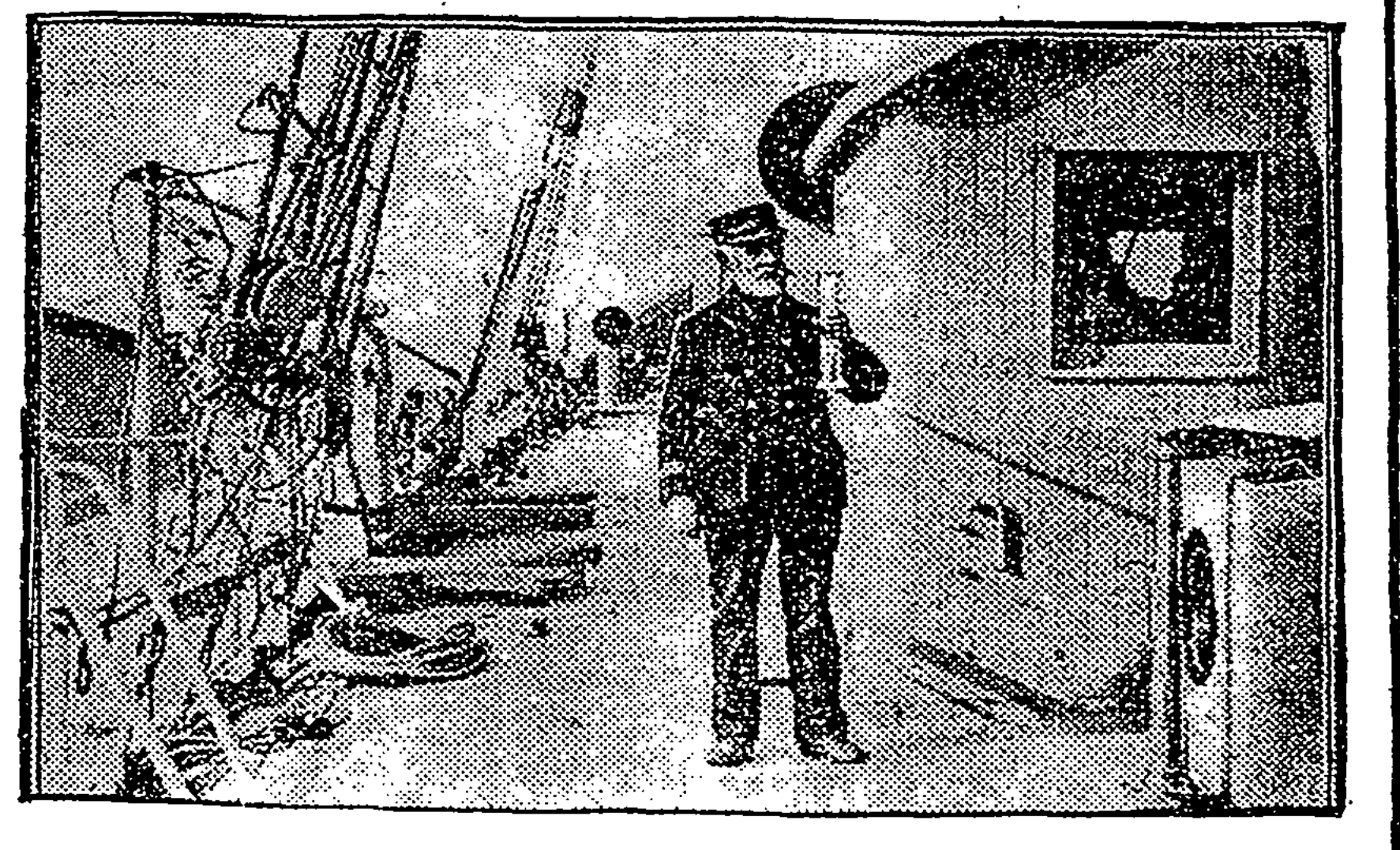
