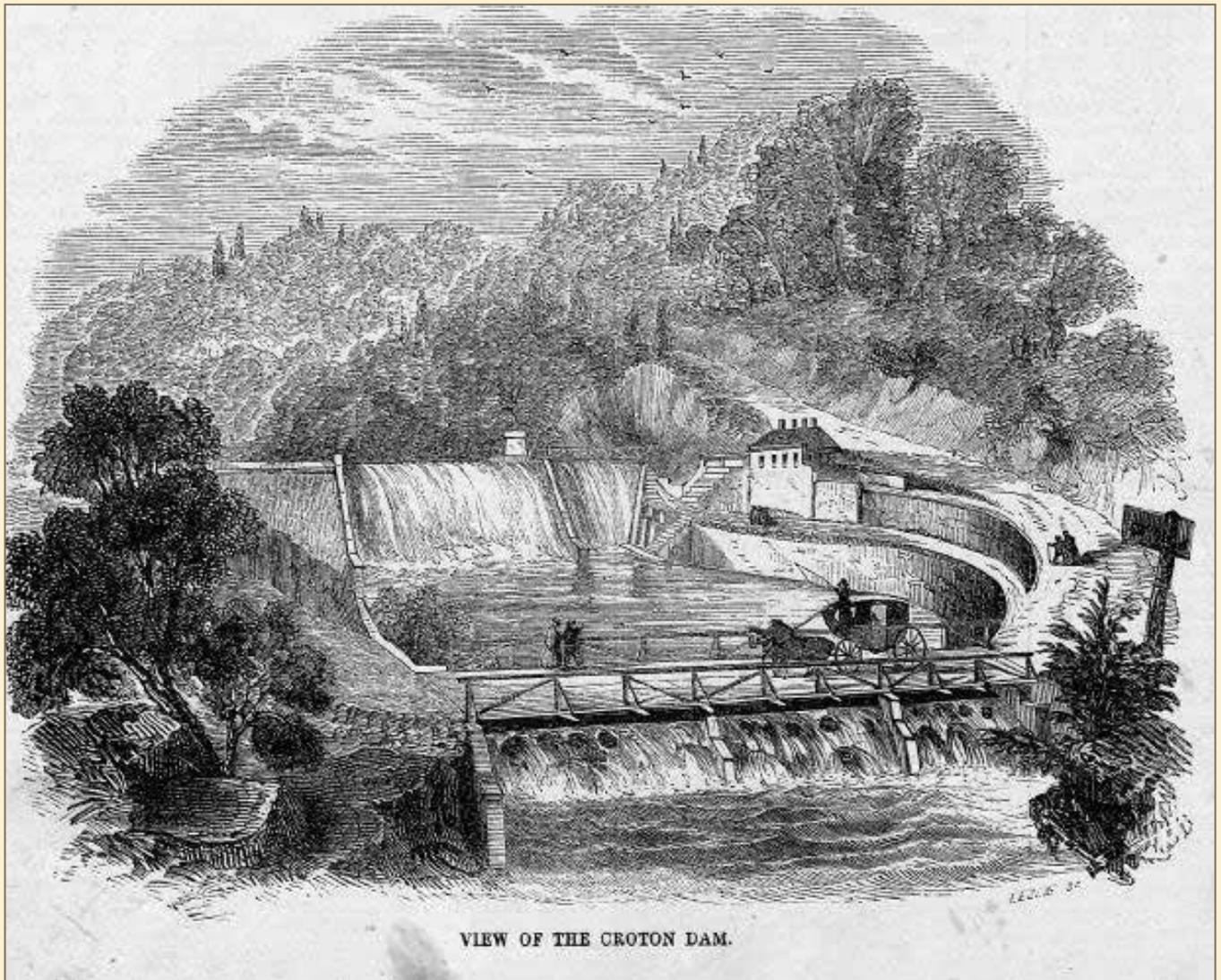
Cholera epidemics of 1849, 1855, and 1866

Unfortunately, the Croton Aqueduct and the pure and wholesome water it carried did not ensure the health of the metropolis. As detailed in Charles Rosenberg's *The Cholera Years*, cholera revisited New York in 1849 (claiming over 5,000 lives that year), 1855, and 1866.¹² As cholera returned, so did earlier notions about its transmission. Perhaps because Stephen Allen and his Croton pipeline had apparently failed to prevent additional epidemics, many New York scientists and physicians focused, as before, on the climate. The Sanitary Committee of the Board of Health attributed the return of cholera—at least in part—to an absence of thunder and heat lightning, a weather pattern resembling that noted in 1832.¹³

