RT OF
APPEALS
HERMEN
CITY
WATER
D.
EALS)

it was in the reservoir, and you answered on cross-examination that the purity depended wholly upon the amount of pollution there was in the stream; how do you square those two answers?

A. I said that it depended wholly on the process of sedimentation, with the process of allowing the water to rest, to settle, and then you put other question not in relation to it, and I said that certainly the amount of pollution would have something to do with the amount of sedimentation that would be required as long as it was kept still, the better it would settle.

Q. Does it depend wholly on the time it is kept still, or does it depend partly on the amount of pollution in the water?

A. The chief dependence is on the time the water is kept still—the pollution makes some difference.

Q. Which does it keep still longest in, a big reservoir or a little reservoir?

A. I should judge a large reservoir would be better.

Q. Why does water keep still longer in a large reservoir than in a small reservoir?

A. Because it has a longer time before it is drawn off.

Q. That is the only reason?

A. That is the only reason.

Q. You spoke, on your direct examination, of your own case of typhoid fever, when you were 15 or 16 years old, in the City of Newark; that was from a well, I understood you to say?

A. Yes, sir.

Q. How did the matter get in the well?

A. No doubt through the same method of entrance from the closets.

Q. Well on your own house, wasn't it?

A. Yes, sir.

Q. Hadn't been anybody sick with typhoid fever in your own house, had there?

A. There had been in that neighborhood, and they all used this privy vault; it was a large vault.

Q. How near was the privy vault to this well?

A. It wasn't more than ten feet.

Q. How deep was the well?

A. The well must have been thirty feet in depth.

Q. Well, doctor, the water in the well, for some reason or other seems to prolong the life of these typhoid bacilli longer than water in streams, does it not?

A. I don't know that it does.

Q. The old causes of typhoid fever from water was mostly from wells, wasn't it?

A. Yes, sir.

Q. The wells would have to be closed up and no length of time would seem to cure the danger from drinking typhoid water from a well after it once got impregnated fully with typhoid germs?

A. There is always that danger from the same source.

Q. Isn't that the source of typhoid—when you first trace typhoid fever to the well, that that well is not used again for drinking water?

A. It is usually not used, because the sourse is always sure to be polluted again with typhoid.

Q. Well, you never use a well after it has once been traced to be the cause of typhoid fever?

A. No, sir; we close them up.

Q. No length of time will apparently cure them, then?

A. Never would feel safe with them.

REDIRECT EXAMINATION:

Q. You said, doctor, that you did not consider any river water running through a populated district safe without some artificial treatment?

A. Yes, sir.

Q. Do you include sedimentation as one of those artificial treatments?

A. Yes, sir.

Q. That is all.

Sworn to before me, (the signature being waived) this 27th day of March, A. D. 1907, at Jersey City, N. J.

Adjourned until Thursday, March 28, 1907, at the same time and place.

IN CHANCERY OF NEW JERSEY.

Between

THE MAYOR AND ALDERMEN OF JERSEY CITY,

Complainants,

and

THE JERSEY CITY WATER SUPPLY COMPANY,

Defendants.

Taking of depositions in the above stated matter, before the subscriber, a Master in Chancery of New Jersey, pursuant to the adjournment last had, at the hour of ten o'clock in the forenoon of Thursday, March 28, 1907, at the office of Messrs. Collins & Corbin, 243 Washington street, Jersey City, N. J., in the presence of Mr. James B. Vredenburgh and Mr. George L. Record, counsel for the complainants, and Mr. William H. Corbin and Mr. William D. Edwards, counsel for the defendants.

Said examination being taken in shorthand, question and answer in full, and the signature of the witnesses to their depositions waived.

DAVID D. CHANDLER recalled.

DIRECT EXAMINATION by Mr. Corbin:

Q. On the 3rd of May, 1906, did you make a visitation to Dover?
A. Yes, sir.
Q. Did you visit the buildings known as the Schwartz Block, and the surroundings there?
A. I did.
Q. What did you find there, and what did you do?
A. We made an inspection of the premises thoroughly on that day, walking all around either side of it.
Q. Make any test?
A. Not that day.
Q. Did you notice the cesspools?
A. In the course of construction; yes, sir.
Q. Where ?
A. In the rear of the building.
Q. Did you go to the police station that day?
A. Yes, sir; the interior and exterior, all around it.
Q. What did you find?
A. Inside of it I found there a building I suppose 8 x 10, with two cells, cemented floors, pail in there, two bunks, and a little groove, indentation or drain running outside of it.
Q. Any connection with the river?
A. No connection with the river.
Q. Any water closet or any such arrangement?
A. No, sir, there were two pails there for that purpose, I presume.
Q. Was there any pollution reaching the river from the jail at the time you examined it?
A. No, sir.
Q. Did you visit Herman D. Moler's saloon?
A. We did.

Q. What did you find the arrangements there for his bar, ice box, etc.?

A. I saw there was a drain, mason drain, covered drain, leading from Moler's to across the alley, across the street or alley, and that carried off the bar waste from the ice box and the pressure pump waste from the saloon.

Q. Carried where?

A. Carried through this drain to the out-let which was right near the police station.

Q. Went into the river?

A. Not into the river; no, sir.

Q. Was there any fecal matter or sewage connected with that drain?

A. To all appearance there was; my attention was called to it and it looked like it to me, looked like fecal matter, and the only way of determining it was to go down and I put some of that in the palm of my hand and in that way detected it was not; it was a fungus growth.

Q. It looked at first sight that it was fecal matter?

A. I would certainly have sworn it was.

Q. But it wasn't in fact?

A. No, sir.

Q. Did you find any evidence of any connection of water closets with that?

A. No, sir.

Q. Was there any sewage matter coming out of that?

A. No, sir.

Q. Where did you find this fungus growth?

A. Right at the mouth of the drain.

Q. In the river?

A. No, on the bank.

Q. These places you have mentioned are near the Second Street bridge?

A. Yes, sir; all near Second Street bridge.

Q. Did you inspect privy vaults between Bergen and Union streets?

A. Yes, sir.

Q. How many?

A. Eleven in all.

Q. What condition did you find them in?

A. All fairly good.

Q. What kind of vaults are they?

A. They are open vaults, laid up loosely, not tight, all of them, some of them are.

Q. In the earth, vaults in the earth?

A. In the earth, yes.

Q. Between Union street and White bridge?

A. There were 27.

Q. Did you examine those?

A. Yes, sir.

Q. What condition did you find them in?

A. About the same.

Q. And from White bridge to Salem street how many?

A. 27.

Q. Weren't there more; look at your notes again?

A. Oh, yes, five. I examined those; same condition.

Q. Between Salem street and the railroad track did you find any?

A. There were two privy vaults there about 200 feet south of the track; they were in good condition.

Q. Did you examine all that there were between those limits I have mentioned?

A. Yes, sir.

Q. Found any that appeared to be contaminating the river?

A. No, sir.

Q. Did you examine the residences along the Rockaway river?

A. Yes, sir.

Q. Did you go to the gas works?

A. Yes, sir.

Q. What did you find there?

A. Well, we found the evidences of the residue of the gas—the gas tar in the stream, a little of it, brook running behind it.

Q. Was it polluting the river?

A. No, sir,—well—

Q. There were evidences of gas tar?

A. Yes, sir; coloring.

Q. What was it from?

A. Waste from the manufacturing.

Q. Was there any fecal matter or sewage emptying into t?

A. No, sir.

Q. Was the gas tar you have spoken of being discharged into the river?

A. No, sir; it wasn't.

Q. Where did it go?

A. It seemed to be in the earth; the ground saturated around it, no connection with the works then at all.

Q. Do you know whether it had formerly been discharging into the river?

A. I was informed that they had formerly discharged into the river.

Q. Where was it discharging at the time you saw it?

A. In the rear.

Q. Could that reach the river?

A. No, sir.

Q. Did you see what their arrangements for water closets were at that place?

A. Yes, sir; an old privy vault in the yard; unpainted house standing there.

Q. Any way of that getting to the river?

A. No, sir.

Q. Did you examine Jenkins' place on Hoey street?

A. Yes, sir.

Q. Where is its out-let and where is its source, if you found out?

A. Well, the Jenkins pipe had been cut off.

Q. Where-

A. In the cellar.

Q. What is Jenkins' pipe, Jenkins' house?

A. Yes, that is the man's name, I presume.

Q. Where had it been emptying?

A. It had been emptying into the stream I had been told.

Q. What provisions had been made when you were there?

A. Cesspool been built and the pipe cut off; the evidences of the pipe were in the cellar.

Q. Did you trace Ford's brook from its mouth, where it empties into the river up the stream?

A. Yes, sir.

Q. Just describe what you found and where it went and so on?

A. We traced it from the head of the pond all the way down crossing the railroad, where it crosses under the railroad, and followed it distinctly all the way down until it gets to the river, and could find nothing there that was in any way polluting the river.

Q. Was there any vault, sewers or water closets discharging into that?

A. No, sir.

Q. Was there anything to contaminate the water?

A. No, sir.

Q. Did you examine Ford's pond and its surroundings?

A. Yes, sir.

Q. What have you to say as to that?

A. On the west banks of the river they had then taken precautions; a little manure lying on the banks.

Q. Stable manure?

A. Yes, sir, lying on the banks—not on the banks but upon the—thirty feet from it and the residents there had dug a trench and banked up, raised quite an embankment of earth there to prevent any of it from—waste, washing any, in case of rain.

Q. Was it sufficient arrangement to prevent it?

A. Yes, sir.

Mr. VREDENBURGH: I object to the answer of the witness, because he evidently is swearing to what he don't know about the residents doing.

By Mr. VREDENBURGH:—

Q. Did you see any residents put up that bank?

A. No, sir.

By Mr. CORBIN:—

Q. Had it been done before you went there?

A. Yes, sir.

By Mr. VREDENBURGH:—

Q. Why do you swear the residents did it?

A. I presume the owners did it.

Mr. VREDENBURGH: I object to the witness giving as a fact his mere presumption.

FURTHER DIRECT:—

Q. Were any of the privies around that pond polluting the water of the pond?

A. No, sir.

Q. How were they taken care of?

A. They were far enough away to prevent their polluting the ponds.

Q. What kind of privies were there?

A. Laid up loose in the ground.

Q. Vaults in the earth?

A. Yes, sir.

Q. On May 4, 1906, did you make inspections in the water shed?

A. Yes, sir.

Q. Did you visit the Singleton mill?

A. Yes, sir.

Q. Where is that?

A. That is above Dover, on the left hand side going towards Wharton,—

Q. That is a silk mill?

A. Yes, sir.

Q. What arrangements did you find there for privies?

A. Closet, tight sides, sufficient from the river and in very fine condition.

Q. Any pollution of the stream there?

A. No, sir.

Q. Did you notice whether there were any closets inside the mill?

A. At that time I don't think we went in; not on that date.

Q. You visited it later, I suppose?

A. Yes, sir.

Q. Did you go to Hibernia?

A. Yes, sir.

Q. Did you inspect the stables and vaults, etc., in Hibernia?

A. Yes, sir; I saw some of the vaults and stables; yes, sir.

Q. What did you find there?

A. I found that there were some vaults that might not be just right at that time.

Q. What kind of vaults are they in Hibernia?

A. Privy vaults in the earth.

Q. Like the others you have mentioned, loose stone?

A. All the same; yes, sir.

Q. Can you specify which ones you saw?

A. Well, there was one opposite the hotel, that on my previous visit to that had been removed, abated.

Q. You mean on a later visit?

A. On a later visit; yes, sir.

Q. What was the trouble with that one opposite the hotel?

A. I don't know that there was any positive trouble with it, but we thought it was just as well to get it back, and there was room enough to place it back.

Q. It was near the stream?

A. Not so near it, but they had a chance to move it further back and they ordered it moved, and on my visit later it had been removed.

Q. Was there any other there you criticized?

A. Yes, there were two others, but inasmuch as there are no Broadways or Fifth avenues up there, it is pretty hard to find about where they were.

Q. On your subsequent visit what had been done to this, if anything?

A. Had been also rectified.

Q. What is the condition of Hibernia then, as you last saw it, after these rectifications had been made?

A. Very good; very good.

Q. Was the superintendent of the mines there at the time you were there?

A. Yes, sir.

Q. Was he with you when you made your inspection?

A. Yes, sir.

Q. Did you point out to him what was needed?

A. Yes, sir.

Q. How did he receive it?

A. Very kindly; said he was perfectly willing to do anything—

Mr. VREDENBURGH: I object to what he said.

Q. You may answer.

A. That anything that was suggested by our men or the party who were there; he didn't know who they were.

Mr. VREDENBURGH: I object to the answer as hearsay.

Q. Did you visit the Bleaching & Dyeing Works at Rockaway on May 4th?

A. Yes, sir.

Q. What did you find there?

A. We found everything there in pretty good condition—good condition. There was a race-way there where they were running off their mill waste material, and there was a pipe there with sulphate of aluminum in it for the purpose of precipitating and breaking up the coloring, or absorbing the coloring, and then this race-way, as you might call it, there were five or six stone dams, and as this matter flowed through each one the color became less and less, and after following about a quarter of a mile in the meadows it entirely disappeared.

Q. Did you look at the arrangement for water closets at this bleaching works?

A. We didn't go inside.

Q. You were looking at the mill wastes, then?

A. Yes, sir.

Q. Did you examine the cesspools?

A. Saw where they were, yes, sir; there were two cesspools situated there.

Q. What kind of cesspools?

A. We didn't go into them.

Q. You didn't open them?

A. No, sir, couldn't open them; we went on the other side of the brook, and there was no evidence on any part of that brook that there was any pollution in it at all.

Q. Any drainage in it?

A. Absolutely none.

Q. Did you go to Camp Tabor?

A. Yes, sir.

Q. What did you find there as to the arrangements for disposal of sewage?

Q. There were cesspools there we were told by the superintendent,—

Mr. VREDENBURGH: I object to what he was told.

A. —we were told by the superintendent, and went down to the manure pile.

Q. Where was that?

A. That was at the foot of the hill, 200 or 300 feet from any of the residences.

Q. Where, as to the barn?

A. Right close to the barn, in the rear of the barn, and there the sewer had thrown up a lot of dirt to prevent any possibility of any of the washings from the manure that might have been.