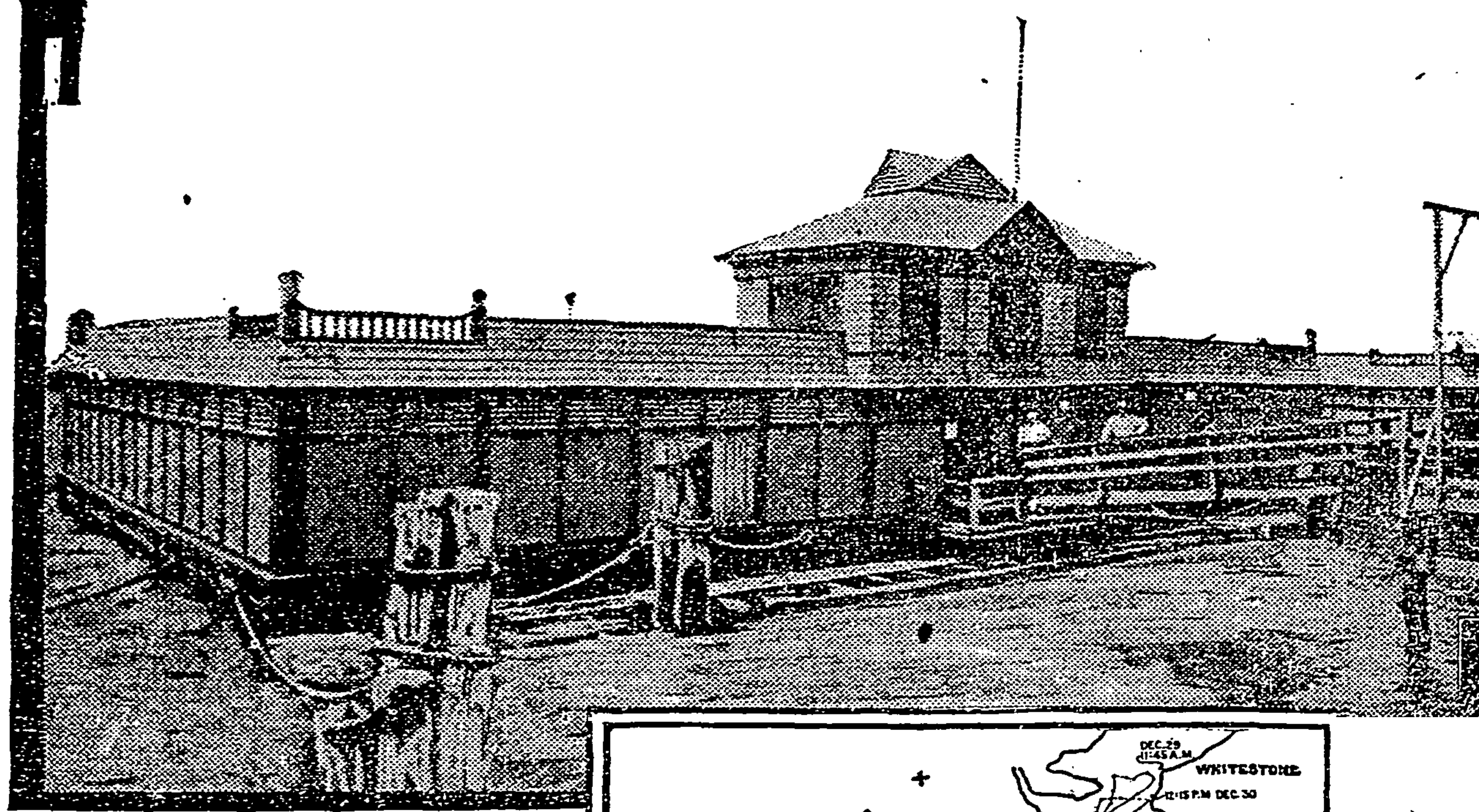


