American Osler Society
John P. McGovern Award Lectureship

The Spectacular and Meretricious Consequences of Medical Progress
A Cautionary History from the Age of Sewer Gas

by

K. Patrick Ober, M.D.
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Wake Forest University, Winston-Salem NC

John P. McGovern, M.D.

Through the generosity of the John P. McGovern Foundation to the American Osler Society, the John P. McGovern Award Lectureship was established in 1986. The lectureship makes possible an annual presentation of a paper dedicated to the general areas of Sir William Osler's interests in the interface between the humanities and the sciences-in particular, medicine, literature, philosophy, and history. The lectureship is awarded to a leader of wide reputation who is selected by a special committee of the Society and is especially significant in that it also stands as a commemoration of Doctor McGovern's own long-standing interest in and contributions to Osleriana.

On the cover - The John P. McGovern Award Lectureship commemorative medal which is presented to each annual lecturer.

The 33rd John P. McGovern Award Lecture

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Delivered May 14th, 2018
at the 48th Meeting of the American Osler Society
Pittsburgh, Pennsylvania

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Dr. Ober has been recognized as one of the "Best Doctors in America" on repeated occasions. He was nominated for the 2007 Humanism in Medicine Award of the Association of American Medical Colleges. In 2015, the Wake Forest Physician Assistant program established the Patrick & Cathy Ober Community Leadership Award to recognize a student "who had demonstrated remarkable dedication to community service and leadership in outreach, philanthropy, and humanitarianism." Dr. Ober is the recipient of the 2016 Alpha Omega Alpha Robert J. Glaser Distinguished Teacher Award from the Association of American Medical Colleges. He was inducted into the University of Florida College of Medicine "Wall of Fame" in 2017.

Introduction

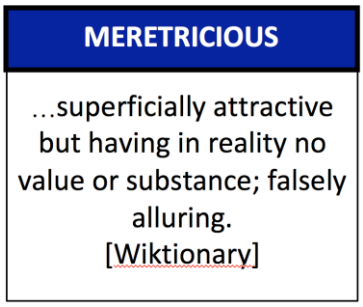
Thank you for this great honor.

My title comes from an observation made by Mark Twain on the subject of scientific progress (I will have more to say about my subtitle later):

"Our civilization is wonderful, in certain spectacular and meretricious ways; wonderful in scientific marvels and inventive miracles…wonderful in its spying-out of the deep secrets of Nature and its vanquishment of her stubborn laws."[1]

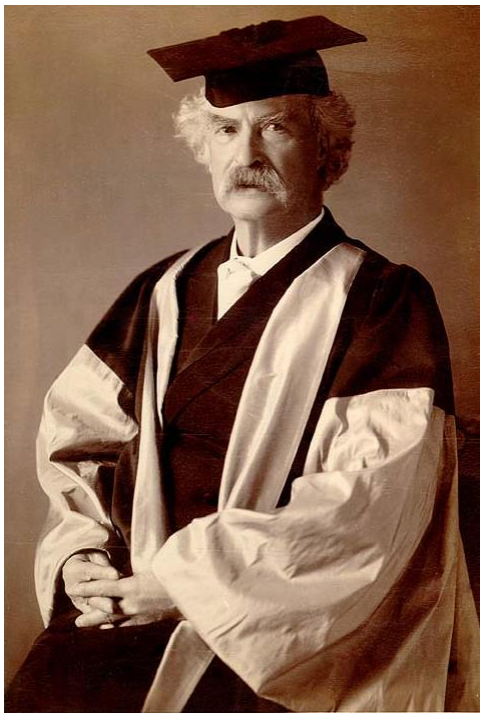
As Twain proclaims that scientific progress is a wonderful and spectacular thing, notice how he slips the word "meretricious" into his commentary. If it is not a part of your everyday vocabulary, "meretricious" pertains to things that are of no value or substance; they are superficially attractive, but they turn out to be falsely alluring.[2] By inserting the word "meretricious" into his laudatory comments about civilization's progress, he warns us to be cautious in our enthusiasm for the breakthroughs of science.

His own experiences gave him good reason to think that way.



Mark Twain, Sir William Osler, Oxford, and the Eels

Mark Twain, of course, was the pen name of Samuel L. Clemens. He was a contemporary of William Osler. Clemens met Osler in 1881 in Montreal, where Osler co-sponsored a dinner in Clemens's honor at the Windsor Hotel. In 1907, Clemens again found himself to be Osler's guest, this time at Oxford. By then, Clemens's declining health had forced him to limit his travel, but an honorary degree from Oxford was too appealing to resist. Rudyard Kipling was a co-honoree, and William Osler invited Kipling and Clemens to be his luncheon guests.[3]



Mark Twain [Samuel L. Clemens] at Oxford, 1907
[https://commons.wikimedia.org/wiki/File:Mark_Twain_DLitt.jpg]

Sir William Osler, 1907
[National Library of Medicine]

Samuel Clemens and Rudyard Kipling at Oxford, 1907
[https://web-archive-2017.ait.org.tw/en/mark-twain-abroad.html]

Here is an intriguing question to ponder: when Mark Twain and Rudyard Kipling sat down as the luncheon guests of Sir William Osler, what topics would they have discussed? I am not sure what Osler or Kipling had to say, but I have good reason to think that Sam Clemens talked about eels. My knowledge comes from a letter he wrote to Osler on September 21, 1909 (two years after the 1907 Oxford lunch) to regretfully turn down an invitation from Osler to return to Oxford.

"I wish I could say yes, it hurts me to say the other thing, but I have said it so long, now (3 years) & so often that I am at last practically used to it, like the eels…"[4]

His offhand comment about getting "practically used to…the eels" implies a shared anecdote, and as a result I am willing to guess that Clemens told Osler about his experiences with Hartford's municipal water problems during the 1880s, which frequently involved eels. In April of 1880, Clemens wrote that "the pipes deliver only a fearfully-stinking fluid which is thick with rotten fish – one has to hold his breath whilst he washes his face."[5] In 1884, the New York *Times* reported that Hartford's water pipes were "clogged by eels and fish" due to low water levels in the reservoirs.[6] In 1886, Clemens composed a letter to the Hartford *Courant*[7] to complain about the odor that came from the "West Hartford reservoir-water in the spring-time, when the pipes begin to deliver tadpoles & we stay home Sundays to dive for dead eels in our bath-tubs."[8]

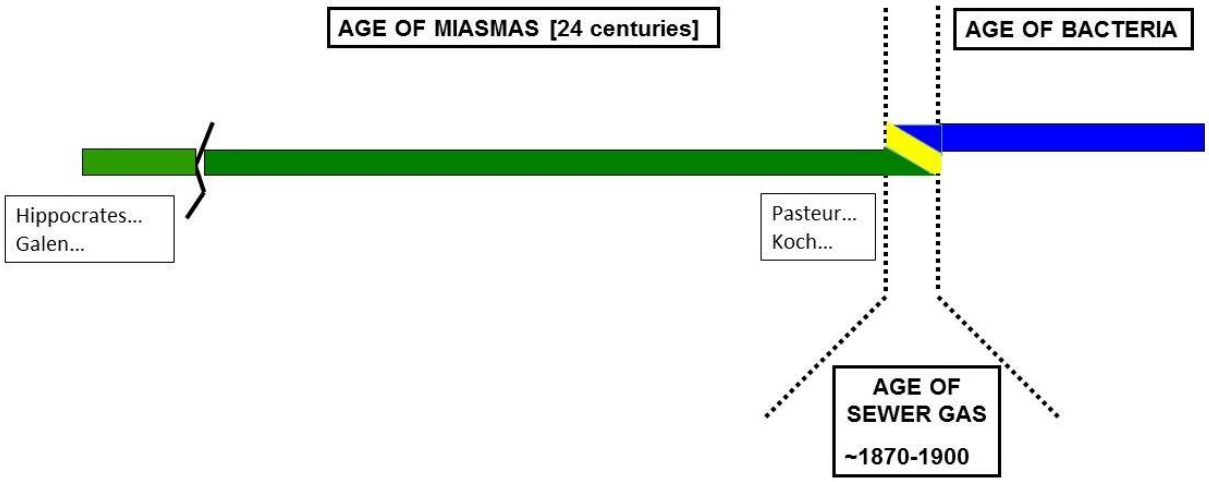
Eels were not Clemens's *only* problem related to his plumbing in his Hartford home in the 1880s, according to an article ("Doctor, Plumber, and Twain") in the New York *Times* in 1886. The *Times* reported that he spent $1500 (which would be $36,000 in today's dollars[9]) to upgrade his household plumbing for medical reasons. The quest to fill in the details of this report leads me to my subtitle,

the sewer gas part of my story. The article lacked a byline, but Clemens was identified as the original source of information. The expensive intervention did not accomplish the salutary medical results Clemens expected, it appears. His reaction was that of unbridled anger, and "the manner in which he cursed sewer gas, doctor, and plumber was said to have been an education in the comprehensive possibilities of the English language."[10]

This story of collusion between a doctor and a plumber, with "sewer gas" as the central element of the reported hoax, raised a number of questions for me that prompted more investigation. Along the way, I discovered that the medical concerns about sewer gas in 1881 were not isolated to Clemens's house. My discussion today will ultimately be a tale of two cities, as a parallel story was simultaneously playing out in the White House.

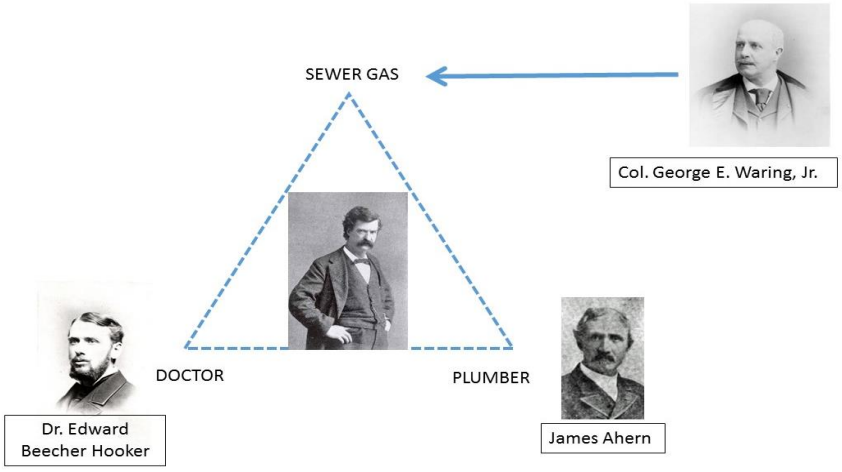
A Change of Medical Paradigms

This is also the story of the paradigm shift that took medical theory from the Age of Miasmas to the Age of Microbes. The shift did not happen instantaneously, of course, but went through a transitional phase that occupied the last three decades of the nineteenth century. The temporary placeholder was a bridge that carried medicine from the miasmatic model of disease to the acceptance of germ theory. It identified indoor plumbing and the resultant "sewer gas" as a modern miasmatic variation as it bought time for better understanding the details of microbiology. This transitional model of disease etiology was anything but a hoax when it was playing out; it was consistent with the clinical observations of America's best doctors of the era.