Q. This manure pile that you speak of, I understand you to say that is where the waste was thrown?

A. We saw no evidences of it being thrown there, but that is where they said it was thrown.

Mr. VREDENBURGH: Did you give the date of that?

Mr. CORBIN: Yes, May 4, 1906, we are talking about.

Q. Suppose the waste were thrown there could it find its way into the stream or pollute it in any way?
A. No, sir.

Q. Why not?
A. It is too far away.

Q. Did you find any evidence of pollution reaching the river or any menace of pollution at Camp Tabor?
A. No, sir.

Q. Did you go to the factory at Powerville with Dr. Herold?
A. We drove by it that day.

Q. Could you get in?
A. No, sir.

Q. Did you drive down the Rockaway river from Dover to Powerville?
A. Yes, sir.

Q. What inspections did you make near the houses?
A. Wherever there was any habitation we went and made inspections.

Q. Did you find any evidence of pollution at any of them?
A. No, sir.

Q. What was their arrangement for water closets and for privies?
A. Privies in the yard, in the ground.

Q. At Boonton did you inspect the Incline Plane and the canal above it?
A. Yes, sir.

Q. What did you find there?
A. Nothing but the waste running from the street—pipes in the street, waste from the street, waste paper.

Q. Did you examine the flap-gates that were placed at the foot of the Plane?
A. Yes, sir.

Q. What were the conditions there at the flap-gates?

A. At that time they were not working just exactly as they should.

Q. What was the trouble?

A. Well, they seemed to have shrunk or expanded or something; they didn't work properly, but on two previous visits to them they had been corrected.

Q. Do you mean previous visits or subsequent?

A. I mean two subsequent visits.

Q. As you observed them, would any water from the lower level reach the flume which leads down to the reservoir?

A. On that day they might, but on two subsequent visits I think it would be utterly impossible to, the greater flow of water coming the other way, from the feeder.

Q. Did you examine the reservoir at Boonton?

A. Yes, sir.

Q. What portions of it?

A. We just drove around that and saw what a grand large body of water it was.

Q. Did you see any evidence of any pollution getting into that at any point?

A. No, sir.

Q. Now on May 5th, 1906, did you visit the water shed?

A. Yes, sir.

Q. What points did you go to?

A. Port Oram and Wharton.

Q. What did you inspect at Port Oram and Wharton?

A. Everything that could possibly pollute the river, and saw nothing there.

Q. Did you find any drains going into the river?

A. No, sir.

Q. What provision was made for the water closets?

A. Same provision, in the ground.

Q. And thence where did you go?

A. Made a trip through the entire Birkshire Valley, Longwood Valley, following the river up to its source about two miles this side of a town called Edison.

Q. What inspection did you make?

A. There wasn't much to make there; it was all uninhabited; we could see from the roads.

Q. There were no houses to examine there?

A. No, sir.

Q. Lake Denmark?

A. Foot of Green Pond, that was about the same condition; there was nothing there to inspect.

Q. Did you make a trip to the water shed on May 6, 1906?

A. I made a trip on that day to the highest point in Dover to get a better idea of the river as it runs through it; a good view of Dover.

Q. And May 7th, did you make any tests in Dover on May 7th?

A. Yes, sir; made tests of the building known as the Schwartz block.

Q. What test did you make?

A. 9:30 a. m. water closet on second floor.

Q. Who made the test and what was done?

A. Mr. Gibson had the coloring and placed the coloring in the closet bowl.

Q. In your presence?

A. In my presence in every instance, I taking the time and seeing that it was properly flushed; there was enough water put in this bowl to flush it.

Q. Who were at the out-lets watching near the river?

A. Doctor Leal and Doctor Herold.

Q. What was the result of the test made at the Schwartz block?

A. 9:30—I find that that wasn't our part.

Q. You didn't take part in that?

A. No sir; we reported to them the date we placed it in.

Q. What was the coloring matter used?

A. At that time we were using blue.

Q. What kind of blue?

A. Just ultra-marine blue.

Q. Any other tests that day?

A. Yes, sir, Mansion House.

Q. What did you do there?

A. Laundry tubs on first floor, sink in kitchen, water closet in bath room No. 17 on second floor, water closet in bath room No. 35 on top floor, at 10:05 a. m.

Q. Put color in every water closet in the house?

A. Every fixture, yes, sir.

Q. Did you report it to Dr. Herold and Dr. Leal who were watching?

A. Yes, sir.

Q. Did you make a later test in the rear of the Mansion House?

A. Yes, we had forgotten two closets in the rear of the barn of the Mansion House and returned at 10:35 to test those, which we did.

Q. Did you report those tests to Dr. Herold?

A. Yes, sir.

Q. Did you make a test in the house of Henry Misel, 8 Blackwell street?

A. Yes, sir; 10:35 water closet and wash basin in store.

Q. In each of these cases in which you testified to having made tests, did you immediately report the tests to Dr. Herold and Leal?

A. I had the book which I put the time in, and reported to them as soon as possible, and they put it down.

Q. You and Mr. Gibson in each case put the coloring matter into the closets?

A. Yes, sir.

Q. You paid no attention to the watching, whether they came out or not?

A. No, once in a while I happened to be there, but that was not my part at all.

Q. Mr. Havens, 8 Blackwell street, what did you do there?

A. There was a privy vault in the yard, second floor, no other fixtures in house. Test was not made. Apartment locked. Tenant ill at Morristown for one year.

Q. Apartments unoccupied?

A. Apartment locked.

Q. 10 Blackwell street?

A. We were refused admittance there by Mr. Livingston, no test.

Q. 12 Blackwell street?

A. Slop sink in rear of clothing store of Newton Ely, 10:40 a. m., made test.

Q. 16 Blackwell street?

A. 10:45, water closet on ground floor, sink on second floor, water closet and bath on top floor.

Q. Tested them all?

A. Yes, sir.

Q. 14 Blackwell street?

A. 10:50 a. m., known as Woodhull's store, Mrs. Mitchell tenant on second floor. Water closet on ground floor, sink on second floor, water closet on third floor.

Q. Was any evidence found at that house?

A. Yes, finding evidence of our test in the river pipe, foot of Morris street at 11 a. m., and having tested all these houses, we proceeded the same afternoon to test each house individually, allowing a certain time for the appearance of the test in the river. Previous to that we had put them in just as fast as we could get along to do it.

Q. Your first test in the morning you put them in altogether, so that any one of them might have given the color?

A. Yes.

Q. When you got the color you went back to test them separately?

A. Yes, sir.

Q. That will come in later then?

A. Yes, sir.

Q. The church, corner of Blackwell street and Mercer street?

A. Yes, sir.

Mr. VREDENBURGH: That has been removed, and the Court ordered no testimony taken on that.

Q. That privy has since been removed?

A. Yes, sir.

Q. 27 East Blackwell street, the post office building?

A. 12:34 p. m., tested water closet in the rear of shoe store of Malloney & Ryan.

Q. 16 East Blackwell street?

A. 2:15 p. m., water closet on top floor, and water closet in store, first floor.

Q. 14 East Blackwell street?

A. 2:55 p. m., water closet on top floor, and water closet on first floor to 2:55 to 3:00 p. m.

Q. 16 East Blackwell street?

A. 3:59 p. m., and again at 5:10 p. m., with anaaline red.

Q. You used a different color the second time, did you?

A. Yes, sir.

Q. Now on May 8th did you make tests at Dover?

A. Yes, sir; at 9:15 we made test at Dr. Hunter's water closet on second floor.

Q. What street?

A. Blackwell street.

Q. Did you find some evidence there?

A. Yes, sir; immediately after I took a sample of the water from cesspool in a bottle and it showed positive evidence of the blueing test, within two or three minutes.

Q. That is, you found it in the cesspool?

A. Yes, sir.

Q. Didn't get into the river?

A. No, sir.

Q. That is, immediately after you had flushed the closet with it in his house, by opening the cesspool you found the blueing in the cesspool?

A. Yes, sir; as soon as we got downstairs, less than two minutes.

Q. Moller's saloon?

A. 10:30 a. m., Moller's saloon, corner Dickinson & Morris streets, water closet and wash basin on first floor, water closet front, rear and east end apartment on second floor, water closet front, rear and east end apartment on third floor.

Q. Any other test?

A. Not there.

Q. Well, go ahead.

A. 11:15 a. m., Herman D. Moller's saloon, 16 North Sussex street, water closet and wash basin on first floor; slop sink in kitchen on second floor disconnected. On top floor, known as Opera House, water closet on stage not in use. Water and soil pipes cut off. Water closet in passage to dressing room not in use. Water and soil pipe cut off. After waiting the time allowed for the appearance of the blueing in the river, we then applied a test to the bar waste sink, which takes in the drip from the ice box and pressure pump. The blueing made its appearance immediately in the masoned drain or sluiceway in the river, showing conclusively that no other fixture in this building were connected to this drain.

Q. Did you examine Misel's saloon again, 6 Blackwell street?

A. At 2:45 p. m., Henry Misel, 6 Blackwell street, water closet and wash basin on first floor; no other fixtures in the house.

Q. You tested it?

A. Yes, sir.

Q. 8 Blackwell street?

A. M. C. Havens, sink on second floor; no other fixtures in house; privy vault in yard; sink not tested; apartment locked; tenant ill in Morristown one year.

Q. Newton Ely?

A. 3:50 p. m., Newton Ely, tenant, 12 Blackwell street; sink on second floor tested; there was a sink on the third floor, tenant was out, and apartment locked, although undoubtedly on the same line of pipe.

Q. Doctor Hunter's?

A. 4:45 p. m., Dr. Hunter's. Placed blueing in gutter of tin roof extension, pouring five pails of water through a window near the water closet.

Q. Where did the color appear after you put it in?

A. I discovered afterwards it appeared in the river.

Q. On May 9th did you visit Dover?

A. Yes, sir.

Q. 10 Blackwell street, did you make an inspection there?

A. Yes, sir, at 12:10 p. m., we got permission from the owner to enter the building.

Q. That is Livingston brothers?

A. Yes, sir; wash basin on first floor disconnected; slop sink on second floor, wash basin on third floor. I have made a note here, appeared in river 12:17.

Q. 14 Blackwell street?

A. 14 and 16 Blackwell street, supposed to be connected to cesspool in the rear.

Q. The first one, 4:20 p. m.?

A. Water closet on top floor.

Q. Tested?

A. Yes, sir.

Q. 14 and 16 Blackwell street?

A. Supposed to be connected to cesspool in the rear; having cleansed the cesspool to the bottom we were enabled to go inside of it; we flushed the water closets at 14 six to eight times and positively no evidence of their being connected to the cesspool appeared, but there was evidence of the sink waste coming in.

Q. Into the cesspool?

A. Yes, sir.

Q. What did you do with the water closet at 16?

A. Also flushed the water closet from No. 16 and all the fixtures in the house, and there was evidence of their going direct to the cesspool.

Q. They didn't go to the cesspool, where did they go?

A. No evidence of their going direct to the cesspool.

Q. That is No. 16?

A. That is No. 16.

Q. There was evidence?

A. Oh, yes,there was evidence of their going direct to the cesspool.

Q. You mean you found your color in the cesspool?

A. Yes, sir; that is right.

Q. And 14, how is that?

A. 14 there wasn't.

Q. Did you examine the Lindsley house on Morris street?

A. Yes, sir, made test of the house on Morris street, blueing appeared in the cesspool at once.

Q. Is that the same cesspool?

A. Same cesspool in the rear of 14 and 16 East Blackwell.

Q. Did you examine the Richard abattoir?

A. Yes, sir.

Q. On the stream?

A. Yes, sir.

Q. What did you find?

A. Found the interior of the abattoir in clean condition.

Q. How did you find the exterior?

A. Same; we followed the stream below the points, and saw the drain that had been made there to carry the waste, whatever there might be from the slaughter house further away from the stream.

Q. Did the pollution reach the stream?

A. No, sir; artificial drain didn't reach it.

Q. On May 19, 1906, did you visit Dover?

A. Yes, sir.

Q. What test did you make?

A. 14 Blackwell street, 8:25 a. m. tested water closet in store, first floor.

Q. Did you on that day visit Ford's pond?

A. Yes, sir; made inspection of Ford's pond, saw excavation for three new vaults at the northern end of the pond.

Q. That is for the residents there?

A. For the residents, yes.

Q. Find any evidence of pollution of any sewage reaching the lake?

A. No, sir.

Q. What did you find there on that day as to the manure being taken care of?

A. That was in good condition, the manure had been taken care of.

Q. Did you visit the Lyondale Print Works and Mt. Tabor again that day?

A. Yes, sir.

Q. Did you find any changes in the condition?

A. No, sir; no changes needed there; they were in the same condition; they were good.

Q. Did you go to the rag mill again on May 19th?

A. Yes, sir.

Q. Could you get in?

A. No, sir; Doctor Leal tried to get in but Mr. McCormick, the foreman placed his arm on his shoulder and said he must not inspect the premises.

Q. Did you examine the upper and lower levels at the Incline Plane at Boonton that day?

A. Yes sir.

Q. What did you find conditions there then?

A. Conditions were good.

Q. That trouble you had noticed before of the gates at the foot of the Plane how was that?

A. That had been rectified at that time; they were working properly.

Q. Did you go to Pelgram & Meyers silk mill?

A. Yes sir.

Q. What there?

A. We made an inspection of that and saw the two cesspools that were there to carry the waste, and made inspection of the bank right close to the stream and found no evidences whatsoever of anything running into it.

Q. Is there any pollution reaching the river from the mill, in your opinion?

A. No, sir.

Q. On May 26th did you go to Port Oram?

A. Yes, sir.

Q. What did you inspect there?

A. Silk mills at Port Oram, taken through the factory there by Mr. Mockridge, superintendent; water closet nailed up, not in use; it was nailed up.

Q. What were the arrangements there for privies?

A. Had two systems there; one had been directed to an old hole in the ground, a deep mine some five or six hundred feet and they hadn't at that time put both systems in I was told and this had been closed up.