NEW YORK'S SEWAGE PROBLEM A HARD ONE TO HANDLE

Dr. George A. Soper, President of the Commission Dealing with It, Tells of Its Difficulties and What Is Being Done to Remedy It.



Testing the Salinity of the Water at Ambrose Light Vessel. In This Way the Relative Amount of Land and Sea Water at Eleven Points in the Harbor Was Determined.



Exterior of a Free Floating Bathing Establishment. It Is Impossible to Locate These Baths at a Safe Distance from the Sewer Outlets.

I SUPPOSE," said Dr. George A. Soper of the Metropolitan Sewerage Commission, regretfully, "that the question of sewage and garbage disposal is not thought by the average person to be very interesting. As a matter of fact, it is no less interesting than a surgical operation and quite as necessary.

"Do people ever stop to realize, I wonder, that life on this planet depends on three kinds of things, first, air and food; secondly, clothing and shelter, and thirdly, not a bit less important than the others, the disposal of waste matter of all kinds so that the countless forms of animal and vegetable life that are known as bacteria may not multiply to the destruction of human life. And nowhere in all the world is there such a problem of sewage disposal as New York and the surrounding cities face to-day."

It is no wonder that Dr. Soper is desperately in earnest when he talks about the particular problem that falls to his province. Other cities have for the most part to think only of their own waste. Not so New York. The harbor is the natural outlet for the waste of many cities besides Manhattan. In the metropolitan district, an area included within a radius of twenty-five miles or so of City Hall, there are no less than 100 cities, towns, and villages, many dumping sewage into New York Bay, and none of them acting in co-operation along scientific lines.

Some idea (not much, because the figures are bigger than the average mind can grasp) of the magnitude of the problem may be gained from the statement that the quantity of sewage emptied into the harbor in a crude state is 700,000,000 gallons a day. This amount would fill the East River at Brooklyn Bridge for the distance of one-fifth of a mile. And this goes on for 365 days in the year.

Already the Hudson River is so dirty that it can barely support fish. If the Passaic Valley Sewage scheme were to go through and a large number of millions of gallons more were dumped into the harbor the Hudson River fish would emigrate or die. The population increases, houses are built to accommodate the food cases in greater and greater quantities, new stores open to sell clothing, and the multitude is fairly well provided for in these respects. But in regard to the other essential of life, the disposal of waste matter, New York is little better off than it was fifty years ago.

The harbor is still the dumping place for waste, and while new sections of the country are occupied for homes and the city and its sister cities spread over a greater and greater area the harbor remains just the same size as when Hudson sailed up the river. This may be called an ominous remark, but it is one that has escaped the attention of most people, including the city authorities, until quite recently.

Dr. George A. Soper is president of the Metropolitan Sewerage Commission, appointed to work at the mighty task of "investigating and considering means for protecting the waters of New York Bay and vicinity against pollution." With him are associated three other distinguished engineers and a physician of prominence, Messrs. James A. Fuertes, H. deB. Pearsons, Charles Sooy-Smith and Dr. Linsly R. Williams. The work they have to do is not only to consider the present situation, but to devise means of providing for the future and to suggest some scheme of co-operation between the various municipalities of the metropolitan district. New York alone cannot solve the problem.