This time line demonstrates the role of the Age of Sewer Gas in the transition between two major medical paradigms.

According to the *Times*, Clemens cursed doctor *and* plumber *and* sewer gas, providing three threads worthy of investigation from the "Doctor, Plumber, and Twain" story. As I will show you, the doctor in question was Edward Beecher Hooker, a recent medical school graduate who grew up as Sam Clemens's neighbor. His co-conspirator was James Ahern, a highly respected Hartford plumber. "Sewer gas," medicine's newest fad to explain disease, was largely the invention of George Waring, an agricultural engineer, sanitarian, and friend of Clemens.



Sam Clemens cursed doctor, plumber, and sewer gas, according to "Doctor, Plumber, and Twain"
[*New York Times*, July 27, 1886, p. 6.]

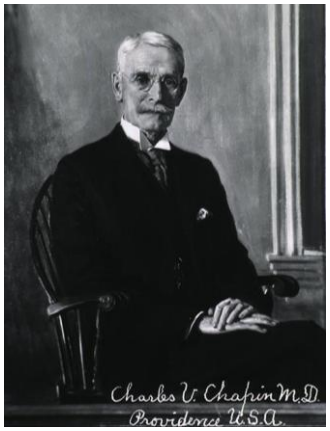
Clemens picture, ca. 1884
[*McClure's Magazine*, 1896; 7 (June): 76]

To understand how American medicine came to identify "sewer gas" as a leading cause of disease, we have to start with a brief review of the theory of miasmas.

Miasmas

Dr. Charles V. Chapin, an early twentieth century public health expert who became president of the American Public Health Association in 1927, wrote about miasmas in his 1910 book, *The Sources and Modes of Infection.*

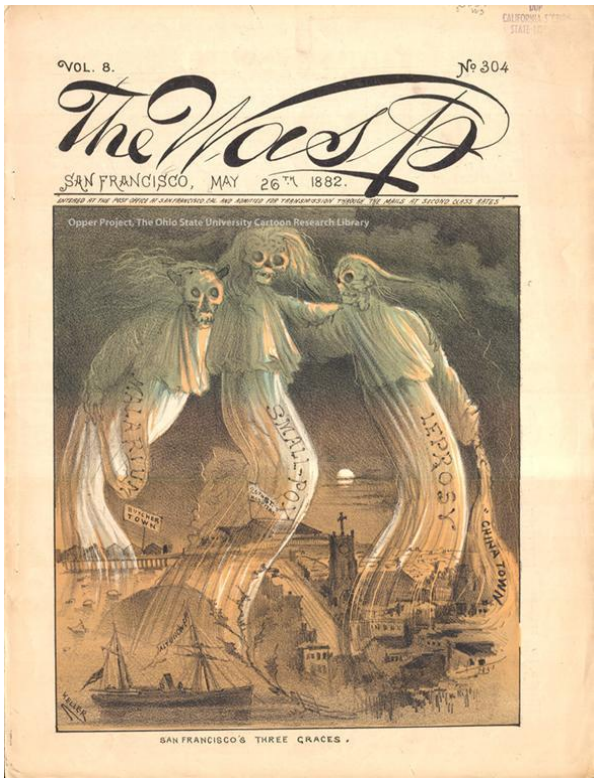
"From time immemorial miasms [*sic*], malarias, vapors and emanations, gaseous or otherwise, have been believed to be the frequent cause of disease…This belief in the extra-corporal origin of disease reached its widest acceptance about the middle of the nineteenth century."[11]



Charles Value Chapin
[http://www.influenzaarchive.org/cities/city-providence.html]

Bad air and *mal aria* were the same thing, and miasmas were part of the natural order. Dr. O. C. Gibbs explained the health implications of miasmas in the *Medical and Surgical Reporter* of 1861. Miasmas were the cause of all epidemics, he wrote, and all epidemics – including "the most terrible visitations of yellow fever, cholera, or the plague" – were preventable. Miasmas were the "exhalations" of bad air that came from the processes of decay and decomposition, but miasmas were not identical. Variations in the character and repulsiveness of each miasma created different diseases. The decomposition of decaying vegetation in a swamp was different from the decomposition of an "over-filled graveyard." The emanations arising from marshes were not the same as the vapors coming from the decay of human excrement or the effluvia that streamed out of slaughterhouses. Each type of miasma could create its own specific disease; dissimilar sources of miasmas created dissimilar results.[12]

In the Age of Miasmas, diseases were viewed as local phenomena. Local factors were profoundly important in affecting the local citizens' susceptibility to disease and in determining the nature and the virulence of each miasmatic disease. Each disease was defined by the nature of the miasma that caused it. Physicians needed to be knowledgeable about local environmental factors if they hoped to understand the miasmas – and thus the diseases – prevalent in their area.



"San Francisco's Three Graces" [the miasmas of malaria, smallpox, and leprosy], 1882.
[Cover illustration, *The Wasp*, May 26, 1882 [https://hti.osu.edu/sites/hti.osu.edu/files/styles/raw-image/public/Immigration_2.jpg?itok=K0xaQxIt]

Miasmas had always been part of the outdoor world, but the miasmatic concept (and its associated diseases) would come indoors in the latter part of the nineteenth century. It all started with the lungs – with increasing understanding of human respiratory physiology, it seemed logical to conclude that the exhalation of the lungs was itself a miasma, identified as "vitiated air."

The Beechers Explain the Problem of Vitiated Air

In a series of articles, "House and Home Papers," published in 1864 in *The Atlantic Monthly*, Harriet Beecher Stowe (writing under a male pseudonym) emphasized the link of family health to household hygiene, and she warned of the risks of "vitiated air" (full of carbonic acid, depleted of oxygen). Stowe would become Sam Clemens's next-door neighbor after he moved to Hartford in the 1870s.

Old houses were often healthier than new houses, she explained, because the drafts of old houses "carried off foul and vitiated air" that caused disease. Modern airtight houses saved fuel and money, she admitted, but they also "saved people from all further human wants" by hastening their journey to "the six feet of narrow earth which are man's only inalienable property."[13] Rebreathing someone else's air caused disease, and a wise person would avoid doing so. "We will no more breathe the foul air rejected from a neighbor's lungs," Harriet proclaimed, "than we will use a neighbor's tooth-brush and hair-brush."[14]

Harriet Beecher Stowe
[with permission, Harriet Beecher Stowe Center, Hartford CT]

Mrs. Stowe wrote more on the health risks of stagnant air in an unsigned article in 1866 in the *Atlantic Monthly*, "Bodily Religion: A Sermon on Good Health."[15] Any educated person, she declared, would be aware that the air breathed from the lungs is "noxious and poisonous" and laden with impurities, and she could not understand why most people ignored "God's gift of fresh air." It was a widespread problem. Schoolboys were forced "to sit six hours a day in a close, hot room, breathing impure air, putting the brain and the nervous system upon a constant strain." Crowded churches were often so stuffy that "the mephitic air almost makes the candles burn blue," and churchgoers found themselves "slowly poisoned, gasping, sweating, getting red in the face, with confused and sleepy brains." It was no wonder, she observed, that people "always feel stupid and sleepy in church." As far as Harriet was concerned, a daily prayer meeting was an exercise in "breathing poison from each other's lungs," and nothing more.[16]

Her brother, the famous preacher Henry Ward Beecher, expanded upon Harriet's message in a talk to medical students in February of 1867. He urged the medical students to think broadly, beyond the health of a single patient, as they took on their professional responsibilities. "Not individuals alone, but cities and states are under the physician's care," Beecher told the fledgling physicians.

Henry Ward Beecher
[with permission, Harriet Beecher Stowe Center, Hartford CT]

Beecher told the students that a physician's duty included an obligation to teach patients that their health was affected by the quality of the air they breathed every day. He was distressed how Americans seemed to expose themselves, purposefully and ignorantly, to the worst air imaginable. "The principal use which men seem to put air to is to destroy it," Beecher told the medical students. "They go into their houses and shut out the exterior air, and burn by stoves that which is inside, and poison it by breathing, and then, when it is thoroughly destructive, they go on breathing it, and sucking it in, as if it were a confection or a luxury!" Henry Ward Beecher commented on the absence of fresh air in crowded lecture halls, churches, and railway cars:

"We should scorn with ineffable scorn to sit down at a plate where a man had just eaten his meal, and take the knife that had been in his mouth and put it in ours, but we will sit down and breathe the air that he has breathed, and that his wife has breathed, and that his children have breathed, and that the servants have breathed, and that forty others have breathed, and will think it just as good for our breathing, and will breathe it over, and over, and over again, as if it was a precious morsel!"[17]