Q. What had been closed up?

A. Closets in that building had been closed up nailed up, were not in use at the same time.

Q. Where did they formerly lead to when they were in use, if you know?

A. I don't.

Q. What were they using when you were there?

A. The other system that was directed to this mine hole but across the stream.

Q. Was there anything there to pollute the stream?

A. No, sir.

Q. You say that the discharge from that factory then goes into this abandoned mine?

A. Yes, sir.

Q. Could that get into the river in any way?

A. No, sir; I was told it was seven or eight hundred feet deep; I guess it was; Mr. Gibson came very near falling into it. We dropped a stone in it and couldn't hear it splash.

Q. Well, the water didn't come anywhere near the surface?

A. Nowheres near it.

Q. How far from the surface would you judge?

A. I should say five or six hundred feet, the depth of that mine hole.

Q. Did you visit Richardson & Boynton's stove works at Dover?

A. Was shown all through that by Mr. Lynd, the manager, and made inspection, and in our presence saw a ten-inch pipe sealed up with concrete and cement.

Q. Where was that pipe and what was it?

A. That was a pipe at the foot of their closets there, supposed to drain off, carry off the waste matter.

Q. Near where the wagon stood for taking the waste?

A. Yes, sir.

Q. You saw that at a later day?

A. Yes, sir; later on saw it again; I saw it sealed up.

Q. When you were there May 26th, it was sealed up with cement in your presence?

A. Right in my presence, yes, sir.

Q. Did you visit the Swiss Knitting Company?

A. 10:20 a. m., tested water closet on top floor of main building. Water closet on first floor also on same line.

Q. Were all these tests you have made, made in the same manner in which you have described?

A. Yes, sir, and with the same party. At 10:30 a. m., water closet in rear of building, top floor, on another line. 10:45 a. m., vent pipe of cesspool.

Q. Did you visit Samson's slaughter house?

A. Yes, sir.

Q. What did you find there?

A. Nothing; everything in good condition there; no possible source of pollution from that place, in my opinion.

Q. Did you test 301 Richards avenue?

A. At 12 o'clock tested sink in kitchen. Saw waste pipe in cellar cut off that formerly carried waste from kitchen sink to Hoey brook.

Q. What arrangement had they for privies?

A. Cesspool; that was the waste.

Q. 20 Hoey street?

A. 12:15 sink in kitchen; no other fixtures in house; privy vault at least 25 feet from brook built upon good solid earth.

Q. Made test?

A. Yes, sir, of the sink in kitchen.

Q. 16 Hoey street?

A. 12:18 p. m. Same condition as above.

Q. Same condition as No. 20 was in your memorandum?

A. Yes, sir.

Q. Any pollution from either of those houses?

A. No, sir.

Q. 12 Hoey street?

A. 12 Hoey street, 12:20 p. m. Sink in kitchen; no other fixtures in house.

Q. You mean at 12:20 you made a test?

A. Yes sir.

Q. Just put it that way, made a test 12:20.

A. Oh, all right.

Q. 321 Blackwell street?

A. Made test at 12:50 p. m.; sink in kitchen; no other fixtures in the house.

Q. That is the corner of Hoey street?

A. Yes, sir.

Q. 180 Richards avenue, John DeHart, owner?

A. At that time we could not gain admission; saw a little drain laid up of loose stone, leading to stream back of Belmont avenue, and entered the Berry stream; no test made.

Q. 158 Richards avenue?

A. Made test 1.25 P. M. sink in kitchen; no other fixtures in house.

Q. Did you go again to 180 Richards avenue?

A. Yes, sir; 1:45.

Q. Did you make test?

A. Made test 1:45. The occupants having returned, and made a test of sink in kitchen at 1:45 P. M. Then entered cellar and made a thorough inspection of the drain spoken of before, which from the outside apparently had every indication of the sink waste running into it, but the test showed plainly that it did not. Was informed by the wife of the tenant that the inspection made by the Jersey City inspectors positively was from the outside, as they had not gained admittance to the house.

Mr. VREDENBURGH: Objected to as hearsay.

Q. 87 West Blackwell street, in front of Viaduct?

A. Made a test 3:10 P. M.

Q. David Gless, Viaduct place?

A. Waste from wooden trough in hard to canal.

Q. Did you make a test?

A. No test made there, the evidence was that that was not just what it ought to have been.

Q. You visited it later, did you?

A. Later on that had been rectified.

Q. 187 Blackwell street,—West Blackwell street did you go there again?

A. Yes, made a test at 3:50 P. M., sink in kitchen, water closet, bath and wash basin on second floor, tested water closet.

Q. 29 and 31 Myrtle avenue and Union street, double houses.

A. No one at home at 31; tested water closet sink and basin on second floor.

Q. What time?

A. Tested water closet at No. 29 at 5:55 P. M.

Q. Did you observe anything else there?

A. Yes, saw indications—there was a large heap of dirt in front of the house, and indications that they were building a cesspool to take care of the waste of both houses.

Q. On October 29, 1906, did you visit Wharton?

A. Yes, sir.

Q. What test, if any, did you make there?

A. 9 A. M. Tested sink on first floor, Mill No. 3.

Q. That is the raw silk mill?

A. Yes, sir. 9:05 water closet second floor, Mill No. 1. 9:10 A. M. water closet first floor Mill No. 1. 9:15 A. M. sink on first floor, Mill No. 1.

Q. Were these the privies which had been nailed up when you were there the previous occasion?

A. Yes, sir.

Q. You did not observe the result of the test at the other end?

A. No, sir.

Q. Did you that day inspect Richardson & Boynton's stove works at Wharton?

A. Yes, sir.

Q. State what you did?

A. We went all around the premises and I personally went through about one thousand feet of the drain or conduit.

Q. Where does that drain empty, and where does it come from?

A. It starts from the middle of the factory and goes under one whole factory for about one thousand feet, I should judge, and empties into the ground apparently at the end.

Q. You went through it, you say?

A. Yes, sir; I went through it.

Q. The effluent of it, where is it?

A. Goes out on the open.

Q. On the ground, into the water, or what?

A. Into the ground and disappears.

Q. Did you take a lantern with you?

A. Yes, sir.

Q. Did you examine when you went through to see whether there was any connection with that drain?

A. Yes, sir.

Q. What did you find?

A. Found one pipe that seemed to be pure spring water, and another one that came from the washing basin.

Q. Where did these pipes join this big drain that you went through?

A. Came right through the wall.

Q. Can you tell me what part the upper end or lower end?

A. About the center of it.

Q. Was there any sewage coming into it?

A. You see it is pretty hard when you are going through the pipes to know where you are; we came outside and tried to locate ourselves after, we were going under the buildings of the factory.

Q. Any sewage going into it?

A. No, sir.

Q. Any pipe coming into it anywhere near this place where the wagon and privy arrangement formerly was on the surface?

A. There was evidence of sealing up a pipe there, about six or nine inches in diameter perhaps.

Q. Had formerly been there?

A. There was evidence of something having been plastered there.

Q. Was there any connection there at the time you went through?

A. No, sir.

Q. Any sewage coming in from anywhere?

A. No, sir.

Q. You spoke of one pipe bringing in water that seemed to be spring water, what was coming in at the other pipe?

A. It was clean water, but it wasn't quite as clear a color as the other, but in going through the factory we were told that the waste from the sink where they were washing their hands in the moulding part of the factory, that is the water from the washing of their hands.

Q. You spoke of a pipe that you saw sealed up near the wagon under the water closet, sealed up on the previous interview?

A. Yes, sir; on that side of the pipe.

Q. Would it have been possible for that pipe to get into this drain?

A. In my opinion it could not.

Q. Why not?

A. It was below it.

Q. You say the pipe which you saw sealed up is below the big drain, is that it?

A. The indication of the pipe, yes; in my opinion, where they said that was supposed to come from it was very much lower than this drain, where this sealing was.

Q. I show you Exhibit D 7, being a map of this Richardson & Boynton works, and I see a drain indicated here as new concrete drain, is that the drain through which you went?

A. Yes, sir.

Q. Which end of it did you enter?

A. We entered the center and went either end.

(Witness indicates a man-hole to the north of the foundry building nearest man-hole to the corner of the building, outside thereof).

Q. What part of the territory did you go through from that man-hole?

A. This end entirely.

Q. Went from the man-holes northwardly?

A. Yes.

Q. How far,—to the end of the drain?

A. Yes, sir.

Q. Away up here?

A. Oh no—well, that is a thousand feet.

Q. From this you entered—you went northwardly to the end of the drain?

A. Yes, sir.

Q. Where did you come out?

A. We walked down to within about twenty feet of this one.

Q. Well, that don't mean anything on the record. Then walked back to the drain?

A. As far as this.

Q. As far as the south-easterly man-hole in the foundry building, is that it?

A. Yes, sir.

Q. Then you went through the entire drain except a short part of it next to the building, is that it?

A. About 20 feet of the mouth.

Q. I see on this map indicated a building marked water closet and then a red line running from it, what does that red line indicate, is that the location where the pipe was that you saw cut off by cement?

A. That would be about it I should judge, yes that would be about it.

Q. When you went through this drain was there any water in it?

A. Yes, sir, about six inches of water.

Q. Running?

A. Running.

Q. What kind of water, what condition?

A. Good condition, there was no odor to it; there was no odor in the drain at all.

Q. Where did it appear to be coming into that drain?

A. Well, it gradually faded away at the end when these pipes were feeding it.

Q. The two pipes you have mentioned?

A. The two pipes were feeding it, but I cannot say any positive direct connection to it.

Q. You mean it disappeared in the bottom as you went down toward the mouth?

A. It was deeper as you got toward the mouth.

Q. When you mean faded away toward the end you mean toward the end there was hardly anything?

A. Yes, and as you got toward the outlet it got deeper and deeper.

Q. Was any water coming into that drain except the two pipes?

A. I saw only the two pipes.

Q. What was the bottom of the drain made of?

A. Concrete, it was hard.

Q. Concrete over your head too?

A. Yes, sir.

Q. How big a drain?

A. I should say four and a half feet to five feet, I had to just bend my head a little to get through it, probably four and a half feet.

Q. Did you examine the electric light plant in Essex street, Dover, that day?

A. Yes, sir.

Q. What did you do there?

A. Tested water closet in the first floor and sink, made test 10:25.

Q. No. 9 Essex street?

A. 11:35 made test, sink in the kitchen.

Q. Did you watch for the results?

A. In that case I did watch, and after watching 45 minutes no appearance of coloring appeared in the river; that is one of the cases that I watched.

Q. Did you go to Hibernia that day again?

A. Yes, sir.

Q. What did you observe?

A. That was the day I noticed these vaults had been removed, and new ones substituted a further distance from the house.

Q. Were they in proper shape when you saw them?

A. Yes, sir.

Q. Did you visit Richards Abattoir in Dover that day?

A. Yes, sir; same condition, existed as my previous visit, good condition.

Q. Did you go to Wharton on October 30, 1906?

A. Yes, sir.

Q. What did you inspect that day?

A. The double house on Canal street, made test of sink in kitchen at 9:20 and at 9:30 made test of double vault in yard.

Q. Did you visit the Singleton silk mills that day?

A. Yes, sir; and made a thorough inspection of those premises, and the conditions were all good.

Q. Any pollution from those mills reaching the river?

A. No, sir.

Q. David Gless, Viaduct place?

A. They had constructed a cesspool in the yard to take the place of the trough that was formerly used there, and it was taking proper care of the waste from the house.

Q. Was it the proper construction of cesspool?

A. Yes, sir.

Q. 75 West Blackwell street, laundry?

A. Made inspection of the laundry.

Q. What have you to say to that?

A. Everything in there was in fine condition.

Q. 79 West Blackwell street?

A. Mr. Pierson, owner. Made test at 10:35 A. M. of water closet, basin and bath, second floor. Test at 10:40 A. M. sink in kitchen.

Q. 85 West Blackwell street, Mr. Pierson, owner?

A. Made test 10:45 A. M. sink in kitchen. 10:50 A. M. tested water closet, basin and bath second floor.

Q. No. 87 West Blackwell street, Mr. Pierson, owner?

A. Tested sink in kitchen at 10:55 A. M.

Q. 89 West Blackwell street, Mr. Pierson, owner?

A. 11:02 A. M. sink in kitchen. Made test 11:05 water closet, basin and bath, second floor.

Q. 83 West Blackwell street, Mr. Pierson, owner?

A. Tested sink in kitchen 11:45 A. M. 11:50 A. M. tested water closet, basin and bath in second floor.

Q. No. 81 West Blackwell street?

A. 11:55 A. M. tested sink in kitchen. 11:58 A. M. water closet, basin and bath in second floor.

Q. No. 32 East Blackwell street, E. J. Jenkins, owner.

A. Tested sink in kitchen 2:30 P. M.

Q. 158 Richards avenue?

A. Tested sink in kitchen, 2:55 P. M.

Q. No. 12 Myrtle avenue?

A. Made test of sink in kitchen at 3:40 water closet, basin and bath second floor at 3:33 P. M.

Q. No. 10 Myrtle avenue?

A. Made test in kitchen at 3:40 P. M. 3:43 P. M. water closet, basin and bath, second floor.

Q. No. 14 Myrtle avenue?

A. Tested sink in kitchen 3:47. Water closet, basin and bath, second floor at 3:50.

Q. 72 Richards avenue?

A. Sink in kitchen tested 4 P. M. 4:03 P. M. water closet and bath, second floor.

Q. 57 Passaic street?

A. Tested sink in kitchen 4:55 P. M.

Q. 59 Passaic street?

A. Tested sink in kitchen, 5 P. M.

Q. Did you visit Dover on October 31, 1906?

A. Yes, sir.

Q. What test, if any, did you make at 68 Richards avenue?

A. Sink in kitchen, water closet, bath in second floor, tested at 9:05 A. M.

Q. 70 Richards avenue?

A. 9:10 A. M. tested sink in kitchen, water closet and bath, second floor.

Q. 34 Bergen street?

A. Water closet, basin and bath in second floor, sink in kitchen tested at 10 A. M.

Q. 36 Bergen street?

A. 10:05 A. M. tested sink in kitchen, water closet, basin and bath, second floor.

Q. 158 Richards avenue?

A. 10:25 A. M. tested sink in kitchen.

Q. 46 McDavitt place?

A. 10:30 A. M. Tested sink in kitchen. Contents of sink run to an open drain in the yard; positively no way for it to reach the river or its streams.

By Mr. VREDENBURGH:

Q. You are reading from this paper?

A. Yes, sir—that is my recollection of it at the time I put it down.

FURTHER DIRECT:

Q. 20 Lincoln avenue, Newton Ely, owner.

A. 11:45 A. M. tested sink in kitchen. 11:50 A. M. tested three privies in yard.

Q. No. 75 West Blackwell street, laundry?

A. Took temperature of the first suds wash wheel 155.

Q. That is fahrenheit?

A. Yes, sir. Last wash wheel 175 fahrenheit. But in making this test we had to open the wheels, and thereby cooling them very quickly; when we first put the thermometer in this wheel you could hardly hold your hands on it, but the wheel hadn't been open for ten seconds perhaps before it was cooled off so quickly that you could see that it was —in my opinion it wasn't a fair test.

Q. The water was hotter?

A. Yes, sir; it would have been very much higher if we kept it in there.

Q. Did you visit the Swiss Knitting Mills?

A. Yes, sir; made test of water closet and sink in south end of building on second floor at 2:35 P. M. Water closet and sink in north end of building on second floor. Water closet and sink in north end of building, first floor. Water closet and sink in south end first floor. Last fixture tested at 2:50 P. M.

Q. 10 East Blackwell street, Livingston brothers?

A. 4 P. M. sink in store and first floor cut off. Pail under the same for catching water. 5 P. M. tested sink on second floor.

Q. Did you observe whether there was any appearance of color in the river?

A. No appearance of color in the water 5:33; also took sample of the water coming out of the conduit at that time.

Q. Did you visit Dover on December 14, 1906?

A. Yes, sir.

Q. Electric light plant, did you make a test there?
A. Yes. sir.
Q. What time?
A. Made a test of water closet in sink at 10:20.
Q. Where was the color placed?
A. Water closet, made test of water closet and sink.
Q. What other test there?
A. Well, we then placed some coloring in a little match box under the upper end of the culvert, and the coloring, came down in less than five minutes under the bridge.
Q. That is the last test?
A. Yes sir.
Q. Did you test the leader pipe of the Mansion House that day?
A. Yes, sir.
Q. Did you get the result?
A. Yes, we got a result in the river from testing the pipe.
Q. Where did you put that color?
A. There was a breakage in the pipe, and we just reached up and put it right in that little defective part of the broken pipe and poured water in it.
Q. That is the leader that comes down from the roof?
A. Yes, sir.
Q. And you got that in the river?
A. We got that in the river.
Q. Where were you when you reached up and put that in, what place or in what place?
A. Well, we first were standing on the ground.

Mr. VREDENBURGH: Who is we?

Q. Who was with you?
A. Doctor Leal and I.

Mr. VREDENBURGH: Well, who did it. We cannot pour water in a thing, one must do it.

WITNESS: He put the color in and I put the water in.

Q. Where were you standing when you did it?
A. On the ground.
Q. 270 East Blackwell street, Fred. Varley?
A. Wouldn't allow us to put color in the sink.
Q. What did you do there?
A. But we pumped a little while and got the water alone coming out in the rear in the yard in the rear of their house, we got the water from pumping, but she would not allow us to put color in.
Q. Pumping the water in the sink the water ran out on the surface?
A. Yes, sir.
Q. Did that go in the river at all?
A. No, sir.
Q. Did you make any further test in that place?
A. Yes 2:35 tested privy in the yard, by pouring eight pails of water in the same.
Q. 296 East Blackwell street, Mrs. Mary Morris?
A. Tested privy vault, 2:50.
Q. Go ahead?
A. The sink waste runs over the surface of the yard in that case.
Q. Any connection with the river—with the sink waste?
A. It might.
Q. How far from the river is it?
A. Forty feet I should think.
Q. That is the kitchen sink you refer to?
A. Yes, sir.
Q. 370 and 372 East Blackwell street, Jenkins owner?

A. Tested double privy vault by throwing six pails of water in same. Made the test at 3:05, before going there—we used red in this case—we went in the rear and discovered a great deal of green lying around very quietly all in the river, so we had to use red to make a test in that case.

Mr. VREDENBURGH: Where was that?

WITNESS: 370 and 372 East Blackwell street, Dover, seemed to be painted with green that day, couldn't go anywhere but where we found green.

Q. You mean before you put your samples in there was green in the river?
A. Yes, sir.
Q. 44 and 46 Samiss avenue, Peterson property?
A. Fifty feet driven well in cellar, over-flow running over same to yard. Waste from sink running to cesspool. Privy vault clean, does not drain into the brook.
Q. 48-50-52 Samis street,—Baker property?
A. The vaults were in good condition, and in my opinion could not reach brook only in case of very heavy rainfall.
Q. Is it near the river or near a brook?
A. Well, brook, but virtually reached the river.
Q. 63 and 65 Samis street?
A. The yards in rear in filty condition.
Q. Have any connection with the river?
A. In my opinion they don't, they don't have any connection with the river whatever.
Q. Where do the privy vaults drain?
A. Into a blind ditch, it seems to just fade away.
Q. Lee place?
A. Found two privy vaults there in very bad condition.

Q. Where do they drain into?

A. Blind ditch, and does not have any connection with the river, seems to fade away.

Q. Where is Lee place?

A. It is on the left hand side of the river, traveling toward Newark.

Q. At the City limits or outside of the City limits?

A. I should judge in the City limits, may not be, I don't know that.

Q. It is toward the edge of the Town?

A. Yes, sir.

Q. East of the gas works?

A. East of the gas works, yes.

Q. Now on December 15, 1906, did you make tests in Dover?

A. Yes, sir.

Q. The Barton property?

A. Made an inspection of the vault there. These conditions and location and the ground surrounding it, and in my opinion it would be utterly impossible for the contents of this vault, under any condition to reach the river or any of its tributaries.

Q. Out door vault there?

A. Yes, sir.

Q. This is the Barton house up on the south hill where there was said to be a case of typhoid fever?

A. Yes, sir.

Q. Why would it be impossible for the contents of the vault to go into the river there?

A. Too far away; the ground is so situated that even if you tried to flush that vault, under abnormal conditions I don't think it would be possible to get its contents in the river.

Q. 61-63 Second street?

A. Three vaults; all clean and in good condition; one might under abnormal conditions be slightly dangerous.

Q. Why dangerous?

A. Well, it was very close to the stream, it might overflow.

Q. Do you remember the name of it?

A. The property—the owner?

Q. Is it the Cooper property?

A. Well, I think it is, although I am not positive of that; I haven't the name down.

Q. If the vault was kept clean and in proper condition is there any danger from it?

A. No, sir.

Q. Why do you say there is one that under abnormal conditions might be slightly dangerous?

A. Well, that is closer than the rest and it wasn't as well cleaned as the other at that time; it was flushed out; more in it than the others, but by considerable watching—

Q. You mean if they should overflow there might be danger?

A. Yes, sir.

Q. 46 Byram avenue, George Parks, owner?

A. Tested sink in kitchen, stable in yard and privy vault in yard 8.10 to 8.15; took us about five minutes to test those three; we saw construction under way for new privy vault and cesspool at that time we were there.

Q. Byram avenue, Lawrence house?

A. Privy vault, 17 feet from stream; no possible source of pollution, in my opinion.

Q. Cabal street, Wharton,—Roe, owner?

A. I tested sink in kitchen at 9.05, and the next house at 9.15.

Q. Was there anything being constructed there?

A. Yes, there was a cesspool being constructed there; more of a well than cesspool, I should judge, about twenty feet deep, away below the bed of the canal.

Q. Do either of these houses drain into the canal?

A. Yes, sir.

Q. These sinks?

A. Well, I wasn't at that end; I merely tested the sinks.

Q. Did you observe the privies at those two houses?

A. Yes, sir.

Q. Any dangers to the water of the canal there?

A. I think not.

Q. In your visit to the water shed did you examine the privy vaults and residences along the river and its tributaries other than those that you have specifically mentioned?

A. Yes, sir.

Q. To what extent?

A. Why to some great extent, and they were all in good condition, and I had noticed several improvements on visits later.

Q. In those visits and in those investigations did you find anything that seemed to you to be menacing to the water supply?

A. No, sir.

Q. Did you visit the Cooper Lord Works at Boonton?

A. No, sir.

Q. Why not?

Mr. VREDENBURGH: I object to counsel going over that the second time.

A. Couldn't get in.

Q. Did you try to get in?

A. No, we were told we couldn't get in.

Q. Have you, in your experience as sanitary inspector, studied the question of typhoid fever death rate?

A. Yes, sir.

Q. Have you watched that?

A. Yes, sir; weekly, daily, monthly always.

Q. Are you familiar with the learning of the writers on that subject, and the significance of the typhoid fever death rate as indicating trouble in the water shed?

A. Yes, sir.

Q. In your opinion what rate of deaths per year per hundred thousand inhabitants would indicate trouble from infected water supply?

> Mr. VREDENBURGH: Objected to as immaterial, illegal and incompetent; this witness has not shown ability to answer any such question.

A. Thirty to thirty-five per hundred thousand.

Q. Did you observe the character of the water shed?

A. Yes, sir.

Q. Is there farming land there?

A. Yes, sir; a great deal of it.

Q. Are there cultivated fields?

A. Yes, sir.

Q. Well, now, of such pollution as does get into the Rockaway river above Boonton what, according to your observation, is the principal source?

A. Washing of the streets, roads, manure fields.

Q. Mr. Chandler, last fall, when there was some agitation in this case and in the public prints relative to alleged increase of typhoid fever in Jersey City, did you have an increased number of typhoid fever cases in Newark?

A. Yes, sir; large increase.

Q. How many cases did you have there?

A. I think we had about 125 cases in four weeks, about a month.

Q. How much was that above normal?

A. We ought not to have over thirty in that time;

I think it was 125.

Q. Did you make investigation to trace the source of that?

A. Yes, sir.

Q. Did you find it?

A. Yes, sir.

Q. What was it?

A. The investigation was made in this way, that every Board of Health have a form, and in every contagious—or particularly in typhoid, the source or milk, ice and everything is put on those cards, the milk supply particularly; now, in watching those reports as they come in, if we discover several from one milk supply or one milk man we immediately follow that up at once every day, and in this case we had eighty to eighty-five per cent. of all our cases coming from a large milk supply house.

Q. From the same milk supply?

A. Yes, sir; and the cases were all at one end of the city, where this supply was mostly delivered; this company has two sources of supply, they have a large place on 14th street, Newark, and a large place on Fourth avenue; all these cases seemed to be settled right in this one upper section of the city, and discovering where that milk came from, why we stopped its source at once; we didn't have to stop it, we made the request and the company themselves stopped it; now, those cases continued to come in; we then sent Dr. Herold and Mr. Pratt, our man for that purpose, to this section of the county where this milk was sent from, and there we found evidence enough to convince us.

Mr. VREDENBURGH: I object to this testimony; he is not telling his own testimony; he is telling something that Dr. Herold said he didn't do yesterday, and I object to the testimony of this witness as hearsay.

A. That is a written report on file in our office.

Mr. VREDENBURGH: Then the written report should be produced; I object to the witness telling the contents of a written paper which he does not produce.

Q. Do you know whether milk from the same source of supply was coming to Jersey City at that time?
A. I do.
Q. Was it?
A. It was.

Mr. VREDENBURGH:

Q. You swear to that, do you?
A. Yes, sir.
Q. You know that of your own knowledge that it came to Jersey City?
A. Oh, no.
Q. Well, that is what you swore to?
A. I heard it was coming.
Q. Well, you swore it was coming?
A. I didn't see it coming.
Q. Well, you swore so under oath?
A. Well, I was informed so.

FURTHER DIRECT:

Q. You didn't personally, Mr. Chandler, make these investigations up in the country where the milk came from?
A. No, sir.
Q. You are speaking of the result of reported investigations?
A. Speaking of the result of a report sent by our department official man that is on record.

Q. After you stopped having milk from that source what happened to your typhoid fever rate?

A. It diminished at once.

Q. Has it got back to normal?

A. Yes, in less than three weeks.

CROSS-EXAMINATION by Mr. Vredenburgh:

Q. You swore that the milk from this source in the country came to Jersey City; what milk had you reference to?

A. The milk supply that we were getting in Newark at that time.

Q. Well, where did it come from?

A. Oxford.

Q. Did you see it come from Oxford?

A. Our supply, you mean?

Q. Yes.

A. Yes, sir; and if we didn't see it we—

Q. You, I don't say we, I mean you?

A. I am speaking now of the department.

Q. I am asking you the question, what you saw, you are swearing, the department is not swearing?

A. I didn't see it.

Q. Did you see the milk at all ever?

A. No, sir.

Q. Did you see any milk coming on the railroad?

A. No, sir.

Q. Did you see any milk going to Jersey City?

A. No, sir.

Q. Did you ever come to Jersey City to see the milk?

A. No, sir.

Q. When you swore that the milk came to Jersey City what did you mean?

A. I meant—I was giving testimony as being informed by officials in Jersey City.

Q. What official informed you that the milk came from this place?

A. Mr. McLoughlin.

Q. Which McLoughlin, this Doctor McLoughlin that is a witness in this case?

A. Yes, sir.

Q. He is an official in Jersey City, is he?

A. I suppose he was at that time a member of the Board of Health.

Q. You swear he is?

A. I don't know; it is pretty hard to keep track of the Board of Health.

Q. What other official of Jersey City informed you that the milk came from Oxford to Jersey City?

A. No other official.

Q. What did Doctor McLoughlin say?

A. He investigated and found milk was coming from Oxford here.

Q. When did he tell you that?

A. It must have been November.

Q. What time in November?

A. Probably the middle of it, started I think on the 12th.

Q. Did he tell you who furnished the milk?

A. Yes.

Q. Who did he say furinshed the milk?

A. Bordon,—or Mr. B.—say.

Q. That is your basis for swearing that the milk came to Jersey City from Oxford, is it?

A. A little more than that.

Q. What else?

A. Mr. Smathers, superintendent of the milk house in Newark, and also Mr. McCormick head man of the concern in New York, through the 'phone, told me the milk was going there.

Q. When did Mr. McCormick, through the 'phone, tell you that milk from Oxford was going to Jersey City?

A. About that time, 15th, 16th or 17th.

Q. Of November?

A. Yes, sir.

Q. You called him up, did you?

A. Yes, sir.

Q. You asked him that question?

A. Yes, sir.

Q. What was it your business with regard to the milk in Jersey City?

A. Very great deal; if the milk was coming to Jersey City, it was my place to notify the Board of Health of Jersey City.

Q. Did you notify the Board?

A. I did.

Q. How?

A. By calling Mr. McLoughlin.

Q. This was the second conversation you had with Mr. McLoughlin?

A. First or second.

Q. Mr. Smathers told you too?

A. Yes, sir.

Q. What did he say to you?

A. That Jersey City had been getting milk from Oxford,—some of it.

Q. When did he tell you that?

A. About that time, about the middle of November I should think.

Q. How many cases in Newark resulted fatally out of the 125 that were sick that week?

A. The death rate was quite light, I don't know the death rate.

Q. What is the proportion of persons who are attacked with typhoid fever in which there is a fatal result?

A. About one out of five, six or seven; they differ.

Q. Has that ratio been constant for a number of year?

A. No, it differs.

Q. Has it been growing less or greater in the last five years?

A.It is liable to be that way any time.

Q. What is liable to be that way?

A. It is liable to five or six in this out-break and four, five or six in the next.

Q. You mean that ratio?

A. Yes, you cannot regulate it.

Q. Five or six out of how many, out of each hundred?

A. Yes.

Q. Five or six out of each hundred will die, is that it?

A. Yes, sir.

Q. Then if there be thirty to thirty-five per cent. out of a hundred thousand inhabitants die—I understand you to say 35 per cent. or 35 persons out of a hundred thousand?

A. In giving the rate?

Q. Yes.

A. I said from 30 to 35 per hundred thousand would indicate something wrong in the water.

Q. That is if 30 to 35 persons die annually you mean out of a hundred thousand people that would indicate that the water was wrong?

A. Yes, we would naturally look for something.

Q. How many would be the cases of typhoid fever represented by those 30 to 35 persons dying in a hundred thousand?

A. I haven't figured it out.

Q. Haven't you studied it, you said you had studied the subject?

A. That is their figuring, that is not studying.

Q. Have you studied the subject to know?

A. To know what?

Q. To know?

A. How many per hundred thousand would be?

Q. Yes.

A. Why no I haven't, I don't know.

Q. You did say a moment ago what proportion of persons would die if attacked with typhoid fever, didn't you?

A. Yes.

Q. What proportion did you say?

A. I said one out of every five, six or seven, that is what they consider, the authorities.

Q. That is what your reading has lead you to believe?

A. Information, lectures and papers that I have heard read on the subject.

Q. When you swore a moment ago you said five or six per cent.?

A. No, I didn't.

Q. Which do you mean?

A. I didn't say per cent. I didn't mention percentage at all, I said one out of every five or six or seven.

Q. Out of every hundred persons taken sick?

A. Yes.

Q. Not five or six per cent. out of each hundred?

A. No, sir.

Q. I understood you to say that this water from this laundry was tested by you with a thermometer?

A. Yes, sir.

Q. What was the water in that was tested, in what sort of vessel?

A. In a round tub.

Q. What size was the tub?

A. I should judge about two feet in diameter and probably 3 or 4 feet in length.

Q. How deep?

A. Well, I say in the length and the diameter, it is rolling on the machinery, tumbling all the time; it was running at the time we went there by machinery.

Q. What did you open?

A. The machinery was stopped and there is an opening in this, it is more like a barrel than a tub, it is barrel shaped, and there is a door where they put the clothes in, and they stopped the machinery and opened this little door, probably a foot square or more, and held the tub while I tried to hold the thermometer in it, which I couldn't do, and then I poked it under the clothing in water and left it there for a while and opened it again.

Q. How much did you say that the temperature of that water had fallen in ten seconds?

A. I didn't say anything about how much it had fallen. I said it wasn't a fair test, but I thought it had perhaps cooled off quickly.

Q. How much had it cooled off in ten seconds, how many degrees?

A. I said that this first test was 155 fahrenheit, and the second was 175—I didn't say anything about cooling off, I said the water had apparently cooled off more quickly.

Q. You said it had cooled off in ten seconds; now how many degrees do you think that water was cooled off in ten seconds?

A. I don't know, only in ten seconds or so I was able to keep my hand very much longer in the water to handle the thermometer.

Q. How much water was there?

A. I suppose it was half full; the barrel was about half full.

Q. You think in ten seconds that water cooled off so much that you were able to bear your hand in it?

A. When the door was open the steam burst out in volumes.

Q. I didn't ask you about steam?

A. I am only explaining why I think it cooled off; I think that is the reason it cooled off quickly.

Q. What day in the year was that?

A. I could turn to my notes and find it for you.

Q. Turn to your notes; that is on page 10 of your notes, is it?

A. It is page 12 of my notes; that was under date of October 31st.

Q. Those notes that you refer to are typewritten?

A. Yes, sir.

Q. Did you typewrite them?

A. I had them typewritten.

Q. Who did it?

A. Girl in my office.

Q. What became of them after you typewrote them?

A. I kept them in my safe.

Q. Didn't Dr. Leal see them?

A. I gave Dr. Leal a copy of them.

A. Immediately after, I guess.

Q. Was that the same paper that Dr. Herold read from yesterday?

A. I made three copies; I don't know whether it was or not.

Q. You saw him reading from it?

A. Yes, but I didn't know anything about the paper.

Q. You didn't know that it was a copy?

A. No, I did not.

Q. When did the typhoid fever commence in Newark, last fall?

A. I think it was November 5th, and ran until December 12th; I am not positive, but I think those are the dates.

Q. Commenced November 5th and ran to November 12th?

A. Yes, when we began to notice so many cases coming in from this one milk supply.

Q. Do you mean November 12th or December 12th?

A. No, November 5th; it covered about five weeks.

Q. Then that would make it December 12th.

A. Yes, didn't I say December?

Q. Was the first sickness on November 5th?

A. Well, probably had one or two—three or four coming from Borden's milk on that date, and probably the next day five, six, seven or eight or nine.

Q. Kept on increasing?

A. Yes, and we would expect a greater increase from Bordens, because they furnished a great deal of the milk, but not so great as was coming in.

Q. You said that there were eleven privy vaults examined by you on May 3rd, where were those privy vaults?

A. Between Bergen and Union streets.

Q. Well, mention the first one; where the first one was?

A. Well, we started from up and worked all the way down.

Q. Well, in what house was it; what number?

A. I haven't got the numbers down.

Q. Well, how near was it to the street, the first privy?

A. To the street, you mean?

Q. Yes.

A. I don't understand you; from the front of the house, or the rear of the house?

Q. Near the street; was it near the street in the front of the house; usually the street is in the front of the house?

A. Yes.

Q. Well, how far was it from the street?

A. I guess 100 feet; I should judge so.

Q. Was it the most northerly house in Bergen street or the most southerly house of these eleven?

A. Well, Bergen is the first steet, and that would be north; yes.

Q. And this particular privy was about 100 feet from Bergen street?

A. As I recollect it; yes.

Q. What kind of a house was it?

A. I cannot recall the house.

Q. Was it a brick house?

A. I cannot say.

Q. Did you go in that house?

A. No.

Q. Do you know who owned it?

A. No.

Q. Was it occupied?

A. I don't know that.

Q. This vault was what size?

A. Oh, I should say 3 x 4, maybe 4 feet square, maybe 5 feet square; I didn't pay so much attention to the size.

Q. What depth was it?

A. Cannot tell that exactly; generally ran from 6 to 8 feet.

Q. Well, this particular one I am talking about?

A. Cannot tell you.

Q. How much was in this particular one, the first one?

A. One-third full.

Q. Solid matter?

A. Yes.

Q. Liquid matter?

A. It was in sort of a dry state.

Q. It was in a dry state?

A. Yes.

Q. Had been used lately?

A. Yes, there were evidences that it had been used lately.

Q. How far was it from the river?
A. 30 feet.
Q. When you spoke of the river, did you refer to the bank of the river or the water?
A. I refer to the water, of course.
Q. How far is it from the bank of the river to the water, there?
A. I should say about 30 feet.
Q. About 30 feet?
A. The bank is very abrupt there.
Q. Then this privy was over the bank?
A. Oh, no.
Q. You said the privy was 30 feet from the river?
A. Yes.
Q. And you said the bank was 30 feet from the river?
A. Well, I didn't mean that at all.
Q. What did you mean?
A. The bank is very abrupt there, the walls are almost as straight as that (illustrating), and when I say it is 30 feet from the river I mean it is 30 feet from the river proper, from the water of the river.
Q. What is?
A. The privy.
Q. How far is the bank from the river proper?
A. The bank is right on the river.
Q. Of what construction was this privy?
A. Loose stone, as I recollect it.
Q. What size stone?
A. Different sizes.
Q. Well, give us the largest?
A. About the size they make stone fences in the country; all sizes, as they could gather them up.
Q. Round stone?
A. No.
Q. Square stone?
A. No, flat stone broken up.

Q. Do you know what the bottom was?
A. **No, sir.**
Q. Did you make any effort to find out?
A. No; from the structure of the vault it was evident that they were, of course, open at the bottom.
Q. Did you make any study of the currents under ground?
A. No, sir.
Q. Do you know whether that went down to under ground stream or not?
A. No, sir.
Q. If it did go down to under ground stream do you think it impossible that that could have gotten to the river?
A. I wouldn't like to say; I don't know.
Q. Did you hear Dr. Herold's testimony yesterday?
A. Yes.
Q. Do you remember the case he spoke of; that is, do you remember of your own knowledge the case he spoke of in which there was so much sikness from a well in Newark?
A. Yes.
Q. You heard him testify to that?
A. Yes, I heard him telling that.
Q. Did you remember that when he recalled it to your mind, did you remember that?
A. When it occurred?
Q. Yes.
A. I think he said it was many years ago, he was only 16 years old.
Q. That was when he was taken sick?
A. I think so.
Q. I am referring to the other case in which the water came from a sewer into a well, and a great many were made sick?
A. No, I don't recall it.

Q. Do you remember that case?

A. No, sir.

Q. Do you remember the location of it as he described it?

A. No, sir; I do not; I think that was some time ago, too.

Q. You think he said he was 15 years old then, do you?

A. Well, one of them may, and I think the other was some time back; a good many years back.

Q. Well, he described the street, don't you know the street?

A. Yes, the street is there yet.

Q. Don't you know the street?

A. Yes, but not familiar with it; I think he said it was Jackson street, but I couldn't be positive.

Q. Don't you know Jackson street?

A. Not very well.

Q. Don't know the sewer there?

A. No, I do not.

Q. Now, the second of these—do you know how many people used this first privy?

A. No, sir.

Q. Made no study of that at all?

A. No, sir.

Q. Did you make any test of it?

A. No, sir.

Q. Do you know whether there was any water supply in that house?

A. No.

Q. Do you know whether the water supply connected with the vault or not?

A. No.

Q. Do you know whether there were any privies in that house?

A. No, sir.

Q. Do you know anything about it at all?

A. Outside of the construction of the privy vaults; no, sir.

Q. About the privy vaults?

A. Only the vaults, nothing to do with the houses.

Q. How many seats were there?

A. I suppose there were two, probably three; I cannot swear to that.

Q. Did you look in to see?

A. Yes.

Q. And you think there were two or three?

A. Might be.

Q. I want to know how many there were?

A. I cannot tell.

Q. You don't know anything about it, do you?

A. No.

Q. You don't know a thing about it, you are guessing entirely about it?

A. I am not guessing about conditions and location of the vault.

Q. You are guessing about the number of seats?

A. Yes, I was; I don't know anything about it.

Q. Are you not also guessing about the size of the vault?

A. I didn't measure it; I said to you about three or perhaps four feet square.

Q. Can you tell us at all about its size, except as a mere surmise that most of the vaults that you saw was about that size; now, is not that all you know?

A. That is really the answer; yes, sir.

Q. Your answer with regard to this vault would be your answer with regard to every vault that you saw?

A. Yes, sir.

Q. Of course, it seems to me impossible that you could recollect each particular vault?

A. I could not; no, sir.

Q. Now, you told us about the jail, and you spoke of there being no outlet or connection with the river; is not the outlet of that jail below the bank of the river—between the bank of the river and the water?

A. No, sir.

Q. What?

A. No, sir.

Q. How far is it from the water, the outlet of that prison?

A. The pipe, you mean?

Q. Pipe, I mean?

A. Why, I should judge 3 or 4 feet higher.

Q. Higher?

A. Yes, sir.

Q. How far is it from the water?

A. 15 feet.

Q. Is it all stone from where that is to the water, showing that it is part of the river—within the banks of the river?

A. No, sir; there is ashes there, banks of it.

Q. Banks of ashes, you say?

A. Yes, sir.

Q. What pipe is that you refer to?

A. Well, that was the drainage at that time; on my first visit there was a little groove or drain cut into the concrete.

Q. The pipe I am talking about?

A. Well, that is the pipe.

Q. Well, there was a pipe from that groove through the building, and came from the outside?

A. I never saw it.

Q. You didn't look for it?

A. Yes.

Q. And didn't see it?

A. Didn't see it.

Q. How did it get through the side of the building?

A. Why, cut right through the concrete, I suppose.

Q. You suppose so?

A. Yes, sir.

Q. Did you look to see how the water got—

A. Yes, sir; made inspection of it thoroughly.

Q. Did the concrete run through the side of the building?

A. No.

Q. How did it go through the side of the building?

A. They could easily cut a drain through the concrete floor; a little opening in the side of the building, same as they cut the drain in the door; they cut it in the side of the building.

Q. Didn't you swear, Mr. Chandler, that there wasn't a pipe, when you first went there, that lead from that—

A. I don't think there was.

Q. That lead from that groove in the floor—cemented floor through the side of the building and stuck outside of that house about six inches?

A. I don't think there was.

Q. And that under that there was a collection of refuse from the building?

A. I could answer that; that wasn't so; I never saw that.

Q. Never saw that?

A. No, sir; that was ashes.

Q. Did you see human excrement there?

A. I certainly did not.

Q. When did you first see that?

A. I will have to refer to the notes for that.

Q. Yes.

A. I think that was the first day, May third; yes, that was the first day, May third.

Q. May third of what year?

A. 1906.

Q. Never had seen it before?

A. I had seen it before, but not to make any inspection of it; I seen it many, many times.

Q. What, had you been there many, many times before that?

A. I passed there going to Lake Hopatcong for two or three years.

Q. In what, driving?

A. Driving and walking over it.

Q. Do you go by that to go to Lake Hopatcong?

A. Yes, sir.

Q. From where were you going to where?

A. To Woodport.

Q. From where?

A. From Dover, and all guests were driven from Dover to Woodport, just to pass that place, and up over the hill.

Q. When were you there first before May 3, 1906?

A. I was there and passed through there the summer of 1903 and 1904.

Q. Did you examine the jail at that time?

A. No, I just say I saw it as I passed it; I never made any inspection of it.

Q. Could you tell whether there was any pipe in that then?

A. No, sir.

Q. How far is the jail from the river, do you say?

A. About 15 feet.

Q. You say that between the jail and the water is not the bank of the river?

A. No.

Q. Where is the bank of the river there?

A. Further over.

Q. Nearer the water?

A. Yes, nearer the water.

Q. How is it shown?

A. There isn't much of a bank there; it is very low bank; very slight.

Q. How high would you say the bank was?

A. Probably a foot and a half or two feet.

Q. And there is a sudden drop of a foot and a half between this jail and the water is there?

A. Yes.

Q. About how far is that from the jail?

A. That is about ten feet, and it is about 15 feet altogether—drops into this earth of ashes that I saw there.

Q. The floor of the jail is so graded that everything runs to the center of this groove?

A. No, I guess it wouldn't, without being flushed.

Q. You think not.

A. I think you would have to flush it.

Q. Did you examine that and measure it in any way?

A. No, but by looking at it I guess they would have to flush it to get it all out.

Q. Isn't there a grade from each side of the prison to the center where the groove you speak of is?

A. Very slight grade.

Q. There is a grade there?

A. It ought to be built that way, but it didn't look so to me; if you wanted to really cleanse it I guess you would have to flush it.

Q. You spoke of going to the top of a high hill at Dover, what hill was that?

A. That is on the left of Dover, as we are facing now; I went up there one Sunday morning to get a good view of the place.

Q. How high was that hill above the water?

A. I should think that is fifty feet; I should think the hill is fifty feet high up there.

Q. How far is it from the water to the top of the hill?

A. From the river—any given place, you mean?

Q. No, to this particular place.

A. I cannot tell.

Q. The top of this hill?

A. Less than a quarter of a mile, I should judge.

Q. When you got there was Dover between you and the river?

A. The river was in front of us.

Q. Was Dover between you?

A. No, Dover is the other side of the river; we were in Dover all the time, but I mean to say—we will take the Mansion House as the center of Dover, and that was the other side of the river from where I stood.

Q. Was there a hill on the same side of the river as the Mansion House?

A. I wasn't on that side.

Q. Couldn't you see; you said you looked over?

A. Yes, there is a hill there.

Q. Dover lies in a basin?

A. Yes, sir.

Q. Hills on each side?

A. Yes, sir.

Q. And the highest hills is on the side of the Mansion House?

A. They might be; you would not get as good view from the river from that side as you would on this.

Q. Is the grade from the top of this hill to the river gradual?

A. It is pretty steep.

Q. All the way to the river?

A. No, not all the way to the river, but as you get a little ways from the level and you start to climb a hill there, it is very steep.

Q. Now, describe that hill; are there any houses on it?

A. Yes, sir.

Q. Houses on this hill?

A. Yes, sir.

Q. What street was it?

A. I cannot recall it; I wish I could for you, and you would know just exactly where I was, but I cannot recall the name of the street.

Q. That was on a Sunday morning?

A. That was on a Sunday morning.

Q. Who was with you?

A. Dr. Leal.

Q. What were you doing there Sunday morning; was that one of these days on which you were inspecting?

A. No, we were not inspecting on that day; we hadn't finished up, and we wanted to make the trip, and we stayed over until Monday, so we stayed up over Sunday.

Q. You stayed up there Saturday night, you and Dr. Leal?

A. Yes, sir.

Q. Where?

A. Mansion House.

Q. On Sunday morning you and Dr. Leal walked up to the top of this hill?

A. Yes, sir.

Q. He was with you, was he?

A. Yes, sir.

Q. And this hill was on the opposite side of the river to the Mansion House?

A. Yes, to the north, I should judge.

Q. Did you stay up there all day with Dr. Leal?

A. No, sir.

Q. What time did you leave there?

A. Just walked up and walked down, and walked along down the river.

Q. You and Dr. Leal?

A. Yes, sir.

Q. How long did you and Dr. Leal remain in Dover that Sunday?

A. All day Sunday.

Q. Stayed there all day Sunday?

A. Yes, sir.

Q. Are any of these dates which you have given here that day?

A. Yes.

Q. You said May 3rd, May 7th and May 8th?

A. No, I can give you the date for that.

Q. Give me the date for that Sunday?

A. On the morning of May 6th.

Q. That was May 6th, that Sunday, was it?

A. Yes, sir.

Q. Well, I think that Dr. Herold testified he was there; was he there that day?

A. I don't know anything about Dr. Herold testifying whether he was there that day.

Q. Well, was he there that day?

A. I don't think he was; I don't think Dr. Herold testified—

Q. Well, the testimony is not important; was he there that day?

A. No, Dr. Herold had to leave to go and see a patient that was very sick; he got a 'phone message.

Q. What time of the day did he go to see the patient?

A. I think he went Saturday night.

Q. Then he wasn't there Sunday at all?

A. No, sir.

Q. Was Gibson with you?

A. No. sir.

Q. When did Gibson leave?

A. I don't know.

Q. Was he there Sunday at all?

A. No, he may have been there, but I didn't see him on the morning we were out.

Q. Was there a cemetery on this hill?

A. Yes, sir; you go down after leaving the hill; I think the cemetery is at the east of the hill; yes, that is where I was; on that side of it.

Q. You spoke of Ford's pond; how is the land around Ford's pond as to its elevation?

A. Why, it is a little higher on the west side.

Q. What do you mean by little higher?

A. The banks are high; the houses are built up on quite an elevation on the west.

Q. What do you mean by high?

A. Well, 15 feet.

Q. In fifty feet, what is the grade of the land; take fifty feet from the water where these houses are?

A. Well, they are about 15 feet.

Q. That is, going fifty feet in distance you would rise to 15 feet?

A. Oh, no; it is almost straight on the westerly side of the shore at certain parts of it, and the bank, I should judge, about 15 feet high on this side.

Q. Well, how is it on the other side?

A. The other side is all low.

Q. So that there is no steep land around Ford's pond at all?

A. No.

Q. No hills?

A. Not in close proximity to the pond; no, sir.

Q. How near are the houses to the pond?

A. You climb a hill after you get to this point of it.

Q. How far from the water do you commence to climb a hill?

A. 1,000 or 2,000 feet.

Q. How many houses are there there?

A. The whole pond?

Q. Yes.

A. There are, I should think, two dozen.

Q. Not more than 24?

A. I should not think so.

Q. The privy vaults that you speak of, are they of the same character as those you have already described?

A. Yes, sir.

Q. Did you make any study of the under current there?

A. No, sir.

Q. Did you dig down any distance in the earth to see what it was, anywhere?

A. We saw that the excavation—

Q. Did you dig down anywhere in the earth?

A. Personally; no, sir.

Q. Now, you said you were at Moller's on the 7th, I think, of May?

A. I will have to refer to that?

Q. Yes.

A. Which Moller's?

Q. Herman.

A. That was on the 8th.

Q. Was that the first time you went there?

A. I think that is the first inspection I made of it; I think that is the first.

Q. What is that?

A. That is a saloon.

Q. What sort of building is it, brick, or wood, or what?

A. Frame building.

Q. How many stories?

A. Three.

Q. What size is it?

A. I should judge the building was 40 feet front, and maybe not over thirty feet front, and about fifty feet back.

Q. How near the river?

A. About 45 or 50 feet, perhaps.

Q. How high above the river?

A. Five or six feet.

Q. You said that the water from the bar was tested?

A. Yes.

Q. Did you test it?

A. Yes, sir.

Q. How did you test it?
A. By putting the coloring in.
Q. What color did you put in?
A. Mr. Gibson put the color in.
Q. Then you didn't put any color in?
A. No, I didn't.
Q. What color did he put in?
A. In that case I don't know whether we were using red or green.
Q. You don't know what color you put in?
A. I may have it here; I don't know; I will see.
Q. See if you have it on your notes.
A. We were probably using green all the time at that date; undoubtedly it was green.
Q. Did you have green and red with you at the same time?
A. We had blue, green and red.
Q. Is that all you had?
A. That is all we had.
Q. You had no other chemicals except blue chemical, green chemical and red chemical?
A. Yes, sir.
Q. Were they in separate bottles?
A. Yes, sir.
Q. Who brought them there?
A. Mr. Gibson had them in his possession; I don't know who brought them there.
Q. Do you know where he got them?
A. No, sir.
Q. What size bottles were they?
A. I saw him purchase some blueing at the drug store the first or second day.
Q. What drug store?
A. Corner of Blackwell and the main street.
Q. Did you see him purchase some aesthetic acid, too?
A. No.

Q. Did you purchase aesthetic acid?

A. I did not.

Q. Did you have aesthetic acid with you?

A. I did not.

Q. Did you have any other acid except those three?

A. No, sir.

Q. At any time did you have aesthetic acid with you or any other acid?

A. Never.

Q. Sure about that, are you?

A. Certain about it.

Q. Did you ever see him put any in?

A. I saw him put it all in.

Q. You saw him put it all in?

A. I always saw him put it in; I saw every fixture tested, and saw him put it in.

Q. He didn't put it all in, did he?

A. I mean to say I saw every performance of the introduction of the coloring.

Q. You watched him very closely, I suppose?

A. Yes, sir.

Q. Very closely; did he put it in with a knife, or how did he put it in?

A. Yes, in all cases he had a pocket knife, and used the large blade.

Q. Did he do that with the blueing?

A. No, the blueing was in packages.

Q. How did he get it out of the package?

A. Just tore the package open and opened it out, and some times threw the whole package in.

Q. You cannot recollect whether at this particular time you used the blueing or the red or the analine?

A. I should judge that we were using green then all the time; we never went back to the blue after discarding it.

Q. When did you discard the blue?

A. The first, second or third day, I think; I am not positive about that.

Q. This test was made on the third there, you must have been using the blue?

A. You mean the Moller?

Q. Yes.

A. No, it was made on the 8th.

Q. You say it was made on the 8th, and was not made on the third?

A. No, sir.

Q. If you testified it was made on the third, that was a mistake, was it?

A. Yes, sir; I don't think I testified to it, because we didn't made any test at all on the third.

Q. What do you know about what went from the bar into this drain?

A. I was on the premises there behind the bar, and the bar waste tank was filled, and the coloring was put in that and mixed thoroughly, and the plug pulled out, and immediately the result came under this drain.

Q. What drain?

A. Mason drain.

Q. Eh?

A. This masoned up drain or culvert.

Q. How did you see it there, go out and look at it?

A. Yes, sir.

Q. And you say that there was nothing put in that drain at any time except bar waste?

A. Nothing from that place goes there but the bar waste and the dripping from the ice box.

Q. Anything else?

A. And pressure pump.

Q. That is all you saw that day, you mean you don't know what was the day before or the day after, do you?

A. That is the test we made that day.

Q. But you don't know what waste goes from that bar except what you happened to see that day?

A. That day; yes.

Q. And that is what you are speaking about?

A. Yes, I am speaking about the only test that I made.

Q. I understood that that drain went to the river?

A. The drainage from these three fixtures got to this mason drain.

Q. And that drain leads to the river?

A. That finally would get in the river; yes.

Q. How do you know?

A. Well, it is very perceptible; as I say, it is about 15 feet from the river; the outlet of this drain.

Q. Does it go directly into the river, or into some other drain?

A. No, it flows over the land; over the ground.

Q. Flows over the ground to the river?

A. This mason drain is open at the end and goes right over the ground on the earth, you see it plainly.

Q. Does it go to the river, that drain?

A. No, the drain stops right at the end of the alley and it goes out on the ground, and that might reach—

Q. How far were the nearest vaults at the pond, Ford's pond, from the river?

A. Why, the nearest vault to that pond must be forty feet.

Q. Did you measure it?

A. No, sir; not by a tape measure.

Q. Why didn't you measure it?

A. I didn't think it was necessary.

Q. You thought you could swear to it without measuring it?

A. Yes, sir; with safety.

Q. You think it is forty feet, the nearest one?
A. I think so.
Q. You said at the Lyondale Dye works that the canal was used to take off the water which was impregnate with color, is that right?
A. Canal and sluice-way, or a race-way there; yes, sir.
Q. What was put in that water?
A. Sulphate of aluminum.
Q. How did you know?
A. I was only told so.
Q. Do you know how much was put in?
A. No, sir.
Q. What does the sulphate of aluminum do in the water?
A. Why, it is used for precipitating, and as I understand it, for dissolving the colors; breaking up colors.
Q. It breaks up colors, does it?
A. That is what I am told.
Q. And what evidence had you that there was no fecal matter sent out through that canal?
A. I couldn't see any.
Q. Could you see it if there was?
A. I think I could, if we examined these five or six drains very thoroughly.
Q. Did you make any análysis of any water up there?
A. No, sir.
Q. Why not?
A. Well, we weren't asked to.
Q. Then ,when you spoke of no impurities going to the river, and no pollution going to the river, you only refer to what you could see?
A. My opinion.
Q. Made no analysis?
A. That is my opinion; yes, sir.

Q. What do you mean by pollution?

A. Why, pollution from the animal matter.

Q. What do you mean by pollution, you said the water of the Rockaway river was polluted, didn't you?

A. I don't think I have said so.

Q. Is it, or not?

A. Why, naturally it is.

Q. It is polluted?

A. Undoubtedly.

Q. What do you mean by saying then that the water of the Rockaway river is polluted?

A. I don't think that I did say so.

Q. You do say so now?

A. Yes, I say it naturally would be.

Q. Now, you say it is polluted; I want to know what you mean?

A. From the washings of the roads and the streets and the fields.

Q. What do you mean by the word polluted?

A. Some foreign matter getting in it that doesn't belong in water.

Q. Then your meaning of pollution is that any water which has foreign matter in it is polluted?

A. To a certain extent, more or less; certainly.

Q. That is what you mean when you say polluted?

A. Yes, sir.

Q. And by foreign matter, I suppose you mean sand; that is foreign matter that ought not to be in water?

A. No, I mean the washings of the streets.

Q. What washings of the streets, the sand from the street?

A. The dirt from the street that is dropped there by horses and other things.

Q. What kind of dirt; sand is dirt?

A. Manure, horse manure.

Q. Then you think this water is polluted if it has horse manure in it; is that it?

A. More or less.

Q. What do you mean by more or less?

A. It is not pure water.

Q. Is it wholesome water if it has horse manure in it?

A. Well, I wouldn't object to drinking it.

Q. You wouldn't?

A. No, sir.

Q. Then you consider it is wholesome so far as you are concerned if it has manure in it?

A. Yes, sir.

Q. How much manure do you think would render it unwholesome?

A. I don't know.

Q. What do you mean by saying it is polluted; that is what I want to get at?

A. More or less every stream must be polluted if it is near a town.

Q. Well, if it is polluted is it fit to drink?

A. Not at that point.

Q. What point?

A. At the river, right there at the river.

Q. Is it fit to drink wherever it is polluted?

A. Yes.

Q. Where?

A. Oh, wherever it is polluted?

Q. Yes.

A. No. the chances are that you couldn't drink it at that river.

Q. Do you mean by polluted water, water that is not fit to drink?

A. No, it could be made fit.

Q. What?

A. It can be made fit to drink.

Q. Then you mean by polluted water, water that can be made fit to drink?

A. Certainly.

Q. Cannot any water be made fit to drink?

A. Yes, sir.

Q. What do you mean then by polluted water?

A. Polluted from just the causes I have told you, from animal pollution and infection from human infection,— pollution and infection are two different things. If you should take a fresh pail of water and clean your hands in it it is polluted.

Q. Well, when you spoke of the water of the Rockaway river being polluted, do you mean by that to convey to us that the water at that point is not potable water?

A. I couldn't say it was at that point, no, sir.

Q. Would you say it wasn't?

A. No, if I never tested it.

Q. Although it is polluted it would still—notwithstanding you call it polluted you say it would be potable water?

A. It might and might not be.

Q. Which do you mean, when you say it is polluted?

A. It might be polluted.

Q. Well, if it is polluted what then—is it fit to drink or not?

A. Not at that point, perhaps.

Q. What do you mean by perhaps?

A. That it might be; it depends on the pollution, how much there is of it.

Q. Senator Edwards suggested to you that it depends upon the amount of pollution?

A. I didn't hear Mr. Edwards say one word.

Q. You didn't hear him say it?

A. No, sir; I did not.

Q. Funny that you use the same language if you didn't hear him?

A. I didn't hear him.

Q. I would like again to know what you mean when you say the water of the Rockaway river is polluted?

A. More or less any stream running through a town of that kind must be polluted.

Q. If it is polluted is it fit for human beings to drink?

A. I wouldn't say so at that point.

Q. Then you say it is not fit at that point for human beings to drink?

A. I wouldn't think it was.

Q. You think it is not fit?

A. I think it would not be fit.

Q. Why wouldn't it be fit?

A. It is polluted.

Q. Well, no polluted water then is fit to drink, do you mean?

A. It would not be wholesome.

Q. Well, what is in the pollution that makes it unfit to drink?

A. We don't know.

Q. You don't know?

A. No, sir.

Q. Do you refer to typhoid bacillus?

A. That is one of them, of course.

Q. Then do you think it would not be fit to drink because there might be danger of drinking typhoid bacillus?

A. No, sir.

Q. What then do you mean?

A. No.

Q. Just explain what you mean?

A. I mean that no water collected, of any stream running through a town inhabited such as Dover, would not be wholesome water to drink at that point.

Q. Why?

A. Because it would be more or less slightly polluted.

Q. How would that hurt you?

A. Well, we don't think it would, it wouldn't kill you, but at the same time it is not a nice idea to drink it.

Q. Then you call polluted water any water that is not nice to drink, eh,—is that your meaning?

A. Well, that is yes one meaning.

Q. Do you think the water which runs through Dover is safe to drink?

A. Perfectly safe if there wasn't any typhoid fever.

Q. If there is typhoid fever what then?

A. I wouldn't consider it safe, no.

Q. If there is any typhoid fever in that water shed would you consider it safe to drink the water of the Rockaway river?

A. In the Rockaway river itself?

Q. Yes.

A. No, not in the river itself.

Q. And that is true of anywhere in the water shed?

A. I think it applies to every water shed.

RECESS.

Q. Mr. Chandler, have you ever made a study of the typhoid bacillus?

A. No, sir.

Q. You know nothing then about its life—history?

A. No, sir.

Q. You don't know whether it is propagated by spores or by division or by eggs or in what way, do you?

A. No, sir.

Q. You know nothing—

A. I would not like to go into that discussion at all.

Q. Is it the same with regard to anthrax?

A. Yes, sir; I know nothing about that.

Q. Do you know anything about the eggs or the worms which infect the human body, such as tape worm?

A. No, sir.

Q. Do you know whether they are carried by water or not?

A. No, sir.

Q. Don't know anything about that?

A. No, sir.

Q. Do you know anything about the bacillus of cholera?

A. No, sir.

Q. Or of winter cholera?

A. No, sir.

Q. Do you know anything about the action of germs of gonorrhea or syphillis in polluted water?

A. No, sir; I know nothing about that.

Q. Do you know how far the typhoid bacillus,—or do you know whether the typhoid bacillus has independent motion?

A. I don't know.

Q. I mean by tails or flippers or some way?

A. I don't know anything about that.

Q. Nor as to the bacillus of the other ones I have mentioned?

A. I have seen them through the microscope, but not to testify about.

Q. Do you know how far the typhoid germs will pass from a sewer or a cesspool or a privy through the different kinds of soil?

A. No, sir.

Q. Never made a study of that at all?

A. No, sir.

Q. Don't know whether they will go one foot or five hundred feet?

A. No, sir.

Q. How about the germs of the other diseases that I have mentioned, such as anthrax?

A. No, sir; I know nothing about it.

Q. Are the cause of tape worms or other worms that infest the body?

A. Nothing.

Q. Don't know how far they would pass through the different kinds of soil?

A. Positively not.

Q. Well, if any of those bacilli should get into potable water it would pollute it?

A. Typhoid would.

Q. Wouldn't anthrax?

A. I don't know; anthrax is a rare disease in this country.

Q. I thought you said you didn't know much about it?

A. I don't know anything about it.

Q. Isn't it a very common disease West, where they have sheep?

A. I think not.

Q. Where does it come from?

Q. Why, it is mostly in Europe, and I even cannot tell what part of it; but I know the culture of anthrax is very hard to get in this country sometimes; I have heard bacteriologists make the remark that it is very hard to get it, it is sometimes sent here on cords, pieces of string and put in bottles; it is very dangerous to handle; I don't know anything about it.

Q. You don't know that it passes through water?

A. I don't know anything about it.

Q. You don't know whether it is common West or not?

A. I never heard of it being very common in the West.

Q. Not in Ohio and Indiana?

A. Never have.

Q. Have you read anything about it?

A. No, I haven't read it up.

Q. But that is the impression you have?

A. Yes; I have read the papers.

Q. Did you read all the evidence taken in the case with regard to the Chicago Drainage Canal, between St. Louis?

A. No.

Q. Well, if it is in water that would pollute the water?

A. I don't know anything about that, sir.

Q. Don't know whether it would pollute the water or not?

A. I don't know anything about the nature of it at all.

Q. You cannot say whether if it is in the water the water would be polluted or not?

A. Cannot say.

Q. I understood you to say that any foreign matter in water polluted it, did you mean that or not?

A. Any animal matter.

Q. You mean animal matter?

A. Yes, sir; animal matter.

Q. Of course we cook all our meat in water?

A. Yes, sir.

Q. And have soup—you don't call soup polluted, do you?

A. No.

Q. That is animal matter in water, isn't it?

A. Well, animal pollution I probably should have said.

Q. Animal pollution?

A. Issuing from the brute animal.

Q. Do you mean animal matter that is from animals that are not eaten?

A. Not necessarily, no.

Q. What do you mean by brute?

A. Cow, horse, hog, is a brute animal.

Q. Well, that is what we usually make soup of.

A. Yes, we make soup of them after they are killed and dressed and cleansed; we don't make soup of what they live on, what passes through them,—discharge?

Q. Do you mean fecal matter?

A. Yes, sir.

Q. Or what corresponds with fecal matter?

A. Yes, sir.

Q. That is what you understand, their urine and their fecal matter pollutes the stream?

A. That would be pollution; yes, sir.

Q. Then your idea of pollution is that the water is polluted whether it is unwholesome for drinking purposes or not,—or is it only when it is unwholesome for drinking water that it is polluted?

A. Polluted water would be unwholesome; it would not be dangerously, perhaps, unwholesome. Typhoid is the principal thing that makes water dangerous. There are some pollutions from animal matter that causes diarrhoea and ptomaine poisoning.

Q. Is not your idea of polluted water, as we are speaking about it here, water that may contain the bacillus of typhoid?

A. No, that would be infected water.

Q. That would be?

A. Yes, sir.

Q. You don't call water which may have typhoid germs in it polluted water?

A. That is infected water.

Q. It is infected water if it has typhoid germs in it?

A. If it has.

Q. I don't ask you if it has; I say if it may have?

A. I will answer the question if it has typhoid germs it infects the water.

Q. Well, you are answering something I didn't ask you. I am asking you about polluted water, and I ask you whether your meaning of polluted water is water which may at times have typhoid bacillus or other infectious bacilli?

A. No, sir; polluted water is, as I have said before, pollution from the brute animal—that is polluted water.

Q. Pollution from the brute animal?

A. Yes, sir.

Q. What do you mean by brute animal?

A. The cow, the horse, the hog.

Q. What animal is not a brute?

A. The human.

Q. By the word brute you distinguish between the human animal and the animal that is not human?

A. Yes.

Q. I suppose a worm would be a brute, then?

A. Well, I never looked that up; I don't know what a worm is called.

Q. Have you studied the difference in the behavior of polluted matter, as you call it, brute matter, which is in suspension and such as is in solution in water?

A. No, sir.

Q. What is the difference between suspension and solution?

A. I don't know; I am not a bacteriologist and I don't want to answer on that question.

Q. You don't know what the difference is between a particle that is in suspension in water and a particle in solution in water?

A. No, sir.

Q. Don't know the difference?

A. No, sir.

Q. Then you don't know whether the bacilli of typhoid fever, when they are in water are in solution or in suspension?

A. No, sir.

Q. Don't know which they are?

A. I don't want to answer on that question at all.

Q. You don't answer because you don't know?

A. Yes.

Q. Returning to those privies that you mentioned, the eleven privies that you visited on the 3rd of May, I think you said?

A. 8th I think.

Q. 8th of May. Near Bergen street.

A. I think it was the 8th, yes.

Q. Well, we will take whatever you state as to that, whether the third or eighth. Did you notice how long that privy had been there in use?

A. No, sir.

Q. Do you know how many years it had been in use?

A. I do not.

Q. Do you know how many years any of the other privies had been in use?

A. I do not.

Q. Do you know whether they have ever been cleaned?

A. No, sir.

Q. You said, however, that the matter in it was dry?

A. Yes.

Q. Well, I suppose it hadn't always been dry, had it?

A. I suppose not.

Q. There was urine in it at times?

A. Yes; most of those vaults are dry,—the majority of them will be dry,

Q. Eh?

A. Most of those vaults will always be dry.

Q. Not in times of freshets they won't be dry?

A. But very soon after, because the liquids get away and the solids remain.

Q. Where does the liquid go to?

A. To the bowels of the earth.

Q. That is pretty deep; I thought it was hot down in the bowels of the earth?

A. Then it is burned up.

Q. You think it goes down in the bowels of the earth and is burned up?

A. I say it is burned up if it gets down there.

Q. You didn't mean that?

A. Well, it goes into the earth.

Q. As you understand it all the water comes to the surface some time or other?

A. I haven't made a study of that.

Q. You don't know whether underground water always gets to the surface some time or not?

A. I don't know about that.

Q. What is your judgment?

Objected to.

A. I am not an expert and refuse to answer.

Q. Well, now, Mr. Chandler, you made a study of how many pounds of fecal matter any average man will pass in a day?

A. No, sir.

Q. You don't know anything about that?

A. No, sir.

Q. Don't know whether it is one pound or ten?

A. Certainly don't.

Q. What an average person will pass?

A. No, sir.

Q. Never made a study of that?

A. Never.

Q. Don't know anything about it?

A. Not a bit.

Q. Then you cannot tell how long it would take to fill up one of those privy vaults that you watched?

A. I certainly could not.

Q. Cannot tell whether it would be a week or a month?

A. No.

Q. Or a year?

A. No; a civil engineer, I think, would have to do that.

Q. I thought that was one of the Health officers business?

A. No.

Q. You think that is something a civil engineer would know?

A. To measure it exactly as you want it, yes.

Q. I don't want it accurately; I want to know how long it would take?

A. It would depend on the excavation in the ground of course, the size of it.

Q. Well, you saw it; I am talking about the particular thing you say?

A. Well, I cannot tell.

Q. Cannot possibly tell?

A. In some of those cases the majority of the family might be working and home only half the time, and you cannot draw any idea how long it would take to fill that vault; they might only be home at nights.

Q. Well, if you didn't know how much a man passed you certainly would be in a poor way of finding out how long it would take for him to fill it?

A. I cannot tell.

Q. You know about whether the infectious germs pass from the urine as well as fecal matter?

A. I am not an expert and do not wish to testify on that; I have heard discussions.

Q. You never made a study of it so as to make yourself an expert?

A. No, sir.

Q. I think you said that the cesspool, some of them that you saw, the new ones were cemented?

A. Sides.

Q. Does it cost any more to cement it?

A. I think it must.

Q. Why do they cement it?

A. Well, it makes them tighter, slightly tighter; some protection, I think the cemented ones are.

Q. It is some protection, is it, to cement it?

A. I should think it was.

Q. Wouldn't it be wise, in your judgment, to cement these privy vaults?

A. No.

Q. It would not?

A. No, sir; it wouldn't be necessary to cement them.

Q. Although you might have it filled with typhoid germs you think it would not be any safer to cement the sides of the vault than to leave it in open stones?

A. No.

Q. Why not?

A. It goes through the ground.

Q. What goes through the ground?

A. The matter in the vault.

Q. Goes through the ground?

A. Yes.

Q. Well, it don't go through the sides, does it?

A. Well, it goes through the bottom.

Q. Then the reason you say it does not make any difference whether you cement it or not is the fact that you leave the bottom open, and therefore it can get out of the bottom?

A. Yes, sir.

Q. Why wouldn't it be safe to cement the bottom?

A. I don't know that it would be safe; that would necessitate their cleaning them very much oftener, and the carting of this stuff, and the uncertainty about where this stuff might be dumped would be a source of danger.

Q. You examined wherever they did throw this stuff?

A. Where?

Q. In Dover?

A. I saw no place where they threw it.

Q. You didn't examine it?

A. I didn't see any stuff dumped in Dover.

Q. Did you try to find out whether they did clean the cesspools at all?

A. No.

Q. Didn't inquire into whether the cesspools were cleaned or not?

A. I saw them in the course of the cleaning, but didn't watch the wagons or follow them to where they dumped them.

Q. Did you try to find out where they dumped this fecal matter which they took from the cesspools?

A. I was told it was away beyond the source of the river.

Q. Somebody told you that?

A. Yes.

Q. And you relied on what they said?

A. Yes, sir.

Q. Well, it would have been dangerous to dump that where it would get in the river again?

A. It should not be dumped close to the river.

Q. Should it be dumped anywhere where it could be gotten into the river?

A. The chances are it wasn't.

Q. I didn't ask you that; that is a first rate answer, but I didn't ask you that; if you will only confine your answers to my question why we will get through a little quicker.

A. I will try to.

Q. Well, now—

A. Certainly not; it would not be proper to dump it near the stream.

Q. How near the stream would it be proper to dump it?

A. It depends on how much was dumped there, location of the land, drainage toward the stream, the whole property,—the conditions existing on the ground, whether I would say yes or no.

Q. I am asking you a general question; how near the river it would be safe to dump it?

A. I am answering it as generally as you are asking it.

Q. I think you are; you cannot answer any better than that?

A. No, sir.

Q. How near the river it would be safe to dump the fecal matter which is taken out of the cesspools?

A. No, sir.

Q. Would it be safe to dump it within five feet?

A. No, sir.

Q. Would it be safe to dump it within a thousand feet?

A. Yes.

Q. Under what conditions?

A. That you would have to see; I would have to be on the ground to tell you that.

Q. Why would you; I ask you whether it would be safe to dump it within a thousand feet, and you say no; now why wouldn't it?

A. I think it would be safe to dump it a thousand feet.

Q. Suppose the side hill which runs down to the brook, runs to the river?

A. It would be a very short hill if it was a thousand feet from the stream, so that there would not be much of a grade and it would be perfectly safe.

Q. You think it would be safe to put the fecal matter taken from a cesspool on the side of a hill which was one thousand feet from the river, and without regard to what the grade of the hill was?

A. You said a hill?

Q. Yes, I said without regard to the grade of the hill?

A. Well, hills are generally regarded as about thirty or forty feet high; that is a very high hill; but a hill a thousand feet, I should think it would be safe.

Q. You have already sworn you did not know at all how far the bacillus germs will go?

A. No, that is my opinion; I am simply giving my opinion.

Q. On what is it based?

A. On common sense.

Q. What common sense have you about typhoid bacillus?

A. I am basing my answer on common sense, not as to whether we had the typhoid, but the contents of that vault going into the river, regardless of what it contained, and I don't think any of the contents of that vault would go into the river at a thousand feet.

Q. I am not talking about a vault, I am talking about dumping?

A. I said contents of the vault.

Q. How far would it go, in your judgment?

A. I don't know; cannot tell you.

Q. You said it wouldn't go a thousand feet?

A. I don't think it would.

Q. Would you say 500?

A. I don't think it would.

Q. 250?

A. It might.

Q. Well, under what circumstances would it go 250?

A. Very heavy rains, deluges.

Q. How about a hundred?

A. I said 250.

Q. Now I ask you about a 100?

A. It might go there, it might go 100.

Q. How about fifty?

A. Certainly must go fifty if it would go 100; it would have to pass the fifty mark first.

Q. You said it might go 100; it would surely go fifty?

A. Yes.

Q. You got one point where you can put your foot on pretty solid and say surely go fifty?

A. Well, we will say fifty.

Q. Will it surely go 75?

A. I don't know.

Q. Where is the point that your mind commences to flicker,—between 50, 75 and 100?

A. It might be one foot.

Q. Fifty-one feet, your mind would flicker; but on fifty you would be sure.

A. It has to stop somewhere.

Q. I am trying to find out from you where you draw the line?

A. Fifty one feet I draw it at.

Q. Who was it that told you where they took the refuse from the cesspools, the cleaning of the cesspools?

A. I think I heard it from several people.

Q. Who is the man; did Dr. Leal tell you?

A. He wasn't the first; I think Mr. Fanning told me, if I am not mistaken.

Q. What is his name—Thomas Fanning told you?

A. I cannot tell you his first name; Mr. Fanning of Dover.

Q. When did he tell you?

A. On one of our trips there.

Q. How did you happen to ask him.

A. I will tell you why, they were cleaning a cesspool—

Q. Who was?

A. Mr. Fanning.

Q. Mr. Fanning was cleaning a cesspool?

A. He had hired the men to do it; he had been given the order to clean it, and I noticed the long intervals between the wagons and I asked them if they were taking it a thousand miles away, and he told me they were taking it quite some distance below.

Q. Below what?

A. Below the town of Dover.

Q. They took it down stream?

A. I think so.

Q. Down stream from Dover, as you understood it?

A. I think so.

Q. Did he show you the field where they put it?

A. No, sir.

Q. What cesspool was that?

A. That was, well, they were cleaning the cesspool in the rear of 14 and 16, and also the Mansion House cesspools.

Q. Did they clean those both the same day?

A. No, I don't think so; they couldn't have done so.

Q. Which day was it you asked him?

A. It was one of those days that I was there; I cannot tell.

Q. Now I ask you with regard to the privies at Bergen street; how long had they been used, and you have answered me. I would like to ask you the same question as to all the other privies about which you have spoken; I would like to ask the same question about each of the other vaults. How long had they been used to your knowledge?

A. I cannot say.

Q. How many people used them?

A. I cannot say.

Q. Do you know whether any of these had any pipe from the bottom of the cesspool to the river?

A. Couldn't see to the bottom of the privy vault, no.

Q. Do you know?

A. No.

Q. Can you swear that these privies didn't have a pipe from the bottom?

A. I cannot.

Q. Of the cesspool to the river?

A. You mean privy vault?

Q. From the bottom of the privy vault?

A. I cannot.

Q. If they had a pipe leading from the bottom or near the bottom of the privy vault directly to the river, do you think that would have been dangerous to the water of the river for drinking purposes?

A. Yes.

Q. Why?

A. Why in times of typhoid it would, if there should happen to be a case of typhoid there it would.

Q. Or a case of any of those other diseases?

A. That would be pollution, not so dangerous as infection.

Q. What would be pollution?

A. If there was no typhoid, just the contents of the vault; it wouldn't be a nice thing to have running into the water.

Q. But I say if the germs of any of those other diseases, such as anthrax or cholera or tape worm or diarrhoea, suppose those germs had been in that vault, would it have been dangerous, in your judgment, to the water—potability of the water in the river if there had been a pipe from those privy vaults to the river?

A. I will volunteer this answer, that I don't wish to testify on that, though, but cholera might be dangerous.

Q. You think it would not be dangerous if it was tape worm, or any of the other diseases that pass through water?

A. I don't know.

Q. What is the danger to water from an abattoir?

A. None whatever.

Q. From any abattoir, however dry it may be?

A. No, sir.

Q. There is no danger at all to human beings from that?

A. No, sir; we don't consider it so.

Q. The water is just as safe to drink as if the abattoir was not there?

A. Yes, sir.

Q. Why did you go there then?

A. It was in the course of our inspection to see the condition of it.

Q. Why did you order it cleaned?

A. Because there was testimony there that there was contaminating pollution and we wanted to see whether there was or not.

Q. You didn'tk now before you went that an abattoir could not contaminate?

A. I don't know, yet.

Q. I understood you to say that the water would not be affected as to its potability by the presence of an abattoir?

A. It would be polluted, as I said before, by pollution, it might by pollution.

Q. Well, we are now talking about contamination, what do you understand contamination to mean?

A. That is pollution.

Q. You understand the word contamination and the word pollution to mean the same thing?

A. Practically, I should judge it is the same.

Q. When you use it you use it indiscriminately either one or the other?

A. Yes, sir.

Q. Then you think the water of the Rockaway river below Dover is contaminated, do you?

A. Yes, below Dover it must be more or less.

Q. Do you think it is safe to drink at all times and under all circumstances?

A. Safe to drink—I don't think,—unless there is only one thing that would make it absolutely unsafe and that would be typhoid.

Q. Well, I ask you whether it is safe to drink under all circumstances and all times?

A. As far as disease go I should judge it was.

Q. Under all circumstances and all times?

A. Yes, sir.

Q. Then it would be safe to drink if there was typhoid in it?

A. No, sir.

Q. That would be some time; you said it was safe to drink at all times and under all circumstances?

A. Unless there was typhoid I said.

Q. Oh, you put unless there was typhoid?

A. Yes.

Q.That wasn't in the question or in your answer?

A. I think it was in the answer.

Q. How can you tell whether there is typhoid fever in it at any particular time or not, you cannot see the germs?

A. I don't know anything about that.

Q. Can you tell whether there isn't typhoid in that water today from any inspection of it?

A. I cannot, no.

Q. Do you know whether it has or not?

A. I do not.

Q. Will you swear it is not full of typhoid germs today?

A. No, sir.

By Mr. EDWARDS:

Q. Will you swear it is full of typhoid germs?

A. I certainly would not, I would prefer to swear it wasn't.

FURTHER CROSS.

Q. I know you wouldn't, you are paid to do that. Did you examine the closets that were below the silk mill at Boonton on the Rockaway river?

A. No.

Q. You examined no closet below the silk mill?

A. Which silk mill?

Q. Below the Cooper-Lord, you have sworn as to that silk mill?

A. Yes. No, sir.

Q. You didn't examine the closets?

A. No, sir.

Q. Are there any closets below that?

A. I don't know, I didn't go to them if there was.

Q. Is there any rule of the Board of Health of Newark with reference to the cementing of the vaults in the Pequannock water shed?

A. No, sir, that is always considered a hardship on the part of the owner.

Q. I didn't ask you that.

A. I am volunteering that.

Mr. VREDENBURGH: I ask that that be stricken out as voluntary.

Mr. EDWARDS: I object to its being stricken out, it being strictly responsive.

Q. How deep was this mine—you said it was five or six hundred feet deep?
A. I was told by Mr. Mockridge it was five or six or seven hundred feet.
Q. Did you measure it?
A. Certainly did not.
Q. Then you are speaking as to its depth from hearsay?
A. Yes, sir.
Q. Did you look into it?
A. We attempted to.
Q. Did you look into it?
A. No, sir.
Q. Why not?
A. We were going to the mouth of this pipe and Mr. Gibson came very near going into it, and I scampered out of it as quick as possible.
Q. What was there dangerous about two men going to a hole—
A. There was an excavation as large as this building.
Q. You could see it?
A. No, sir; there were rails over that, and he fell between the rails—was caught between them.
Q. Then he was venturing over the top of it?
A. Yes, sir; it was all fenced up, there was a warning to keep out.
Q. Did you go in?
A. We climbed the fence and got in.
Q. Did you look down to see how deep it was?
A. No, sir; we didn't, we attempted to, but we didn't go that far.

Q. Do you know where it empties?
A. No, sir; we were told it was a deep man-hole.
Q. You were told so?
A. Yes, sir.
Q. You don't know anything about it of your own knowledge?
A. No, sir.
Q. Didn't examine it to find out?
A. No, sir; we were told by Mr. Mockridge that this fence was put around it to keep people out of it, that it was dangerous.
Q. Did you see the closets there?
A. Yes.
Q. Did you test them?
A. Yes, sir.
Q. Who tested them?
A. Well, Mr. Gibson and myself.
Q. Well you put in the stuff?
A. He put in the stuff and I watched it put in and flushed them.
Q. Did you see him put in the stuff?
A. Yes, sir.
Q. Then you went out to watch after he put in the stuff?
A. No, sir.
Q. How then?
A. Doctor Leal and Dr. Herold was at that end.
Q. How far was that end from where you put in the stuff?
A. It would vary from one factory it would probbly be fifty feet and another would be a hundred and fifty feet.
Q. Then there were several water closets in those factories in the Lyondale silk mill?
A. