Bad Water vs. Good Health

BY LOUIS EDWARD THEISS

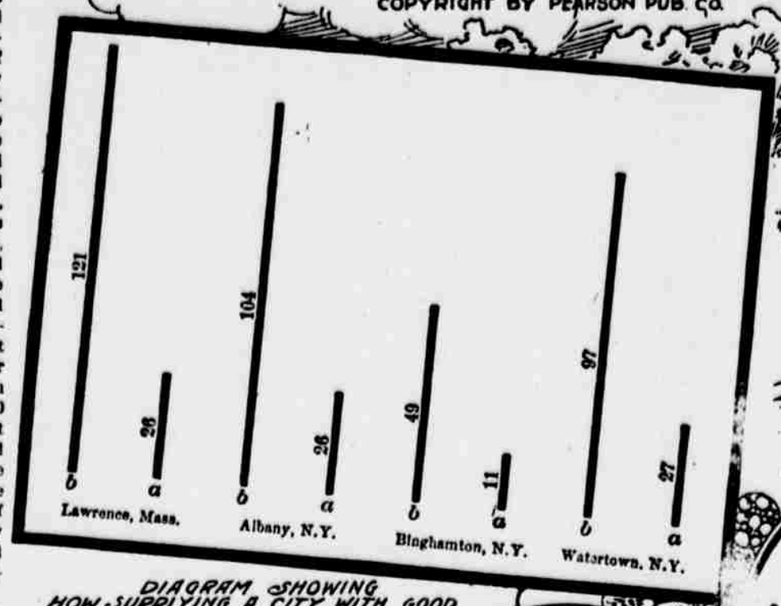
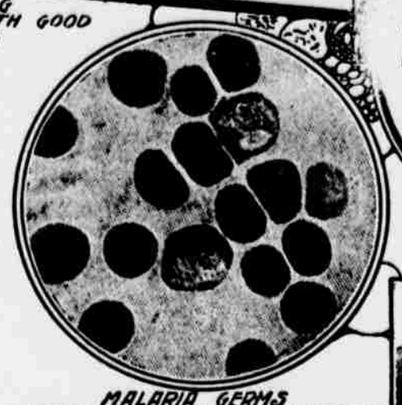


DIAGRAM SHOWING HOW SUPPLYING A CITY WITH GOOD WATER LESSENS SICKNESS AND DEATH



MALARIA GERMS PHOTOGRAPHED THROUGH MICROSCOPE

TYPHOID GERMS AS SEEN THROUGH MICROSCOPE

WELL CONTAINING VERY IMPURE WATER

HOW grossly inconsistent we are! When, for the sake of gain, a Missouri physician administered typhoid germs to some of his relatives, thereby causing six or eight illnesses and one death, we stood aghast, called the physician a murderer, and clapped him into prison for life. And when, during the Spanish-American war, some twenty-five hundred of the boys in khaki were needlessly slaughtered, many of them by typhoid, we denounced in scathing terms those officials whose carelessness and incompetency caused the tragedy. But we hear with absolute indifference the statement that yearly the pollution of our water sources needlessly causes more than 185,000 typhoid illnesses and 15,000 deaths. We pay no heed to the fact that year after year in the United States seven times as many people are needlessly ill of typhoid fever as there were soldiers wounded in the battle of Gettysburg, and three times as many persons needlessly die from typhoid fever as met death in that tragic struggle.

It is the old, old story of the mote and the beam. We do not see the enormity of this terrible wrong, because we are ourselves the authors of it. We are just as responsible for those 15,000 yearly deaths as our army officers were for the tragedies in our Spanish war camps. And our motive is just as mercenary as was that of the physician who gave typhoid germs to gain a heritage. For we, too, are actuated by financial reasons: we are unwilling to pay the price of water purification. So we continue to smite the rock of a polluted water supply and there gushes forth sewage. And when our children ask for water we give them poison.

To be suitable—that is, to be potable and fit for domestic use—water must be practically free from pathogenic germs, color, sediment, odor, taste and turbidity. Hardness makes laundering difficult. Iron spoils linen. Carbonic-acid gas turns water pipes brown. Algae make water taste bad. Water supplies differ widely as human beings. "Pure, wholesome water," the term set forth in so many water contracts, is, then, wholly a relative term. Really pure water is a rare thing, because there hardly exists in nature water that does not contain some foreign ingredients. Not all of these are harmful, however, so that water that is fit to drink is as common as really pure water is rare. So that, generally speaking, the question of a good water supply is merely a question of being willing to spend the money necessary to obtain it. Hence there ought to be no community in the United States that does not have a plentiful supply of perfectly wholesome water.

Anything but wholesome, however, is the quality of the water that all too often we actually get. Dr. F. W. Shumway, reporting on water conditions in Michigan, says in part: "Of the ninety-nine replies received, 79 per cent reported the water as good, 11 per cent as fair, and 10 per cent as of bad quality . . . The replies from 124 localities indicate that in 43 per cent of these localities the public water supplies are in danger of contamination." Dr. Q. O. Sutherland, discussing water conditions in Wisconsin, says that in his state "nearly every stream used for any kind of supply is contaminated to some extent by sewage." Health Commissioner G. A. Bading, speaking of Milwaukee's water supply, says that most of the city's water comes from Lake Michigan, but that there are still 5,000 wells in existence, 91 per cent of which have been shown to be contaminated. Lake Michigan is the source of water for many other towns near it. One of the tributaries of Lake Michigan is the Grand Calumet river. And here is what Health Commissioner W. A. Evans, of Chicago, has to say of the Grand Calumet: "The greater part of the sewage from the business and residential districts (of Hammond, Ind.) empties into the Grand Calumet, which, as it flows through Hammond, is almost unspeakably vile and putrescent. And this stream empties into the lake only 3,000 feet from the waterworks intake." Dr. Edward Bartow, analyzing conditions in Illinois, says that "an examination of the untreated lake water shows that unsatisfactory water is frequently delivered at Evanston, Lake Forest, Glencoe, North Chicago, Waukegan, Wilmette and Winnetka. . . . And that the water supplies of all cities which use unfiltered lake water are shown to be impure at times." And this condition of the water supply may be taken as typical of the entire country. A very considerable proportion of our drinking water is absolutely unfit for human consumption.

Criminal negligence is the sole and only cause of such a condition. We dig a cesspool and a well in the same yard, and the contents of the one seep through the earth into the other. We place a privy vault a few feet from our well hole, and the rans wash the filth from the former into the latter. We defile the surface of the ground so that every rainstorm sweeps the defilement into our streams. Did you ever stand at the edge of a barnyard and watch the rain falling from the roof of the barn and pig pen to the manure piles below, slowly accumulating in pools of reddish black, and draining away into a nearby stream, and so on into some one's drinking water? Or have you ever stood by a river bank and watched a sewer belching forth its infinitely more harmful human corruption? The idea of drinking such nauseating stuff is not pleasant; but that is exactly what millions of us are doing. Like the dog, we have turned to our own vomit. For, to quote Theodore Horton, Chief Engineer of the New York State Health Department, "We pump filth into a stream by one pipe, and by another pipe we pump it out again to drink."

Let me give you some concrete instances of how our drinking water is defiled. In rural New York inspectors from Ithaca found a farmer, who patterning after Hercules' method of cleaning the Augean stables, had built his barn directly over a large brook, which carried away all his stable manure. This brook was one of the sources of Ithaca's water supply.

Along the valley of the Susquehanna there is a string of good-sized towns—Plymouth, Wilkes-Barre, Wyoming, Bloomsburg, Nanticoke, and others, all of which empty sewage into the river, and a number of which take their drinking water direct from the river. Wilkes-Barre does, and its pumping station is on an island in the river. When the stream overflows, as it does every spring, the pump-well is flooded with the foulest of water—the roiled river flow containing suspended sewage and the reeking, sulphurous waste of coal mines. They make an effort to clean this pump-well. Perhaps they succeed and perhaps they do not. The point is that the expenditure of a little money would protect the pumping station from inundation.

New York state has the same tale of pollution to tell. Albany, Cohoes, Dunkirk, Lockport, Niagara Falls, Ogdensburg, Oswego, Tonawanda, Watervliet, and other cities drink river water that is grossly polluted by the sewage of cities farther upstream. And I have seen dozens of photographs of filthy cow-sheds and barns, the drainage from which polluted the watershed for New York City.

In Illinois fifteen towns north of Chicago empty sewage into Lake Michigan, and nine of them draw their drinking water back from the lake. And what is true of Pennsylvania, and New York, and Illinois, is also true of other states. Particularly is it true of the south. From the Atlantic to the Pacific, from the Gulf to the Lakes, our people are needlessly drinking polluted water.

What is worse, water pollution is on the increase. "With the rapid growth of our population," says Alec H. Seymour, Secretary of the New York State Board of Health, in a recent bulletin, "the defilement of our streams also increases. Some of our finest streams and lakes are being rendered unavailable for boating, bathing, fishing, and domestic use. They are of no value except as cesspools."

Typhoid fever one cannot contract without taking into one's system germs that have been voided by a typhoid patient. These germs get into the body through the mouth, pass through the stomach into the intestines, and are carried through the body by the blood. They leave the body through the bowels and in the urine. Sometimes infection is carried by contact or through vegetables and milk; but the common channel of typhoid transmission is through our water supply. "In order that germs could find entrance into drinking water," to quote Dr. Howe again, "there must have been carelessness in caring for the body wastes of previous victims." And this carelessness, as we have seen, consists for the most part in allowing our water sources to be polluted with sewage.

In consequence, typhoid, winter cholera, and diarrhoea are most prevalent along water courses used for both sewage disposal and water supply. Conversely the typhoid rate of any town continuously using a given water supply fairly represents the sanitory quality of that water supply.

The truth of this will be seen by a comparison of the typhoid rates of towns using clean water with the rates of towns using polluted water. In Michigan, for instance, Allegan, a town of 2,795 population (in 1904) with a pure water supply, had, between 1889 and 1906, 32 cases of typhoid and 4 deaths. South Haven, a town of 2,767 inhabitants, with water drawn from Lake Michigan within 100 feet of a sewer outlet, had in the same period 245 cases and 24 deaths. Manistee, with 12,320 population and pure water from wells, had during these same years a typhoid rate of 15 per 100,000 population; whereas Menominee, with 10,666 population and polluted water from Green Bay, had a typhoid rate per 100,000 of 84. Hartford, Mich., with 1,246 population and impure well water, had, between 1889 and 1906, 24 typhoid cases and 7 deaths; whereas Montague, with 1,021 population and pure well water, had in the same period only 5 cases and 3 deaths. Again, Benton Harbor, with pure water from deep wells, had a death rate per 100,000 of 17.8; Grand Haven, with pure well water, a rate of 13.8; and St. Joseph, with pure lake water, a rate of 12.8; whereas the following New York towns using polluted river or lake water had for ten years—1899 to 1908—these typhoid rates: Lockport, 48.4; Oswego, 49.4; Ogdensburg, 54.6; Cohoes, 84.8; Niagara Falls, 132.9; and Pittsburg, using polluted river water, had a typhoid rate, from 1900 to 1907, that averages 127 per 100,000.

Before the typhoid rate of cities that have been scourged with epidemics, the high typhoid mortality of such cities as Pittsburg and Niagara Falls dwindles into insignificance. In Watertown 44 out of 582 cases were fatal; in Ithaca 82 out of 1,350; in Pittsburg 432 out of 5,265. In Plymouth 114 out of 1,104 persons died; in Lowell 132 out of 550; in Lawrence 34 out of 141. Of 514 cases in New Haven 73 resulted fatally. Butler had 56 deaths and 1,270 cases. In Scranton there were 111 deaths and 1,115 cases; in Cleveland 472 deaths and 3,443 cases; and in Philadelphia 1,063 deaths and 9,721 cases. In every case the death rate has been terrible, rising, in many instances, to several hundred per 100,000 population.

The U. S. Census Bureau report for 1908 shows 11,375 typhoid deaths in the registration area, and for 1909 there were 10,722 deaths—an average of about 11,000 a years. The registration area includes only 51 per cent of the total population, and does not include the South, where the typhoid rate is very high. In ten southern states the average rate has been 79. "Twenty thousand deaths a year," says Dr. William Guilfoy, Registrar of Vital Statistics of New York City, "would be a very conservative estimate of the total annual typhoid mortality." Certainly this is a conservative estimate, for the complete census of 1900 showed 35,379 typhoid deaths that year. For the sake of being conservative, however, let us take Dr. Guilfoy's figures. They are large enough.

The dead, it has long been held, amount to not more than one-tenth of the total number of those stricken. "But recent studies," to quote Mr. George C. Whipple, "indicate only one death in 15 or 18 cases." If we allow one death for every twelve cases—an estimate that Dr. Guilfoy says is entirely within the mark—we shall have the tremendous annual total of about 250,000 cases. Think of it—a quarter of a million people yearly stricken with typhoid!

Recall the largest parade you ever saw—say one with 25,000 troops in line—and think how those serried ranks marched past hour after hour until your eye grew tired of watching them. Then multiply that parade by ten, and imagine what an enormous army 250,000 persons would make. That is exactly the size of the army, recruited anew every year, that this country forces to fight—typhoid fever.

Like any other army, this army, too, costs money. In this case, though, the cost is in the form of economic loss. Statistics compiled by the Connecticut Board of Health show that typhoid carries people off in the years of their greatest earning capacity, 41 per cent of the deaths occurring to persons between the ages of 20 and 40, and 60 per cent to persons between 10 and 40.

The economic loss thus caused reaches a staggering total. The cost of the epidemic at Plymouth, it is shown by Professor Mason, amounted to more than $115,000, divided as follows:

Loss of wages of those who recovered...	$30,020
Cost of caring for the sick.....	67,000
Year's earnings of the dead.....	18,419
	$115,539

In making this estimate, however, allowance was made for the loss of only one year's earnings. An examination of an insurance mortality table shows that the man who dies before he is forty dies before his time. Hence his death represents a loss, not of one year's income, but of many. Five thousand dollars is the sum at which a life is usually valued in reckoning economic loss. The typhoid loss is based only on the number of those who die. As Mr. George Whipple points out, there is an added loss occasioned by non-fatal typhoid illnesses that should also be taken into account. The average period of typhoid convalescence, as figured from 500 cases in a Pennsylvania hospital, is 43 days. Hence loss of wages plus cost of medical attendance would easily average $100 for every person who recovers. If ten recover for one who dies, then an extra $1,000 must be added to the $5,000 allowed for each death, making the total economic loss caused by every typhoid death $6,000.

Figured on this basis the loss to many communities amounts to millions of dollars yearly. Take Pittsburg, where, as we have seen, the typhoid rate was 127 per 100,000 population. Pittsburg is a city with a population in excess of 350,000. Hence its annual death roll from typhoid must have amounted to 3½ times 127, or something like 444. At $6,000 a life, this death roll will cost Pittsburgh $2,664,000 a year, or $26,640,000 every decade. And the loss to the entire country, figuring the typhoid deaths at 20,000, reaches the astounding total of $120,000,000 a year, or $1,200,000,000 every decade.

This estimate, however, is without question too conservative. Mr. Allen Hazen, an eminent American engineer, says in his book, "Clean Water and How to Get It," that the reduction in the number of deaths in five cities, brought about through water purification, amounted to 440. Improved general sanitary conditions, he says, were responsible for 137 of the 440 decrease. The typhoid reduction amounted to only 71. The reduction in the number of deaths from other causes amounted to 232—three times the typhoid reduction. If this ratio of deaths due to water holds good generally, then our typhoid deaths are only a small part of the deaths due to bad water.

That three-quarters of the typhoid deaths are due to water Mr. Hazen himself declares. That three-quarters is referred to in the first paragraph of this article as the "fifteen thousand needlessly slaughtered each year by polluted water." Because, to quote Mr. Hazen, "three-quarters of the typhoid deaths could be prevented, and thereby could be stopped this needless loss of vital capital that is going on year after year."

The way to save that three-quarters, then, is by being careful, which in this case means by providing pure water. As Mr. Hazen puts it, "By filtering all the water supplies of the important cities of the country, and by instituting other necessary sanitary reforms."

As proof of this let us see what has happened to the death rate in those localities that have purified their water supplies. The typhoid rate of Rensselaer for ten years averaged 61.9 per 100,000 population. In 1908, after the water was filtered, it fell to 30. Hudson changed from Hudson river water to a purer supply, and the rate fell from 59.2—the ten-year average—to 17.1. Poughkeepsie's rate used to average 112. In 1907 the filtration plant was improved, and the rate fell to 34.5. In Albany the ten-year average before filtration was 88.8. Since filtration the ten-year average has been 22.2.

In Pennsylvania, Pittsburg had a typhoid rate, according to Health Director E. R. Walters, that from 1901 to 1907 averaged 127. In 1907 the city spent $6,500,000 for a filter system. During the three years since, the typhoid rate has been 31.9—a decrease of more than 75 per cent.

Chicago affords an even more striking example of the benefit of purifying the water supply. In 1891 Chicago's typhoid rate was 173.8 per 100,000, the highest average typhoid rate in the civilized world. Chicago purified its water by building its wonderful drainage canal to keep its sewage out of Lake Michigan. In 1908 Chicago's typhoid rate was 15.6—a reduction of 91 per cent.

Excellent as these achievements are, there is a possibility of an even greater reduction in the typhoid rate.

The methods of water purification are various. Undoubtedly filtration comes first; but filtration is not infallible.

Another method of purification is the use of huge storage reservoirs. Water is a poor medium for disease germs, and in it they die quickly. To quote Mr. Whipple again: "The typhoid bacillus does not multiply in ordinary drinking water. On the contrary the cells die. . . . Ultimately all the cells die. The rate varies greatly. In some experiments all died in 3 to 5 days. In others germs lived a month. In very cold water mortality is more rapid." Hence if water can be impounded in large reservoirs and held for a time, it tends to purify itself.

Sewage disposal is fully as important as water purification—that is, for any purpose except the saving of human life. If property is at stake it is indispensable.

The problem of clean water is evidently not a difficult one to solve. No nation has a finer supply of water than we have.

At the least you can guard the water that comes into your house. See that you get fresh water from the mains, and not water that has stood for hours in the lead or brass pipes within the house. House filters are plentiful, but few of them are efficient. They are merely strainers. Don't put ice in your water. It may contaminate it. Your great safeguard is is boiling your water. Particularly is this necessary in the late winter, when typhoid epidemics so often break out.

MAN IS A MEGAPHONE

Railroad Caruso With a Cyclone in Either Lung.

Clyde Hayes, Who Calls the Trains in Chicago's Big Northwestern Station, Has a Voice Like a Foghorn.

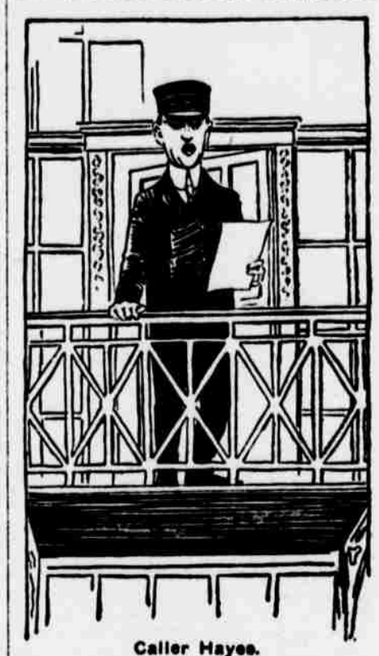
Chicago.—Clyde B. Hayes is the railroad Caruso. Every day from 3:30 p. m. to 11 he proclaims the departure of more trains than any other station caller. His concert platform is of all steel construction and it is located way up near the splendid ceiling of the new Northwestern railroad station.

Thirty thousand people each day lend appreciative ears as he skylarks the suburban schedule on the Milwaukee and Galena divisions, plus enough overland trains to keep Chicago and the Pacific coast bound in close fellowship. Presidents of the United States, boy orators, world famous evangelists, divinities of grand opera, baseball umpires—none of these ever had the constant opportunities of Train Announcer Hayes to enlighten and electrify a listening multitude.

Passing swiftly over the poor boy and burning ambition section of his life, we find Hayes in full charge of a night accommodation train in Nebraska. Yes, until recently he was a railroad conductor, and was treading the threadbare aisle of a Nebraska accommodation, occasionally unhooking a brightly nickled lantern from his left elbow and dropping off into the night to wigwag the engineer.

One day the division superintendent of the Northwestern line at Omaha summoned young Conductor Hayes into his grim presence.

"Are you aware, Mr. Hayes, that you have been 'turned in' a number of



Caller Hayes.

times lately?" said the superintendent to the conductor after the latter had nervously placed his cap on the edge of the glass topped table.

Hayes trembled and his heart sank. To be "turned in," in railroad patois, means to be the object of complaints by passengers.

"What have I done, sir?" he murmured anxiously.

"You have disturbed the sleep of a large number of passengers on this line," said the superintendent. "Letters have come to me from traveling men who ride on your train, and they say that when you announce a station at night your voice not only wakes them, but scares them and knocks them out of a proper frame of mind to do business the next day. Hereafter, Mr. Hayes, when calling out stations I wish you would not try to displace the window panes or experiment with sound vibrations on the bell rope.

But it seems that Mr. Hayes is a walking library for volumes and volumes of stentorian noise. It couldn't be suppressed, and as he had no time to attend a ball game and let out steam on the bleachers, he had to resume his old habit of standing at one end of a yellow car and closing the floor at the opposite end by sheer force of his low register. Also he would cough when impelled by the platform draft, and the stovepipe would collapse with a jangling noise. For a time the gentle patter of cinders would be stilled and the volatile dents in the water cooler would take up the echoes. At least, that was the description given by the sleep-eager passengers who signed a petition which was sent to the big chief at Omaha ere another month had passed.

The railroad officials were deeply puzzled by the case of Conductor Hayes, who had proved himself reliable and efficient in every other way. Some one suggested putting him on a day run, where people sleep at their own risk, or at the mercy of the train butcher.

In the meantime the hilarious story of Conductor Hayes and the sleepy drummers found its way to Chicago and Conductor Hayes was ordered to report here. He came wondering and promptly he was set to work learning the list of train departures. Then when the new station was opened, like an admiral on the porch of a battleship, he stood in his high balcony and began his interminable recitations in earnest. For a day or so he wrestled with echoes and acoustic snares, but now he has mastered the problem of resonance in the great station.