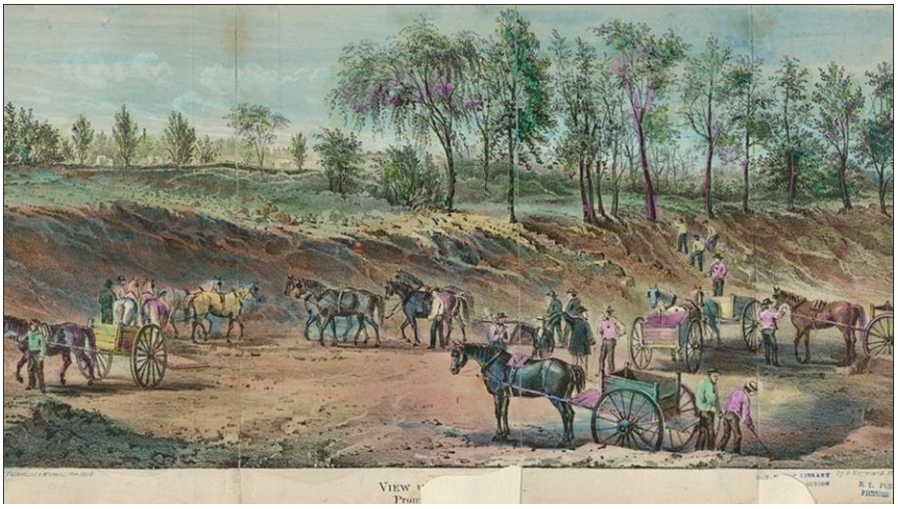
In 1869, Harriet Beecher Stowe and her sister Catharine Beecher published *The American Woman's Home: or, Principles of Domestic Science*. They warned American homemakers about the noxious nature of vitiated air by observing that "matter thrown out of the body, through the lungs…is as truly excrement and in a state of decay as that ejected from the bowels, and as poisonous to the animal system."[18]

In summary, the vitiated air created by human metabolism, combined with the close-knit indoor living of the nineteenth century, created a newer version of miasmas that resided inside the house. No family was more aware of the health risks of the impure air of respiration than the Beecher family – Harriet Beecher Stowe, Henry Ward Beecher, and Catharine Beecher. (Dr. Edward Beecher Hooker was their nephew, by the way, and he was destined to become the medical advisor to Samuel Clemens when the Clemens family needed to figure out the cause of its recurrent medical problems.)

Around the time that "vitiated air" was being recognized as a health hazard, human progress of the nineteenth century created another miasmatic variation that would become an even greater problem. Its name was "sewer gas." The sewer gas story is largely the story of Colonel George Edwin Waring, Jr. His role started with the miasmas of some marshy land of New York City.

Col. Waring Promotes the Concept of "Sewer Gas" as Pathogen

In 1856, New York City's chief engineer, Egbert Ludovicus Viele, identified a large swampy area of the city as a "pestilential spot, where rank vegetation and miasmatic odors taint every breath of air." The health of the community was at risk until the swamp could be drained.[19]



Draining the swamp to create New York's Central Park, 1859
[http://www.earthlymission.com/central-park-in-the-1800s/]

George Waring was the young engineer who led the drainage project that turned the miasmatic swamp into New York City's Central Park. Waring joined the Union army in 1861 and gained the rank of colonel. After the war, he continued to pursue the relationship of sanitation to health as a lifelong proponent of miasmatic theory.[20]

Col. George E. Waring, Jr., ca. 1892

[https://commons.wikimedia.org/wiki/File:George_E._Waring_cph.3b15760.jpg]

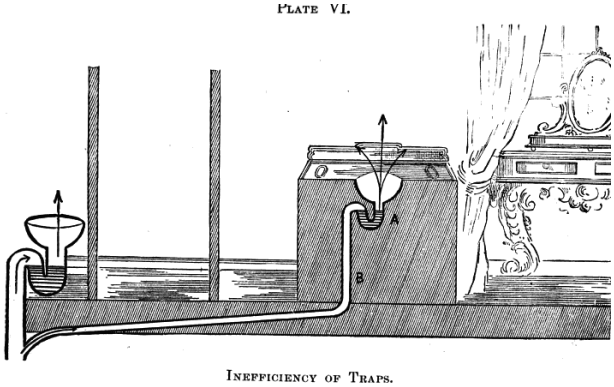
In 1875, Waring wrote a series on "The Sanitary Drainage of Houses and Towns" for the *Atlantic Monthly*. He expanded the definition of miasmas to incorporate the role of indoor plumbing as a factor in the causation of disease. Disease-causing air no longer had to originate exclusively in swamps and bogs. It could come from anywhere. "Sewer gas" became a new-fangled designation for "the emanation from waste matters undergoing decomposition," regardless of where it started.[21] Waring was a self-promoter who became America's authority on sewer gas and its medical consequences.

Waring was not alone in his concerns about sewer gas as a cause of illness. New York City's sanitary engineer, Dr. Walter De Forest Day, warned the city's Board of Health in 1875 that "the presence of sewer gas in our houses is one of the most fruitful causes of sickness and death" and was "directly responsible for many sudden attacks of obscure disease ending fatally."[22]

It was also in 1875 that the *Atlantic Monthly* published a series of monthly installments by Mark Twain, "Old Times on the Mississippi." The magazine's editor, William Dean Howells, was a friend of both Sam Clemens and George Waring, and he introduced the two authors that year. Clemens and Waring visited each other, wrote to each other, and consulted with each other through the years that followed. (After Waring's death in 1898, Clemens wrote "I [k]new him a quarter of a century; & we were not mere acquaintances, but friends."[23])

George Waring increased the intensity of his campaign to warn the public about the dangers of sewer gas. In 1877, he accused architects and physicians of negligence for ignoring the sanitary aspects of home construction, despite the predictable results: "The house is built in the usual manner, and the patient is treated for the usual diseases." The architect was more responsible for the health of a family than the doctor, Waring believed, and should be held accountable to a sick family for causing "its ailments, and its weaknesses, and its early deaths."

The problem, maintained Waring, was that any house with indoor plumbing was "more or less pervaded, day and night, with the gaseous emanations of the drains." As a household's inhabitants were exposed to the emanations "of decomposing filth," they were also being exposed to "to the danger of typhoid fever, or diphtheria, or scarlet fever, or black vomit." "The finer the house, and the more complete its modern conveniences," Waring wrote in 1877, "the more certain it is" that its inhabitants' health was at risk.[24]



"Sewer gas" entering the living quarters despite the presence of traps.
[George Preston Brown, *Sewer-Gas and Its Dangers*, Chicago, Jansen, McClurg & Company, 1881, p. 83.]

A new concept developed. A house was a living, decaying organism, with filth rotting in its drains and pipes, the arteries and veins of its internal plumbing. The house produced its own *mal aria* from the metabolic processes that took place within its pipes. Traps under the sinks were small filthy swamps that poured their unique version of swamp air into the living space to poison a home's inhabitants.

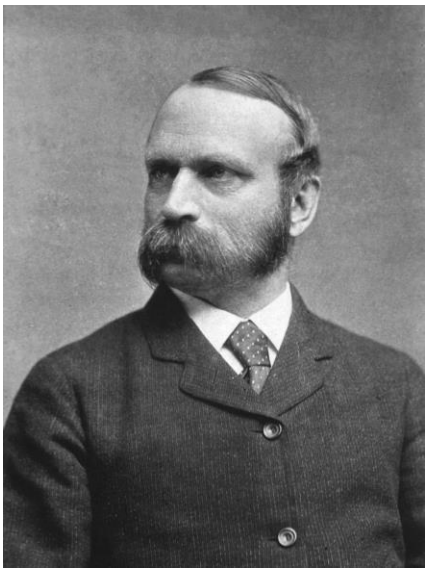
For a while, it appeared that America might retreat from its experiment with indoor plumbing due to health worries. Henry C. Meyer, a prosperous plumbing supplies manufacturer, became concerned when a dinner guest mentioned her plan to remove all of the plumbing from her house the following spring, if disease from the plumbing did not kill her first. Meyer (not surprisingly) encouraged her to keep her plumbing and explained how his own family had been afflicted with diphtheria earlier that year, leading him to discover unanticipated plumbing problems which he was able to correct.[25] He suspected that similar problems were present in virtually *every* American home. One of his dinner guests commented that America needed a well-written publication to "enlighten architects, plumbers, and physicians" on the health problems related to their plumbing. Meyer followed through and published the first issue of *Plumber and Sanitary Engineer* in December 1877. (It later created a more sophisticated image for itself by removing the word "Plumber" from its name to become the *Sanitary Engineer*.) Colonel George E. Waring, Jr., became a contributor. The *Sanitary Engineer* promoted the idea that plumbing done correctly could prevent diseases such as the diphtheria caused by sewer gas. It explained how to identify plumbing flaws and how to correct them before illness struck.

Henry C. Meyer
[https://www.enr.com/aboutus]

In the meantime, George Waring's prominence as a medical expert increased dramatically when he published a widely acclaimed two-part article in the *Boston Medical and Surgical Journal* (the predecessor of today's *New England Journal of Medicine*) in 1878 that identified "The Causation of Typhoid Fever." The problem, he explained, was "ignorantly arranged plumbing work," particularly "in the better class of houses." Waring proposed that a doctor should devote more of his time to his role "as a sanitarian rather than as a physician."[26]

On January 27, 1878, the New York *Times* reported further on "The Sewer Gas Danger." Dr. Charles Frederick Chandler, a chemist by training and the head of the New York Metropolitan Board of Health, reported that half of houses in New York were dangerous habitations because of

their defective plumbing. And, just as Waring had warned, Chandler pointed out that great wealth was no protection. Some of the most expensive houses in the city were also the most dangerous and were "actually unsafe to live in for an hour." Sewer gas, Chandler reported, often made its presence known by bringing diphtheria into the family. "Dr. Chandler does not claim that diphtheria is invariably caused by sewer gas," the *Times* equivocated, "but the fact that a large number of cases of diphtheria have occurred in houses badly poisoned by sewer gas, has indicated the wisdom of guarding against it."