Amid the morbidity and mortality of the 1849 cholera epidemic, some New Yorkers remembered the Croton water—if not for consumption, then at least for scrubbing. As an article in the *New York Tribune* of May 19, 1849, documented:

We learn that the City Inspector called yesterday on the President of the Croton Board, to obtain a full supply of Croton Water. The latter stated that there was very little in the reservoirs, and refused his consent to the use of it for washing the alleys and yards on the Five Points. The City Inspector, however, proceeded at once to cleaning the locality, in spite of the prohibition.¹⁴

The Sanitary Committee also considered the role of Croton water in the city's health. In a July statement on "The Progress of Cholera," the committee reported that



The Croton Dam, 1852. © CORBIS.

The greater number of cases is still to be found in the upper part of the city, viz: from 28th street to 45th, which is exceedingly filthy and abounds in nuisances, . . . Besides, in a large proportion of this district there is a want of Croton water.¹³

Was Stephen Allen ahead of his time?

While Allen’s theories on water and disease transmission often seemed counter to prevailing opinions of the time, other medical and civic leaders had expressed similar concerns for decades. Following a 1795 yellow fever epidemic, the Medical Society of the State of New York reported that, “Obstructed water drains, by occasioning stagnant water, and collecting matter of various kinds which, undergoing decomposition, emit air of qualities extremely prejudicial to health.”^{15p61} In 1778, Major General Valentine Jones, the commandant of New

York, declared it illegal to wash clothing or place garbage or dirt in the Collect.⁷

Throughout the nineteenth century, distinguished physicians with prominent roles in the New York Academy of Medicine, chief among them Dr. John H. Griscom, first vice-president of the New York Sanitary Association, emphasized the importance of sanitation in the prevention of cholera and other epidemics.¹⁵ In 1822, following multiple yellow fever outbreaks, but ten years before New York’s first cholera epidemic, Griscom published a letter to the Board of Health delineating priorities to avoid future epidemics. In order, he cited (1) an adequate water system, (2) open parks and squares, (3) sewer renovation, and (4) improved conditions of wharves and streets.^{7p171}

Allen did not consider himself a theorist, and in fact

avoided scientific discourse. Historian John Duffy writes in *A History of Public Health in New York City, 1625–1866*:

When the New York Board of Health was accused of concealing yellow fever cases in July, President Stephen Allen declared that the Board of Health was not composed of medical men and did not pretend to be able to diagnose diseases. “How should they undertake to decide,” he asked, “when medical men differ so widely on this subject?” All that the Board could do, he said, was to report all cases and to give the various opinions of the doctors.⁷pp237–38

Allen’s later writings do not specify his thinking about the connection between water supply and cholera outbreaks. Perhaps he thought clean water for scrubbing houses and streets, or for scrubbing bodies, would prevent the disease. Or perhaps he considered cholera transmission a matter of water consumption, as did John Snow. Nor is it clear whether Allen specifically linked New York’s water supply and cholera, or whether he considered cholera as one of many preventable diseases associated with contaminated water. In cases in which Allen’s reasoning is documented, there are shortcomings. He cites superior water quality as the principal reason for lower rates of cholera mortality in Philadelphia compared to New York, neglecting to consider other factors such as the cities’ populations (in the 1830s, approximately 300,000 in New York City and 80,000 in Philadelphia) and New York’s position as a major international port.

Would New York City’s water supply have been improved without Stephen Allen? Would Allen have improved it without cholera outbreaks? The likely answer to both questions is: eventually. For decades, citizens of New York and public health advocates such as Griscom had been petitioning for better water, but lack of funds, political distractions, and a disorganized public health administration hindered efforts. Allen brought to the fight the essential characteristics of urgency, persistence, and influence. Water quality dominated his agenda throughout his entire civic career. Repeated cholera outbreaks gave him the attention, popular support, and funding to act. What drove this prolonged and, at times, singular vision? There are several potential explanations: his father’s death from yellow fever, a desire to leave a legacy after criticism for his handling of the 1822 yellow fever epidemic, or perhaps a profound belief that—more than any other intervention—it would improve the lives of New Yorkers.

Acknowledgments

The author thanks Ruby Weis for assistance with manuscript preparation; Arlene Shaner, Acting Curator and Reference Librarian for Historical Collections, the New York Academy of Medicine Library; and Ted O’Reilly from the New York Historical Society for access to and assistance with archival materials.

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