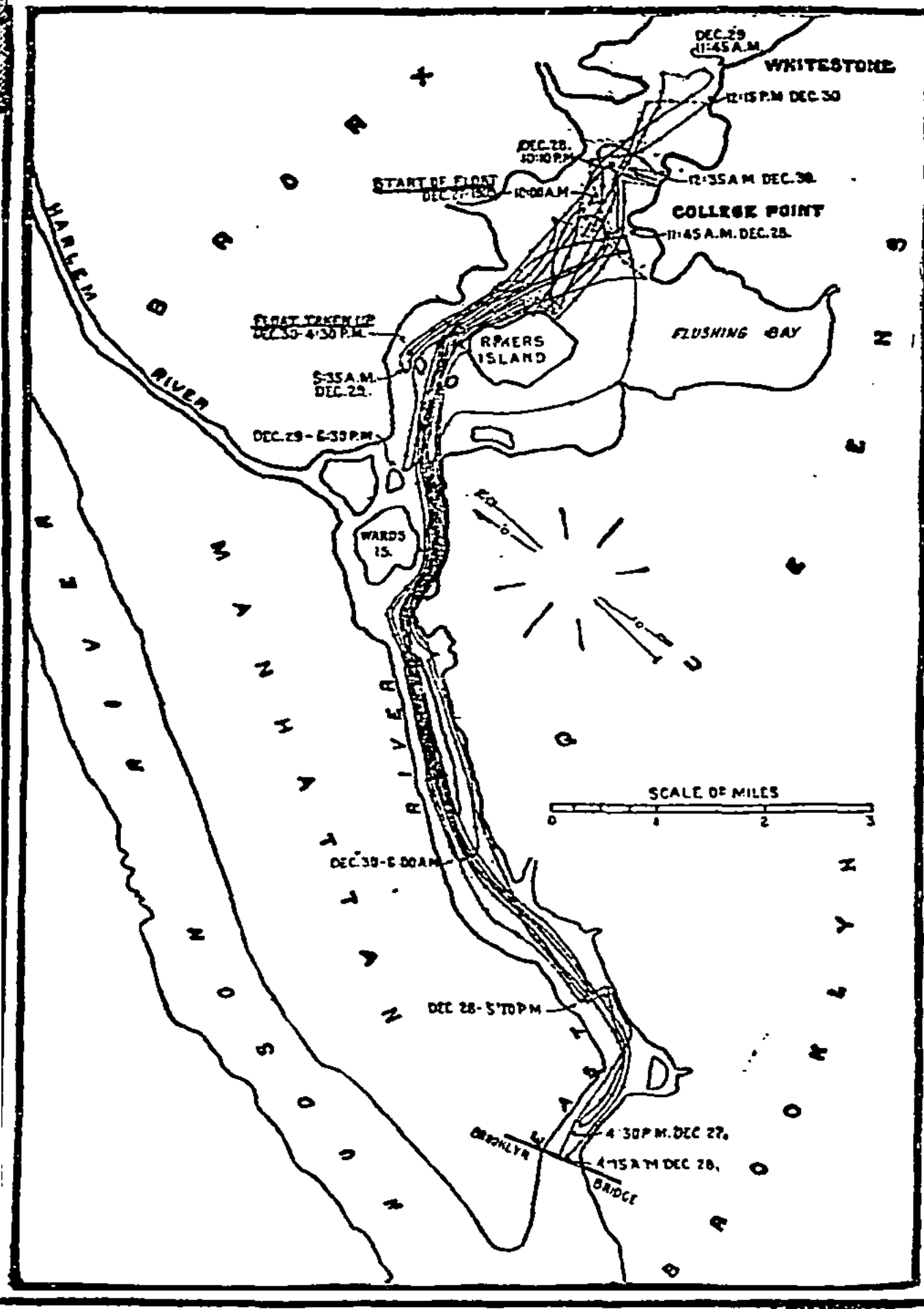
It is Dr. Soper's business to know all about sewer construction and also (though he is a doctor of philosophy, not of medicine) to know all about the diseases that come from bad drainage. Naturally, he has always felt the magnitude of the problem, but it came home to him with new force when the census returns were published and he found that the Commission's estimates for increase in population were under the mark. The city has grown even more rapidly than was expected and its sewage problem is growing, not indeed at the same rate, but very much faster. We are pretty near the limit now of what a large part of the harbor can do for us and we will pass that limit before long.

"Engineers come in here," said Dr. Soper as he sat in his office and looked over Battery Park toward the muddy waters it is his business to help purify. "men who have had experience with great cities, and we tell them the amount of waste that is dumped into the harbor—700,000,000 gallons a day. They repeat the figures and they look blank for a minute or two. It is difficult even for men accustomed to great works to grasp what such an amount means."

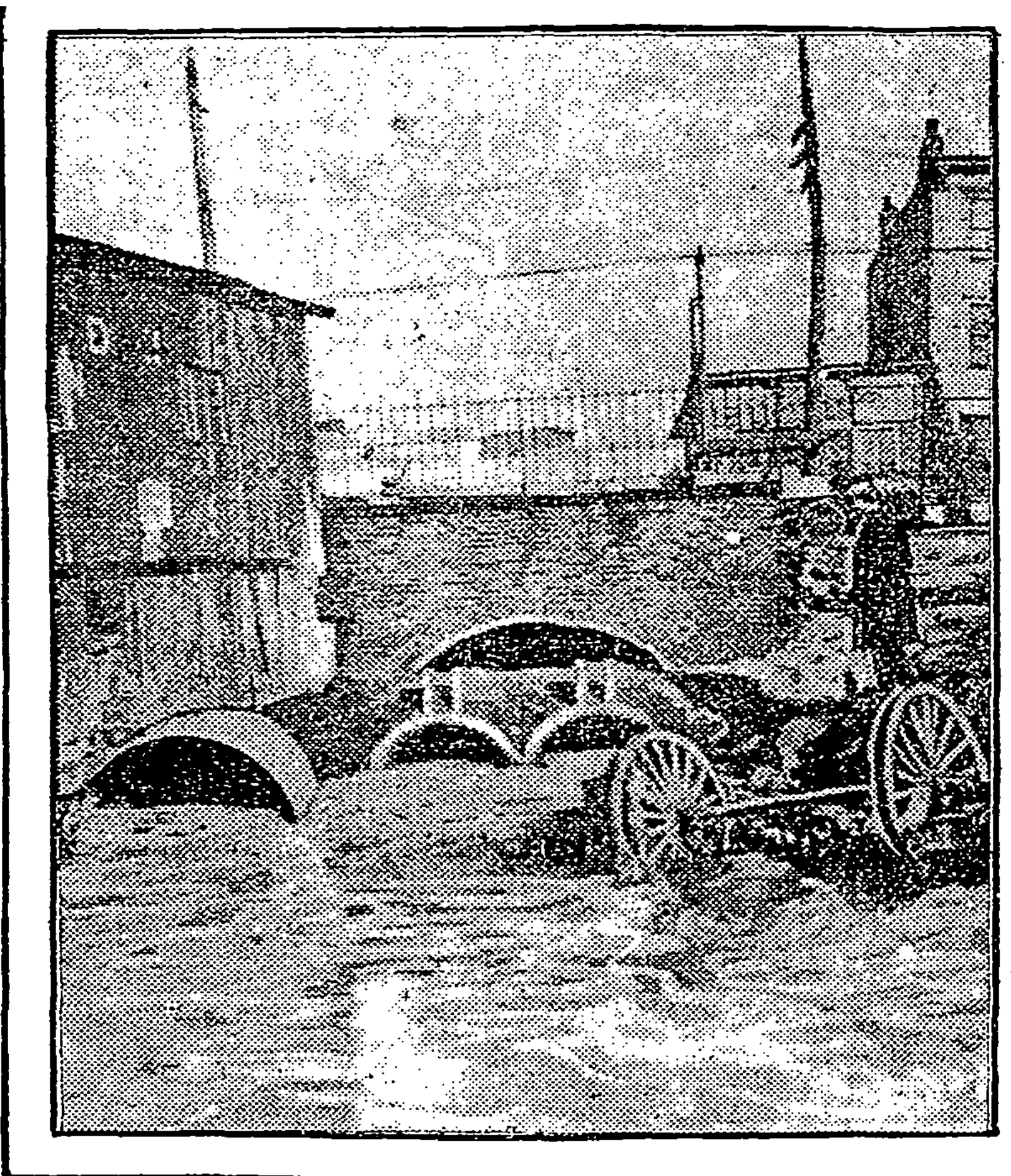
The population of the metropolitan district is equal to the combined populations of Chicago, Philadelphia, St. Louis, Boston, Baltimore, and Columbus. We had carefully gone over the various estimates made by competent persons for the increase in population since 1905, but when the figures came out we found that the highest estimates were not too much.

The population will certainly be doubled by 1940. Then the quantity of sewage will be close on to 1,500,000,000 gallons per day. If the quantity of tide water is insufficient to-day, what will it be in 1940?

The metropolitan district includes about 700 square miles of territory. The methods of sewage disposal are still very crude over practically all this area. In New York City the sewers empty at the pier heads, and at high-tide the waste is actually driven back into the sewers. The conditions brought about by this state of affairs at Gowanus Canal were so bad that a pumping station had to be erected



Path of a Float in the East River.



Example of a Sewer Outlet in Jersey City.

to force the sewage out. Where conditions are less evil than at Gowanus they are still pretty bad.

"Among great cities New York is certainly behind in the matter of sewage disposal. And mind you," put in Dr. Soper earnestly, "I don't believe in being too hard on the city. I am rather of the Mayor's point of view. The city has a great many unkind and unnecessary things said about it. When I criticize conditions in New York I want to add emphatically that no city in the world has so complicated a problem and that at last the authorities are thoroughly alive to the necessity of action. It is necessary to face conditions in order to remedy them."

"The extent of the pollution of the harbor can readily be seen by anybody. One

does not have to resort to chemical analysis to prove it. All along the water front there are films of floating grease that come from the discharge of the sewers. Sludge forms on the bottom and on the piers, and its decomposition gives the water the appearance of effervescence. Conditions like this are to be found beside recreation piers, surrounding floating bathing establishments, in front of hospitals. They are always disagreeable and may be injurious.

"All along the water front drift wood is collected for fuel by the poor. At the Battery, at the foot of East Fifty-first Street, at West Eighty-third Street, it is common to see women and children piling up the wood to take home. And this wood, which is coated with the impurities of the harbor, goes into the



Gathering Driftwood for Fuel at the Battery. Driftwood, Sometimes Coated with Grease and Other Material from Sewages, Is Taken Into Many Home Daily.

homes of those who are poorly able to resist disease.

"There are 175 miles of coast about New York—I do not include Coney Island—which are not safe for bathing purposes, to say nothing of the floating bathing establishments. It is impossible to bathe without getting some water into the mouth or nose or eyes, and this water may well be laden with germs. It is known that typhoid germs live for a long time—several weeks—in sea water. The weaker germs die at once, but there are plenty of the stronger ones left.

Besides the danger of bathing in the harbor waters we must not forget that the oyster industry of this State is an important one. It is believed that no oysters are taken in the dirty waters of the bay, but here is a photograph of a boat taking oysters off Robbin's Reef, only four miles below the Battery. Along Jamaica Bay, too, oysters are taken, and those are in places of polluted waters. The oysters taken in polluted waters are put in clean waters to purify them, but there is no proof that this process is effective.

"Now, if you turn to the reports of deaths from typhoid fever in great cities you will find that New York does not make a very good showing." And Dr. Soper took down a big black book, which sets forth matter of this kind. He turned to a page and pointed to the death rate from typhoid, which read this way for the years 1901-1905:

Berlin, 5.0 per 100,000 population.
Paris, 12.0 per 100,000 population.
London, 14.3 per 100,000 population.
New York, 17.8 per 100,000 population.

The figures for the entire death rate still put New York at the bottom of the list, but not so far behind. Typhoid is more prevalent than it should be in New York. Dr. Soper pointed out that typhoid fever has now become a rarity in many European cities in which it was once as prevalent as it now is in New York. A case of typhoid in Munich is actually looked on as a curiosity.

"I am not going to trace as direct a connection between harbor pollution and sickness as you might expect," continued Dr. Soper. "It is impossible to avoid the conclusion that bathing in the polluted water, collecting driftwood from it and eating shellfish taken from it do give a certain amount of disease. The germs carried by the polluted waters must take sickness to many susceptible persons."

But there is no statistical evidence to prove this.

"There have been many attempts to trace a close connection between disease and bad water conditions in great harbors. It has not been possible to make out a clear case. Still, that is no argument against further pollution. More than two thousand, or half the cases of typhoid in New York every year come from 'unknown causes.' Filthy water is always capable of giving disease, and even though we cannot directly trace a connection between harbor conditions and these unidentified causes of typhoid there is no reason to deny that such a connection may exist.

"The sewerage system of New York is based on the idea that the tides will carry out to sea the refuse that is dumped into the harbor. Sea water has of course a great power of assimilation and the plan was not a bad one when the population of the city was less, but the rise and fall of the tide in our harbor is not great. The average is 4.4 feet. At London Bridge, for instance, the rise is 17 feet, yet London does not rely on the tide to carry away its sewage. Even at Sandy Hook the average range of rise is but 4.7. So the tide is not working very hard in our favor.

"Though the quantity of water in the harbor is enormous, that does not imply a great capacity to assimilate sewage. The tide in New York Bay, for the most part, merely shifts the water about, but it does not thoroughly change it. What is more, the movement of the river and tidal water does not proceed in a regular and reliable manner.

"To secure perfectly accurate figures on this question, the commission conducted a series of experiments with floats. We made them so that they would be affected only by the tide and not at all by the wind. These experiments were carried on during three years and spread over several months each year. The floats were put overboard, followed by a launch and their movements carefully noted.

"Dr. Soper took up a series of prints on which were traced zig-zag lines resembling more than anything else the erratic movements of an undecided crab. There were many of the prints and not one of them bore a straight line, as if the float had made up its mind not to go any way in particular. "You see," continued Dr. Soper, "the movements of the floats. Not very definite, are they? Here is one in the Harlem River. The average velocity of the current there is one mile per hour. You see this float never got well out of the Harlem River. It was launched at half past eight o'clock and traveled slowly up to Washington Bridge.

"Then, at nearly eleven o'clock, it changed and went down to the end of Randall's Island. By the time it had there the tide turned and the float drifted quietly back into the river. The sewage that was contained in the water of course did not fare very much better than the

float. No wonder that the Harlem River is little more than an open sewer. The action of the tide never cleans it out.

"You see there are any number of these float experiments. In one case after three days and a half a float that had been launched about three miles north of the junction of the Harlem River and the Sound was picked up within a mile of its starting place.

"During that time it had traveled 108 miles and had got as far down as Brooklyn Bridge, but it and the sewage it represented never got to sea and came back home again.

"This was the most complicated wandering of our floats, but nearly all of them showed the same tendency to go back and forth. We followed this one a little longer than most or we should probably have equalled its record many times. In most cases the sewage that flows into the two rivers at the upper part of Manhattan drifts down to the Battery or a little below, then turns and goes back again.

"Now as to the possible remedies for such a situation. We have to guide us by the experience of many cities, using various methods. In Berlin an area of 35 square miles is owned by the city and is given over to the reception of waste, where it is utilized so far as possible in fertilizing farm lands. The city of Paris, too, forces its sewage away from the city and makes similar use of it.

"London pumps its sewage far down the Thames and after it is partly purified the tide takes it out to sea. The Thames around London is practically free from sewage now. Glasgow, Dublin, Belfast, Hamburg and other cities have similar works either completed or in course of construction. Marseilles, for so many years a synonym for dirt, has installed splendid sewer works and has pierced a mountain to make a great tunnel for its sewage.

"In this country there are also excellent works of this sort. Boston has a magnificent system, pumping its sewage well out to sea before it is discharged. Philadelphia is making plans for works and Baltimore has begun a system that could not be improved upon. New York is behind the great sea-ports of this country.

"But here we come to the crux of the matter. New York itself is immensely big and so peculiarly shaped and the Metropolitan district as a whole is so enormous that methods which can be used elsewhere would cost here vastly more money.

"To collect the sewage to some central spot and purify it as is done in Berlin and Paris would be prohibitive in cost. Manhattan is surrounded by water and 83 per cent of its surface is built upon. Land in the vicinity on which works would be located is very dear and to maintain such works would be a severe drain on the taxpayer. This is also true for some other municipalities in the Metropolitan district. On the other hand, it

would be possible to do this in some portions of the Bronx, Brooklyn, Queens and Richmond.

"To pump all the sewage out to sea would entail an enormous cost, owing to the formation of the harbor and the location of the thickly crowded sections. The city is under heavy expense for other improvements and to recommend the immediate undertaking of such a colossal work would certainly frighten the taxpayers.

"Something, however, must be done. If it is a question of health and decency money must be found. The Commission feels, however, that relief may be obtained without bringing on the city immediately the enormous expense of works that could be devised now and should be built later when the city is in a position to undertake them on a sufficiently large scale. The present situation calls for action, but, I think, just now, for conservative action.

"The water of the harbor must be used to some extent for the assimilation of sewage, although, you understand, it would be possible, at enormous cost, to keep it all out. But the water will stand a certain amount of partly purified sewage without harm.

"The point, therefore, is to reduce the amount of sewage flowing into the harbor so that the water will be less contaminated than at present, not to abolish it immediately, forever.

"There should be established and is being designed a system of main drainage, including such outfall works and purification plants as are required. The work would take many years for completion, but the commission has recommended it and at the request of the city authorities will remain in existence three years longer to make the engineering designs and estimates.

"The point especially to be emphasized is this: The manner of sewage disposal in the various parts of the metropolitan district must be adapted to the locality under consideration. As I said, there are about one hundred cities and towns to be considered. The remedies will be different in different cases. Some will use purification plants. Some cannot. It will be necessary to devise special means for different localities."

"How about New Jersey? Will it be possible to regulate the disposal of the sewage there, also? And if not, how can the harbor be kept clean?"

"The ideal way," said Dr. Soper, "would be to have an inter-State commission, but this may not be immediately feasible. New Jersey was invited to cooperate with New York in this investigation, but declined. You will remember Passaic valley project was begun, and there threatened to be the addition of millions of gallons of sewage in the harbor every day. The protest made against that scheme was not heeded and an injunction would be possible, even if there is not an inter-State commission. The question is too vital for the municipal authorities not to be keenly alive to it and anxious to do what they can. But even if New Jersey had nothing to do with the reform, that would not interfere with the necessity for action on the part of New York."

"In New York originate the chief sources of pollution. When New York shall announce its intention to remedy present evils and prevent future ones by disposal than we have at present there will be no difficulty in seeing effective co-operation. If not official, at least friendly and neighborly."

"We must have co-operation, too, right here in the City of New York, and this is the second point that must be emphasized. So far the different departments of this municipality have not co-operated effectively in disposing of their waste. Again, they have hardly been to blame. This is such a young community and it has been growing so fast that it would be little short of miraculous if the city's life were all well co-ordinated. At present even Brooklyn sewage is discharged without reference to Manhattan and vice versa.

"As one little instance of lack of co-operation—street sweepers push much debris into the sewers. It costs much more to remove such deposits from the catch basins and the sewers than it would to remove them, in a dry condition, from the street surface. Then, again, the Public Service Commission should submit plans in advance to the Bureau of Sewers when the moving of sewers is concerned and the Bureau should have the money to pay for the prompt consideration of these plans. Many improvements could be made in this way at one cost for the work of tearing up the streets and taking up the sewers. We feel that much can be done at a reasonable expense to relieve present conditions. We feel that no work of a revolutionary character should be undertaken until the city is able to build not only for the present generation but for those to come. Such works are indispensable and to be constructed with due regard to the requirements of public health and welfare and to the rules of economy. They must be built in accordance with a carefully prepared system made out far in advance."

Dr. Soper stopped and smiled.

"These are just a few elementary ideas, you know. And I have touched only the question of sewage. There is garbage, too, you know, which is a most fascinating subject. But perhaps we had better not enter into that or we might never emerge. I do hope and believe, though," he added earnestly, "that the public is beginning to appreciate the importance of these matters and perhaps does not find them as dull as they were once thought to be."