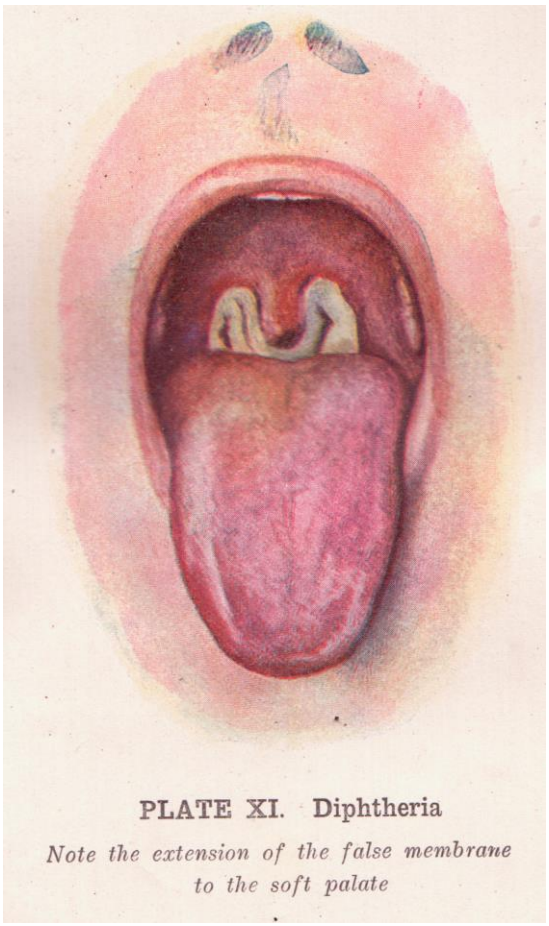


Charles F. Chandler
[https://en.wikipedia.org/wiki/Charles_F._Chandler]

The article also included comments from James C. Bayles, a consulting engineer and author of the first standard American work on the mechanics of hygiene (*House Drainage and Water Service in Cities, Villages, and Rural Neighborhoods, with Incidental Consideration of Causes Affecting the Healthfulness of Dwellings*, published in 1878). It was his opinion that the recent advances in plumbing placed homeowners in a precarious situation: "Unfortunately, the difference between good and bad plumbing work is usually so slight as to escape the notice of any but the trained expert." It was not rare to see the wrong pipes used, traps installed incorrectly, and water closets cheaply constructed and placed in flimsy unventilated recesses where they became "pestilential nuisances." When illness arose, the architect often blamed the builder or the plumber for using cheap materials and doing shoddy work, and they in turn put the responsibility on the owner who was "unwilling to pay the price for good work."[27]

Diphtheria: Evidence of a Problem with Sewer Gas

Health experts of the era considered the development of diphtheria in a child to be among the strongest pieces of evidence that a family's home had problems with sewer gas. If more than one family member came down with diphtheria, sewer gas was almost a certainty. Diphtheria was called the "Strangling Angel of Children" in reference to the wing-shaped patches of pseudomembrane that formed in the throat, blocked a child's airways, and caused death by suffocation.



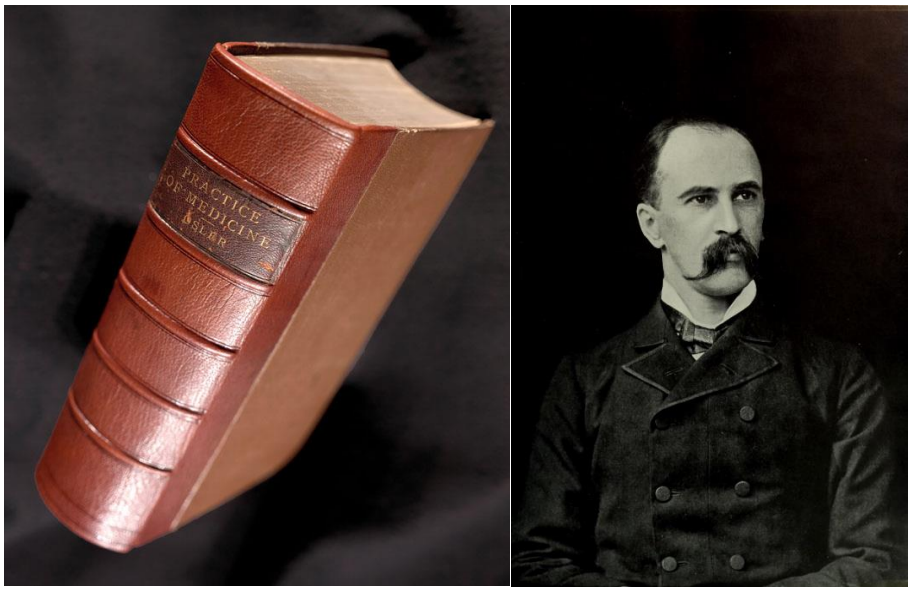
The obstructive pseudo-membrane of diphtheria [left] suggests the shape of angel wings [right]. As a result, diphtheria was known as the "Strangling Angel of Children."
["Plate XI. Diphtheria," in Frederick Rossiter, *The Practical Guide to Health* (1913), p. 270. https://commons.wikimedia.org/wiki/File:Diphtheria.jpg]

"The Guardian Angel" by Bartolome Esteban Murillo (1617-1682)
[https://commons.wikimedia.org/wiki/File:Lienzo_del_altar_del_%C3%81ngel_de_la_Guarda_(Catedral_de_Sevilla).jpg]

Diphtheria became more common and more virulent in the second half of the nineteenth century. Children of wealthy families who lived in the finest houses appeared to be at the greatest risk. Dr. F. Gordon Morrill, one of the most highly esteemed physicians of the nineteenth century, was convinced of the role of sewer gas in causing diphtheria. Morrill was educated at Harvard Medical School, trained at Massachusetts General Hospital, and served on the editorial board of the *Archives of Pediatrics*. "When we are called to a case of typhoid nor [*sic*] diphtheria," Morrill observed, "we at once order an inspection of the drainage and plumbing, and are seldom disappointed in finding defects."[28]

The first edition (1892) of Osler's *The Principles and Practice of Medicine* confirmed the observations of others that diphtheria was on the increase, and that it had a predilection for attacking families who lived in homes with flawed plumbing.

"It is a remarkable fact that while other contagious diseases have diminished within the past decade, diphtheria, particularly in cities, has increased. It is by no means confined to the poorer districts, but occurs in the houses of the better classes, particularly when the plumbing is defective…"[29]



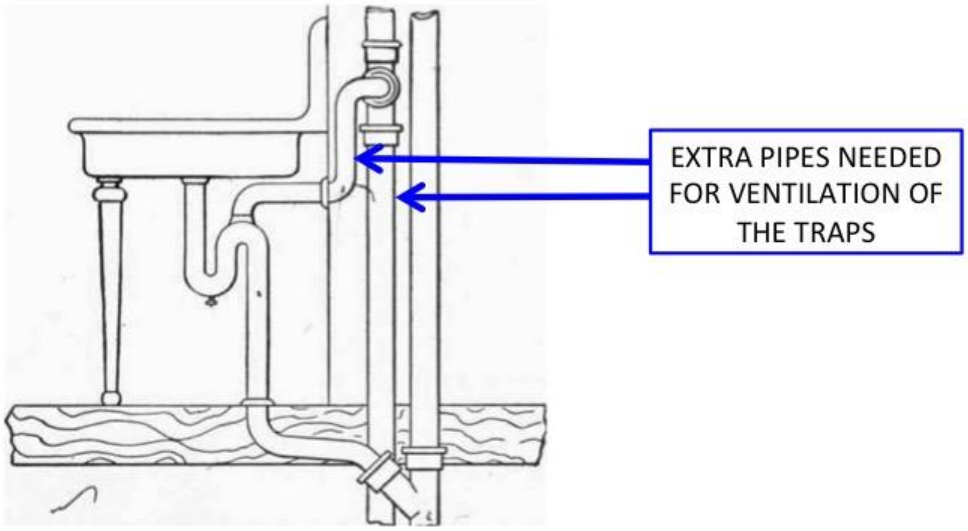
The Principles and Practice of Medicine, 1892 edition, and Sir William Osler.

Dr. Edward Beecher Hooker Brings Modern Medical Practice to Hartford

The diphtheria scare set the stage for Dr. Edward Beecher Hooker to launch a modern medical career. He hoped to employ the latest medical knowledge to have the greatest impact on his fellow man. Hooker, the nephew of Henry Ward Beecher and Harriet Beecher Stowe, grew up in Sam Clemens's neighborhood. He completed his homeopathic medical education at Boston University in 1877. Sam Clemens provided the "certificate of moral character" required for Hooker's medical school graduation.[30] Dr. Hooker returned to Hartford in 1878 to start his practice, just as the concern about indoor plumbing and the sewer gas risk was intensifying.

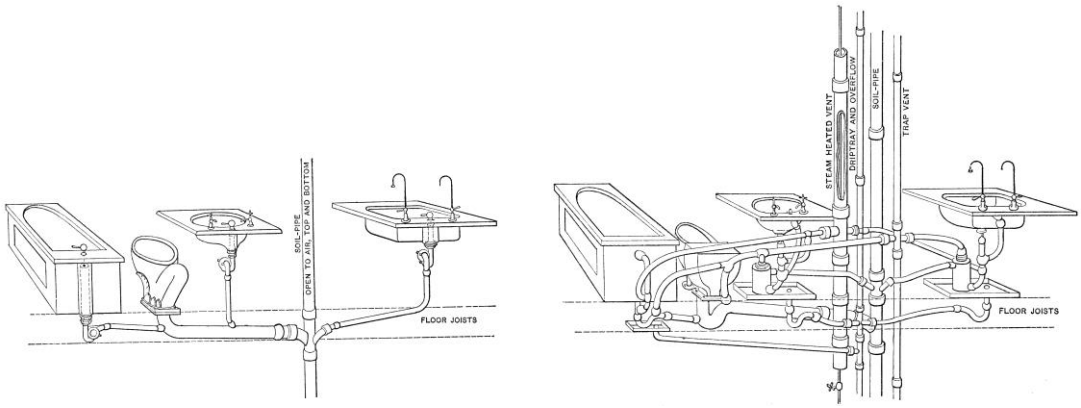
Edward Beecher Hooker, M.D.
[with permission, Harriet Beecher Stowe Center, Hartford CT]

Upon his return to Hartford in 1878, Dr. Hooker envisioned a career as the type of doctor that his uncle Henry Ward Beecher (and Colonel Waring) had talked about; he would be a physician who was a sanitarian as well as a diagnostician and therapist. The increasing concern about the role of sewer gas in causing illness gave him a perfect opportunity to make his community healthier. Hooker submitted articles to the Hartford *Courant* in early 1880, using content derived from Henry Meyers's *Sanitary Engineer,* to warn his neighbors that the greatest risk to their family's health was "the slow and often imperceptible escape of sewer gas" into their homes.[31] His articles explained the necessity of installing a trap under every sink, basin, and water closet in the household. The traps were important but imperfect barriers, though, and each trap must be individually ventilated if a family truly wanted to protect itself against sewer gas.[32]



The ventilation of each trap in the house required installation of more pipes.
[R. M. Starbuck, *Standard Practical Plumbing*, 1910, figure 41]

The practical result of taking the extra precaution of ventilating the drains, as seen here, was a substantial increase in the number of pipes and joints needed. Household plumbing in America was starting to become very elaborate, and the complexity made it quite lucrative for the plumber.



Simple plumbing [left] evolved into complex and confusing plumbing arrangements [right] to protect against the entry of sewer gas into living quarter.

A Tale of Two Cities, 1881

The events that played out in two American houses in 1881 demonstrate the influence of the Age of Sewer Gas on medical practice in the late nineteenth century.

In Hartford, Connecticut, Sam Clemens had moved his family into an elegant new house in the city's finest neighborhood, Nook Farm, in September 1874, where he became Harriet Beecher Stowe's next-door neighbor. His house was described as "permanent polychrome and gingerbread Gothic; it was part steamboat, part medieval stronghold, and part cuckoo clock."[33] The house's "wealth of idiosyncratic delights" included five bathrooms made possible by the wonders of indoor plumbing.[34] From the very start, the house's "unusual number of bathrooms" was one of its distinguishing features.[35] In 1881, when diphtheria struck the Clemens family for the third time, it appeared that the time had come to pay attention to young Dr. Hooker's warnings about the linkage of diphtheria to sewer gas, and to seek his help in remedying the risk to the family's health.

Health problems related to sewer gas were more than a Hartford concern, though. It was becoming an American problem. In Washington, D.C., the newly elected James Garfield moved into the White House in 1881. Within a few months after taking occupancy, new health problems in the White House suggested that sewer gas was a threat to the health of the president and his family. George Waring was consulted to sort things out.

A review of the health problems and plumbing activities at these two homes during the year of 1881 may be instructive in demonstrating how America dealt with the Age of Sewer Gas.

Health Problems in Hartford, January-May 1881

In January of 1881, the Clemens's second daughter, Clara, "was taken alarmingly ill" with diphtheria, her father reported.[36] The Clemens family had a long history of battling diphtheria. Diphtheria killed their firstborn child, a 19-month old son, Langdon, in 1872. In 1876 Clemens saw his oldest daughter Susy suffer from "the savagest assault of diphtheria a child ever did recover from."[37] It was a vicious attack, but "Susie escaped death by a hair…Diphtheria, of the worst form."[38] Now, in early 1881, Clara's attack by diphtheria once more made the family felt helpless, but the girl managed to survive the episode. Their third daughter, Jean, was still an infant, and she appeared to be the next in line for acquiring a relentless disease of diphtheria that had already killed one of their children and gravely threatened two others.

Mark Twain's home in Hartford, Connecticut.
[photo by K. Patrick Ober, 2011]

It was in that same month as Clara's diphtheria, January 1881, that local plumber James Ahern inspected Clemens home to assess the state of the household plumbing. Ahern was a sewer gas expert. He wrote a pamphlet, "Common Sense Plumbing," that explained about the "Formation of Sewer Gas," the "Effects of Sewer Gas," and "The Remedy." He advertised that, "free of charge," he would personally inspect the home of anyone who was worried about the status of the household plumbing. Ahern's inspection of the Clemens home found the plumbing to be suboptimal, and the house soon became the site of extensive plumbing upgrades to counter the risk of diphtheria and protect the family's health.[39] In May of 1881, Sam Clemens wrote that "plumbers are all over the house uprooting & re-arranging all the pipes."[40]

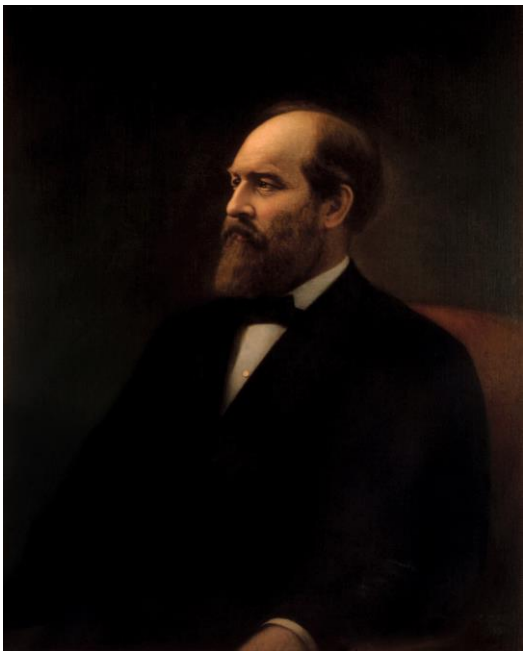
Health Problems at the White House, March-May 1881

The home of Samuel Clemens was not the only house in America where there was significant concern about the state of the plumbing in May of 1881. To the south of Hartford, the White House was becoming a focus of national worry. The President's home already had a reputation for unhealthiness due to its proximity to the marshes of the Potomac River. It was the perfect example of where a home should not be built, according to the principles of the Age of Miasmas.

White House, ca. 1881
[http://www.whitehousemuseum.org/residence-history.htm]

The White House was considerably older than Sam Clemens's house. It was rebuilt in 1817 after the original structure was burnt down in the War of 1812. In 1879, the officer in charge of the building proclaimed that the plumbing had fallen far behind the standards of the times. Congress was willing to commit only a small amount of the requested funding for the project, and so only modest changes could be made. New water closets were installed, along with newly developed water traps to keep sewer gas out of the building. Even so, doubts remained about the White House's healthiness.

President James Garfield was inaugurated on March 4, 1881. Two months later, in early May, just as the plumbing in the Clemens home in Hartford was undergoing renovation to lessen the threat of diphtheria, First Lady Lucretia Garfield developed a poorly defined illness with prolonged fever. She was diagnosed with "malaria" and went to Long Branch, New Jersey, to recuperate. President Garfield wrote that he was so distracted at the thought of her demise that he was unable to conduct the affairs of government. The press jumped all over the opportunity to criticize the management of the White House. The *Baltimore American* reported that the Potomac flats had pushed "the sewer gas right into the President's House, and Mrs. Garfield is suffering from that form of poisoning."[41] The newspaper recommended drastic remodeling, if not a total rebuilding, of the structure.



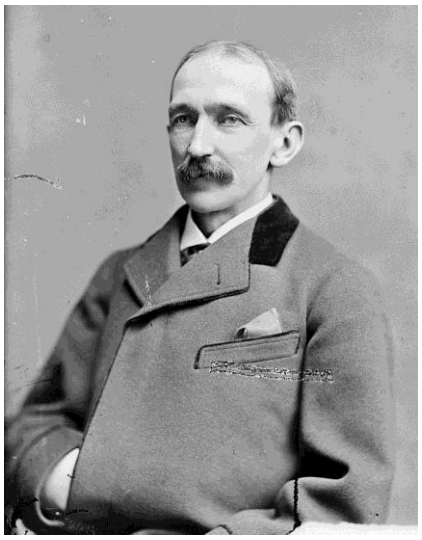
James Garfield, 1881
Official Presidential Portrait
[https://commons.wikimedia.org/wiki/File:Jgarfield.jpeg]

Lucretia Garfield
[Source: Library of Congress http://loc.gov/pictures/resource/cwpbh.04025/]

President Garfield was shot on July 2, 1881, in an attempted assassination. Garfield's injuries consisted of a grazed arm and a bullet wound in the back near his spine. After the wounds were cleaned with alcohol and temporary dressings were applied, Garfield was transported to the White House, which served as both home and hospital. After the shooting, his physicians probed the wound in an effort to determine the location of the bullet. After transient improvement, Garfield developed a chronic fever and took a downhill course. His decline has been attributed to infection related to his doctors' poor sanitary methods (although his attending physicians argued otherwise).

Combined with the worries about Mrs. Garfield's fever in spring of 1881, the President's fever in the summer of 1881 raised the question of whether the White House was an unhealthy environment. In late July, the muckraking New York *Herald* found an answer sufficient to answer the question (and boost its own circulation). The paper concluded that "the real trouble is sewer gas." The information came from a "well-known plumber" who went unnamed. The *Herald* reported that "there is not a single perfect working trap in the Executive Mansion" (despite the limited plumbing improvements of 1879 to install traps), and thus there was no barrier to prevent sewer gas from seeping into the living quarters of the building.[42]

The official position of the President's physicians was straightforward – they overtly rejected the notion that any of Garfield's trouble had anything to do with plumbing defects. In private, though, the President's advisors harbored the concern that there *might* just be something to the sewer gas idea, and Attorney General Wayne McVeagh recommended an evaluation of the White House. He called upon America's leading expert – Col. George E. Waring, Jr.



Attorney General Wayne McVeagh
[Library of Congress [http://loc.gov/pictures/resource/cwpbh.04727/]

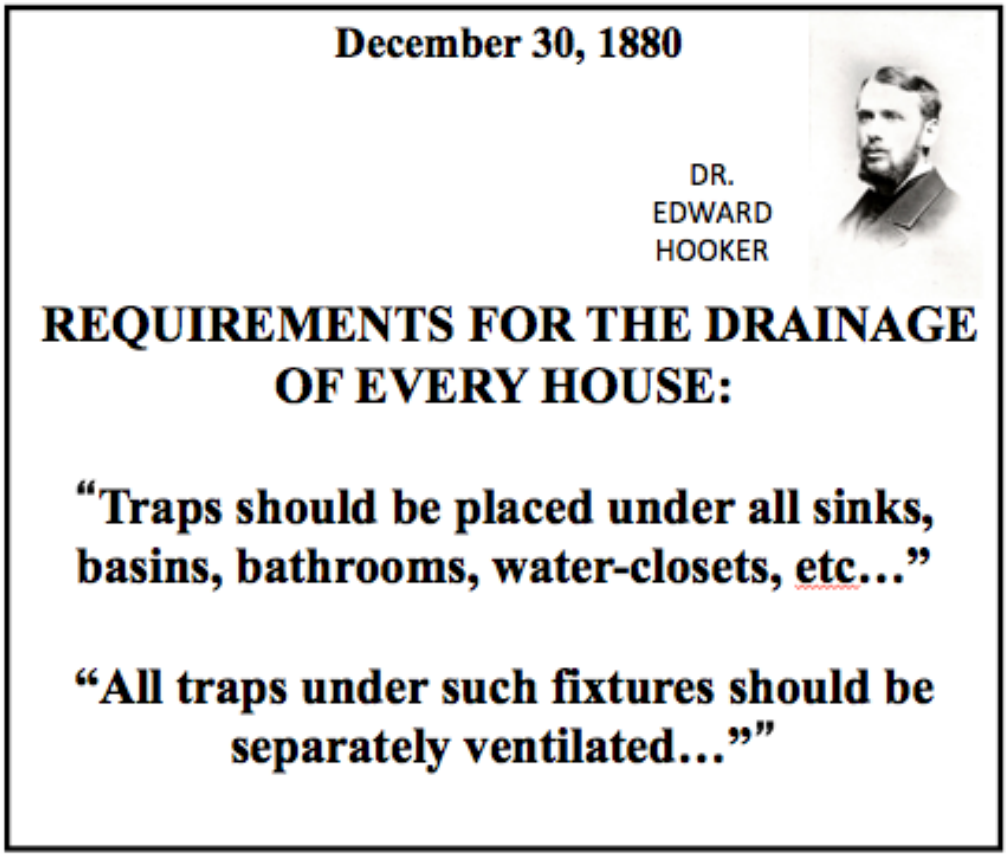
Colonel Almon F. Rockwell, the doctor in charge of the White House and coordinator of the President's care, approved the idea of a thorough plumbing inspection. Waring was the obvious choice for the task. President Rutherford B. Hayes had appointed him in 1878 to oversee the revamping of the drainage system of Memphis after the city's yellow fever epidemics. Waring was familiar with the sanitary conditions in the District of Columbia. On March 26, 1880, under the auspices of the Smithsonian Institution, Col. Waring lectured on miasmatic diseases of Washington, D.C. His opinion was that too much attention was given to the miasmas of the Potomac flats, when the greatest threat to Washington's health really came from the sewer gas created inside the district's homes.[43] He was the perfect person to check out the President's home, and his White House inspection took place in August 1881.

Dr. Almon F. Rockwell
[https://garfieldnps.wordpress.com/tag/almon-rockwell/]

Plumbing Problems in Hartford, August 1881

Meanwhile, back in Hartford, the plumbing renovations at the Clemens home seemed to stall out. Months went by, and the project dragged on, with little evidence of any real progress. By August 12, 1881, Clemens was annoyed with the pace of the project. When there was evidence of work, it appeared that the plumber was grossly overcharging him. "A mile of old pipe unaccounted for – for if he has put a mile of new pipe in, he must have taken a mile of old pipe out –," Clemens complained, "& if he hasn't taken out about as much as he put in, he has certainly charged too great a quantity against us."[44]

To bring things under control, Clemens insisted on a written contract with James Ahern, the plumber. The August 26, 1881 contract between Clemens and Ahern could have been lifted straight out of the article Dr. Hooker placed in the December 30, 1880 Hartford *Courant* on combatting sewer gas. The contract specified that all appliances were to have traps, and all traps were to be ventilated. Clemens's contract put Dr. Hooker in charge of supervising Ahern's work, demonstrating Hooker's role as a medical expert on the topic of sewer gas related illness.[45]



December 30, 1880

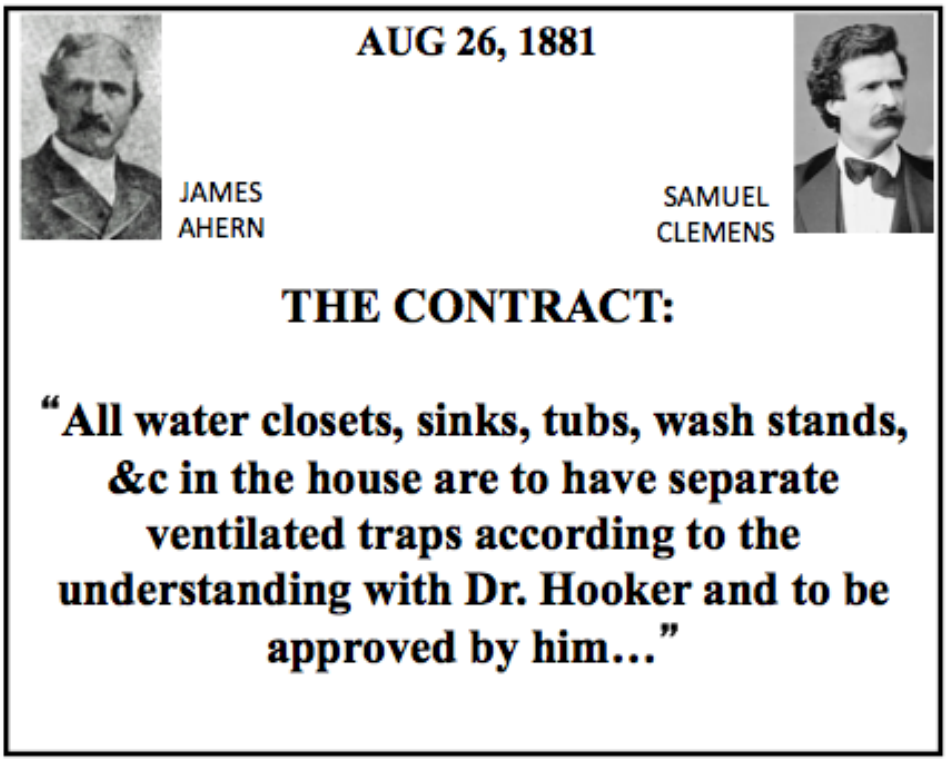
DR.
EDWARD
HOOKER

REQUIREMENTS FOR THE DRAINAGE OF EVERY HOUSE:

"Traps should be placed under all sinks, basins, bathrooms, water-closets, etc…"

"All traps under such fixtures should be separately ventilated…""

From the article "Requirements for the Drainage of Every House" in the December 30, 1880, Hartford *Courant*, contributed by Dr. Edward Hooker.

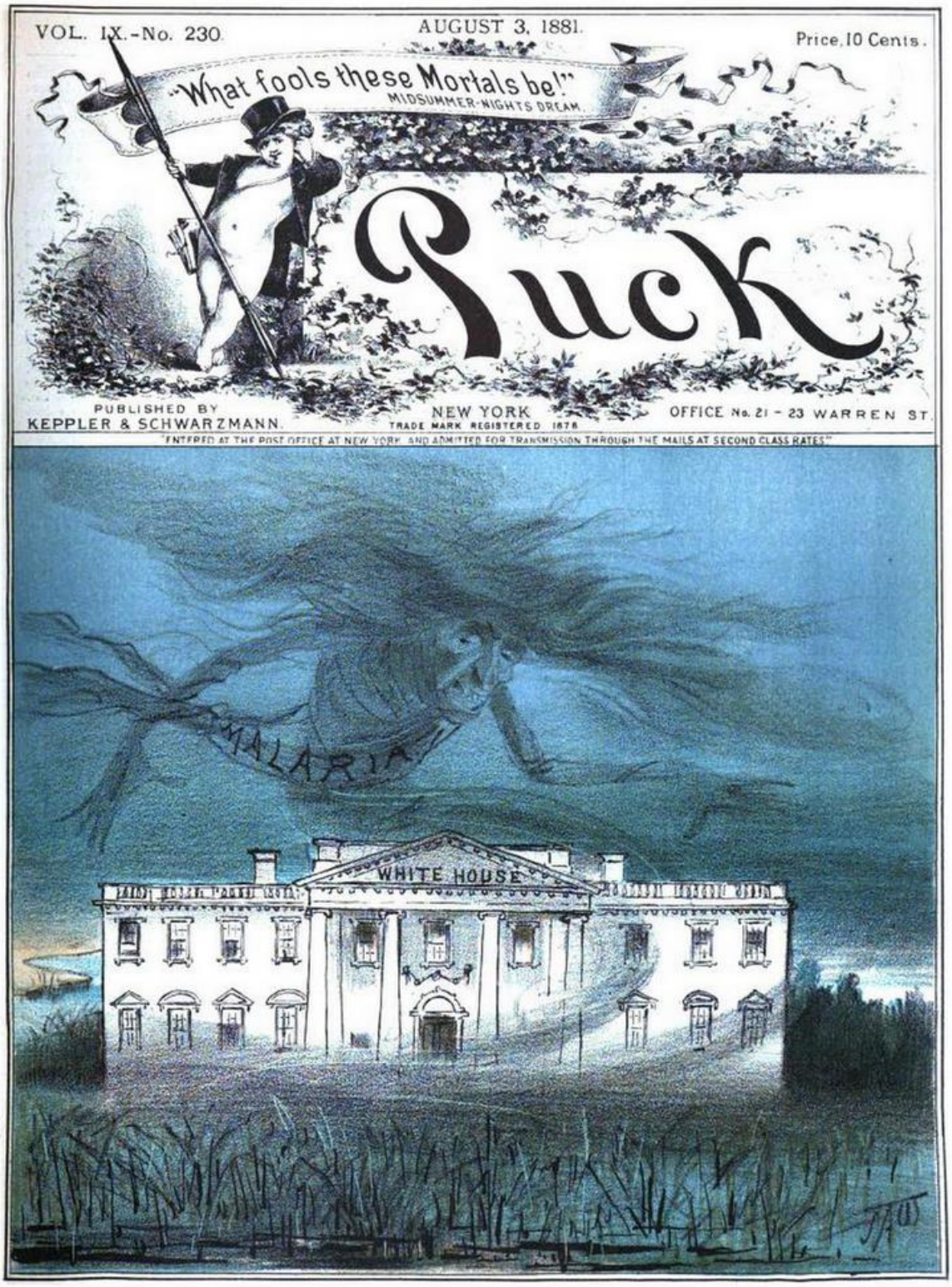


From "Memorandum of an Agreement between James Ahern and S.L. Clemens."
[Mark Twain Papers, University of California, Berkeley]

Plumbing Problems at the White House, August 1881

As Clemens finalized his plumbing contract to deal with his house's sewer gas problems in Hartford, George Waring was finishing his inspection into potential sewer gas problems in the White House. It was the middle of August 1881.

Before Waring started his inspection, though, the August 3, 1881, issue of *Puck* predicted his findings. An ominous cover drawing showed the dark cloud of "malaria" hovering over the White House.



THE EVIL SPIRIT OF THE WHITE HOUSE.

Cover of *Puck*, August 3, 1881

Puck blamed the President's situation on the infamously bad air in the vicinity of the White House:

"Our good President, although he has had two or three dangerous relapses, still makes, at the time of our going to press, fair progress towards recovery. And yet he has had much to contend with. Not only from the severity of the injury and a multiplicity of doctors, but also from the poisonous atmosphere which at all seasons of the year envelopes the White House. There can be no question that this building is on a most unhealthy site, and it says much for the constitution of our several presidents who have lived in it, that fewer have not been carried off prematurely. That part of the Potomac that flows through the city of Washington, is little better than an open sewer, and the Executive Mansion gets more than its full share of the noisome and unhealthy exhalations which come from it."[46]

The *Puck* editorialist acknowledged that the New York *Herald* might have been onto something in making its proclamation that "the real trouble is sewer gas."

"We know that there is a great deal of nonsense talked about malaria. It covers a vast number of ailments. If people suffer from overeating, it is put down to malaria. Dyspepsia goes to the credit of malaria; dipsomania is frequently euphemistically styled malaria—indeed it is a wonder that President Garfield's severe wound from a pistol-bullet has not also been attributed to malaria. While we do not, as does our esteemed contemporary, the Herald, pretend to know quite as much about medicine, surgery, and hygiene as duly qualified medical practitioners, we yet venture to express an opinion that the President's recovery is much retarded by his remaining in the White House while the overshadowing demon of malaria hovers over the edifice."[47]

There was only one way to save the President. He had to get out of the White House.

"In his present condition his removal to a healthier region would, of course, be attended with much risk; but if he were out of the Washington atmosphere we should be much more hopeful about his speedy restoration to health. President Garfield is such a magnificent specimen of humanity that it takes even more than bullets and malaria to kill him—the bullet happily so far has not done so, neither will the malaria: though he would have been better without either. One thing is very certain, that until, especially at this time of year, the President is miles away from Washington, we shall consider him in no little danger. The wound may heal, but in the patient's necessarily weak state all his remaining strength and vitality will be put to the test in battling with the insidious disease called malaria, which secures its victims slowly but surely in its dread embrace."[48]

As Clemens was stewing about the progress of his plumber's work in Hartford, Waring devoted an entire week to a thorough investigation of the White House plumbing, and he submitted a preliminary report to Dr. Rockwell (Superintendent of Public Buildings in the District of Columbia) on August 23, 1881. Waring found that most of the building's plumbing and fixtures were below the standards of the times.

Waring listed a number of improvements that could readily be accomplished. Colonel Waring hoped to avoid alarming the American public with his findings; he wanted his report to be reassuring. He hoped to imply that the problems he discovered were not as bad as the rumors had suggested. He wanted to calm down public anxieties. Rockwell's reading of Waring's report gave him no reason to think that the American public would take comfort in it, though, and he decided to refrain from passing the details of Waring's report on to the Associated Press, even though it had been the original plan to do so.

Increasing Concerns about the White House Plumbing, September-October 1881

On September 6, two weeks after Waring submitted his preliminary report on the state of White House plumbing (and one month after *Puck* recommended the President be removed from the White House), Garfield was moved out of the White House. In an apparent vote of no confidence in the healthiness of the White House and its environs, the President was taken to Elberon, New Jersey. At first, the new environment appeared to be salutary. After the transfer, Garfield's condition improved so much that one of his physicians, Dr. Frank Hastings Hamilton, told Mrs. Garfield "I am afraid to tell you how confident I feel of your husband's recovery."[49]

Garfield on his Death Bed.

[Source: Supplement to *Harper's Weekly* on October 1, 1881
https://upload.wikimedia.org/wikipedia/commons/thumb/b/b1/Death_bed_of_President_James_A._Garfield_-_From_Harper%27s_Weekly_-_NCP_001861.jpg/4096px-Death_bed_of_President_James_A._Garfield_-_From_Harper%27s_Weekly_-_NCP_001861.jpg]

Hamilton's optimism was premature, though, and Garfield's improvement was transient. James Garfield developed chills and chest pain on September 17, and died on September 19, 1881, two weeks after his removal from the White House.[50] His autopsy attributed his death to a ruptured aneurysm of the splenic artery, most likely related to his bullet wound.

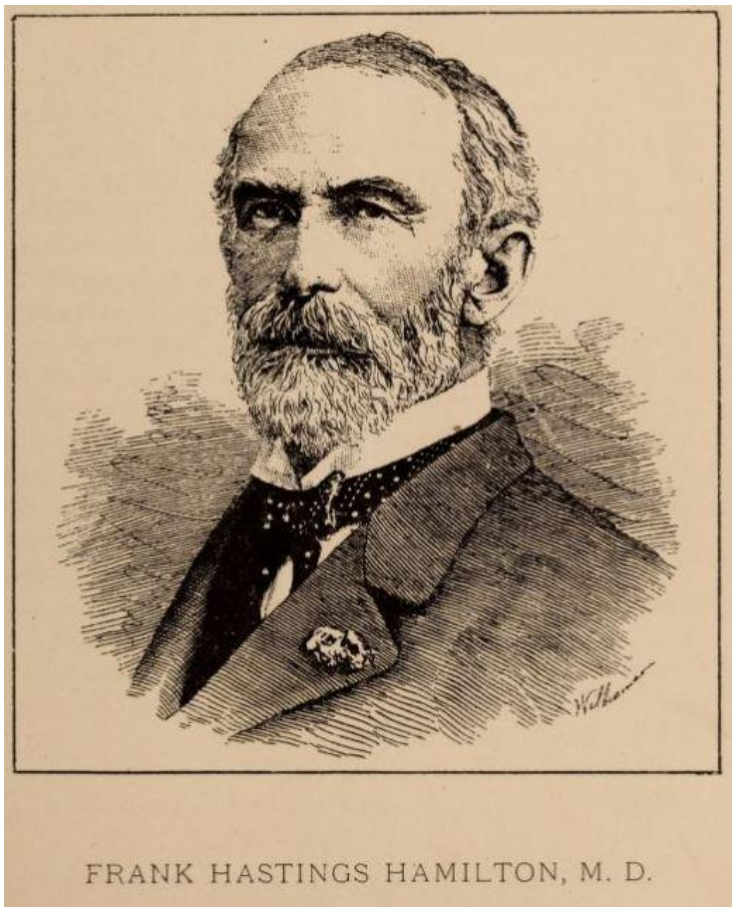
Waring's report – the report that White House staff had decided to withhold from the Associated Press – was printed in full in the *Sanitary Engineer*. An accompanying editorial in the journal described the President's death as a "great calamity" that created concern about the White House, and "suggest[ed] to many minds that Mrs. Garfield's illness and the President's lingering sufferings might be due, to some extent, to defects in the building."[51] In October 1881, a month after Garfield's death, the New York *Times* published long excerpts from Waring's report in the *Sanitary Engineer*, as well as excerpts from the accompanying editorial that held Congress responsible for overseeing the White House as if it were a New York City tenement.[52]

The *Boston Medical and Surgical Journal* provided a more tempered summary, stating that Waring's report revealed "a very much less unsafe condition than current reports would lead one to expect." Even so, the *Journal* went on to recite the building's numerous plumbing flaws, noting that "not one of the soil pipes has anything like proper ventilation, and more than one of them has no attempt at ventilation whatever."[53]

After Garfield's death, President Chester Arthur, Garfield's successor, had serious concerns about the safety of the White House. Even though the right to occupy the building was his, he refused to move into the executive mansion until the plumbing was updated. Rockwell promptly initiated the renovations recommended by Waring, and Waring was put in charge of the updates. William Paul Gerhard and William Chapman, Col. Waring's trusted associates, directly supervised the White House renovations of 1881 as Waring was providing consultant work in Paris.

Dr. Hamilton Explains the Dangers of Premature Adoption of New Technology (as Demonstrated by America's Sewer Gas Threat), 1882

Dr. Frank Hastings Hamilton – one of the most respected physicians of the era – had been summoned from New York as a consultant shortly after Garfield's shooting, at the request of Garfield's wife. Hamilton continued to be involved in the case until the death of the president.[54] Hamilton was a highly regarded surgeon. He served on the faculty of a number of medical schools, and his career included stints as chairman of surgery at Geneva Medical College and as dean at the Buffalo Medical College. He was a founder of Bellevue Hospital Medical College, where he served as departmental chairman. He was a prolific writer whose works included *Prognosis in Fractures, Treatise on Military Surgery, A Practical Treatise on Military Surgery and Hygiene, Surgical Memoirs of the War of Rebellion,* and *Treatise on the Principles and Practice of Surgery*. He was highly regarded for his innovations in orthopedic surgery and his pioneering work in skin grafting.[55]



Dr. Frank Hastings Hamilton
[*Buffalo Med Surg J*, 1886; 27: 91]

After Garfield's death, Dr. Hamilton began explaining the dangers of sewer gas to the public. In view of the criticisms of Garfield's doctors, it might be fair to ask whether Hamilton's purpose was to distance the presidential medical team from the blame for the president's demise. In any case, he wrote a paper on "The Struggle for Life against Civilization and Æstheticism." He argued that some apparent advances in civilization and aestheticism (*e.g.,* plumbing) were actually threats to human survival. His paper was read before the New York Academy of Medicine on March 17, 1882, a short six months after Garfield's death. The New York *Times* reported on his presentation in an article titled "The Sewerage Gas Evil." Hamilton's comments brought Garfield's last days to mind as he explained how the "insidious enemy of human life – sewer gas" – had become a common cause of lingering illness and death in modern America of the late nineteenth century:

"…we are at present, and have been for a long time, wholly unprotected against sewer-gas…whether this defective condition of our plumbing is due to the ignorance or wickedness of plumbers, architects, or sanitary engineers, or to other causes, the fact is undoubtedly as has been stated…"[56]

There was good reason to worry about the implications of modern innovations. Civilization was advancing so rapidly, Hamilton suggested, that humanity was not capable of fully comprehending or adapting to the medical implications of its newest technologies in time to save itself.

In the final analysis, indoor plumbing may have been a terrible mistake, and the time may have come to think about moving the plumbing back out of the house, Hamilton suggested. The owners of some recently constructed and "most elegant" mansions were coming to that very conclusion based on their own observations. To protect their own health, these well-informed, intelligent, and attentive citizens were doing all they could to make sure that "not an inch of plumbing" could be found in the living quarters of their homes. Instead, all the water closets, pipes, and drains were being placed in another building or in a separate annex away from the living space of the home.[57]

George Waring agreed with Hamilton's conclusions. Colonel Waring wrote on April 2, 1882, in praise of "the substantial soundness of Dr. Hamilton's position" on "the effect of the plumbing work of city houses on the life and health of their occupants." It no longer mattered whether a person lived in a tenement or in a mansion. Everyone had the same problem – the plumbing in America's homes was "almost universally" defective in its construction. It was not just bad; it was "disgracefully and dangerously bad." Unsafe plumbing could be found "in nine out of every ten houses, even in Fifth Avenue." The risk was so predictable, Waring explained, that the standard plumbing of the times "ought not to be allowed to remain within the same four walls with a family of human beings."

Dr. Frank Hamilton warned that America's experiment with indoor plumbing could turn out to be "a great failure." If so, it was "not necessarily a dereliction on the part of any one concerned." It might just be a bad idea. Eventually, the public might have to accept the reality and get rid of its plumbing. There were lessons to be learned from the recent White House tragedy, Hamilton suggested, as he attempted to draw the public's blame away from Garfield's doctors and shift public focus to the predicament they were in due to the sewer gas: "The odds were against us; and this is what everybody will, sooner or later, come to understand."[58] President Garfield's fate could be anyone's fate.

Colonel Waring Defends His White House Plumbing Work, 1882

After the upgrade in the White House plumbing was completed, George Waring found himself in an awkward situation. Every aspect of the high visibility job was subject to scrutiny and second-guessing. Waring found that he had to defend himself from the criticism of his professional colleagues when the quality of the plumbing work done in the White House under his direction came into question.

In particular, Waring was heavily criticized for his failure to ventilate the traps in the White House plumbing upgrade. It was quite a turnaround of affairs. Waring, the great promoter of the concept of minimizing sewer gas exposure, appeared to have taken a suboptimal approach to controlling the White House sewer gas threat. In defense, Waring contended that the installation of large quantities of additional pipes was not only prohibitively expensive, but it was not needed; he had been able to bring the White House to the highest standard of safety without ventilating the traps. When the editor of the *Sanitary Engineer* refused to publish Waring's rebuttal to criticisms about his work, Colonel Waring wrote to the *American Architect* to tell his side of the White House story. He wanted to dispel the rumor that his work had been anything less than the best. He particularly objected to the criticism of his failure to ventilate the White House traps. "The ventilation of traps, so urgently advocated, is, in my opinion, not only unnecessary for the protection of the trap," Waring wrote,

"but is, aside from its cost, objectionable as complicating the work, and as increasing the amount of lead pipe to be used."

If he had to do it all over again, unrestrained by any financial or structural considerations, Waring contended he would have done the White House upgrades exactly the same way. "If I had been unhampered by the injunction to work as economically as possible, and by conditions of the building which could not be changed, I should not have cared to make the new work in any essential particular different from what it is…" [59]

Col. Waring's opinion would be a perspective that would eventually be of considerable interest to Samuel Clemens.

Samuel Clemens Gets to the Truth

The plumbing updates in the White House and in Mark Twain's house took place at virtually the same time and for essentially identical reasons – to protect the health of the building's inhabitants. Colonel Waring's conservative approach to the White House upgrades was a striking contrast to the extensive renovations that took place in Hartford under James Ahern's direction with the guidance of Dr. Edward Hooker. George Waring was restricted by significant financial limitations in refitting the plumbing in the President's house at 1600 Pennsylvania Avenue in Washington, D.C. In contrast, James Ahern seemed oblivious to the idea that there might be any constraints on his spending on the project (at least until a contract was forced upon him) as he installed the plumbing upgrades in Sam Clemens's house at 351 Farmington Avenue in Hartford, Connecticut. Ahern acted as though he had as much money to spend as he wished to spend, and he spent a lot of it on ventilating the traps.

The decision about whether or not to ventilate the traps became a significant difference between these two major plumbing jobs of 1881 – the Clemens house ended up with ventilated traps, but the White House did not. If the sewer gas theory were correct, the ventilation of traps was essential, and the Clemens house would be a healthier house for having done it (which did not prove to be the case).

Sam Clemens was fully aware of George Waring's prominence as an expert in health matters. Waring was particularly delighted in early 1883, when Clemens sent Waring an early look at *Life on the Mississippi* – in the book, Clemens lavished praise on Waring's remarkable sanitary engineering feat that dramatically improved the health of Memphis. Waring replied with a note of gratitude for the package and the attention.[60]

Diphtheria finally caught up with the third Clemens daughter, Jean. On July 20, 1883, Clemens wrote "Jean is just over a solid attack of diphtheria, & is all right now."[61] The expensive plumbing changes of 1881 had been all in vain.

Clemens invited Waring to visit him at his summer home in Elmira, New York, in August 1883, but Waring had a last-minute conflict.[62] In November 1885, Clemens and Waring exchanged letters about ongoing concerns Clemens had about Ahern's 1881 plumbing work.[63] Waring hoped to visit Clemens's home to inspect the plumbing in December 1885, but Clemens had to be out of town on the proposed date.[64]

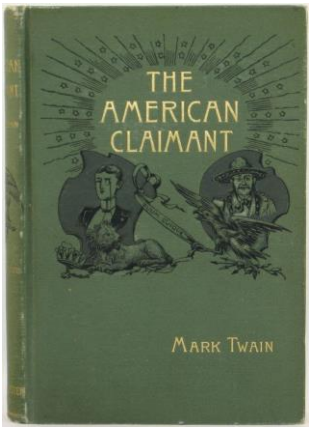
Waring planned to visit Clemens in May 1886, but a scheduling conflict led him to send William Higgins Chapman in his place.[65] Chapman, George Waring's protégé, had worked for Col. Waring since October 1880. According to genealogical records of the Chapman family, William Chapman was responsible for inspecting existing plumbing and supervising necessary upgrades in old buildings, "all in accordance with plans and specifications prepared by Col. Waring." No one knew George Waring's methods better than William Chapman. Chapman's responsibilities were not trivial ones. "The most notable work of this class of which Chapman had direct charge," according to Chapman family records, "was the installation of new plumbing appliances at the White House in Washington, just after the assassination of President Garfield."[66]

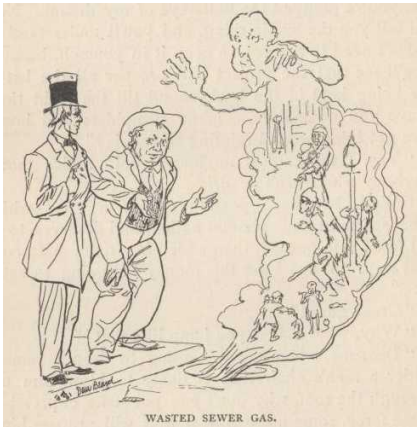
Chapman's role in the White House renovations made him fully aware of Waring's decision to forgo the ventilation of traps. He would have visited Clemens in June 1886, and it is unimaginable that he would have failed to point out the differences in philosophy between Col. Waring's conservative approach to the White House plumbing and the far more extravagant work done in the Clemens home by James Ahern, under the direction of Dr. Edward Hooker.

Clemens erupted in anger when he learned his expensive plumbing renovation had been unnecessary. A local gossip columnist caught wind of his diatribe and reported the episode in the Boston *Saturday Evening Gazette* of July 17, 1886. The New York *Times* republished the story a few days later. According to the article, Clemens concluded his expensive plumbing work did nothing except to "carry out the whim of a too scientific physician, and add some $1,500 to the pile of a rapacious plumber."[67]

Samuel Clemens Gets His Revenge, 1892

In 1892, Clemens published *The American Claimant*. The book featured an eccentric inventor, Colonel Sellers. Sellers declared sewer gas to be an unappreciated resource, and he invented a device that would *increase* household sewer gas production. In rebuttal to the advice to Clemens received in 1881 about the health risks of sewer gas, Sellers reported that "Every physician I talk to recommends it, and every plumber." He even had a marketing plan for his invention that oddly alluded to the 1881 concerns about the possible role of sewer gas as a contributor to James Garfield's death: "I'm playing my cards to get it adopted in the President's house, and *then* it'll go — don't you doubt it."[68]




WASTED SEWER GAS.

Cover of Mark Twain's *The American Claimant* (1892), and illustration showing Col. Mulberry Sellers explaining the benefits of sewer gas (p. 184).

Conclusion

Sewer gas was a logical explanation for disease causation in the late nineteenth century. It was a reasonable extension of the role of miasmas as causative agents of disease. It was compatible with newer observations about the risks of vitiated air.

It was an alluring hypothesis. It promoted advances in public health and sanitation. It influenced medical practice for three decades. It turned out to be wrong.

As Mark Twain discovered, the idea was spectacular, but meretricious.

Postscript

In retrospect, the Age of Sewer Gas led to a number of futile interventions and medical misadventures. In that regard, it is not different from other medical "breakthroughs" that fail to stand the test of time. By its very nature, medicine seems to propagate a disproportionate number of appealing but flawed concepts, many of which have short half-lives. It is a lesson to remember. Contemporary pop philosopher, science historian, and poet Jennifer Michael Hecht may have described the phenomenon as well as anyone:

"If you look at a testimony of love from 2,000 years ago, it can still exactly speak to you, whereas medical advice from only 100 years ago is ridiculous."[69]

Acknowledgements

I am grateful to The Mark Twain Papers at the University of California, Berkeley, and in particular to the assistance of Neda Salem and Melissa Martin in tracking down the correspondence of Sam Clemens with George Waring and others.

I am equally indebted to the Harriet Beecher Stowe Center in Hartford, Connecticut, and the guidance of Beth Burgess, collections manager, in leading me to the correspondence, diaries, and photographs of the Beecher and the Hooker families.

I thank Barbara Schmidt for her review of this work while in progress.

I am grateful to all of the Mark Twain scholars who listened to presentations of this work in its exploratory stages at the Mark Twain House in Hartford, at the Clemens Conference in Hannibal, and at the International Conference on the State of Mark Twain Studies in Elmira.

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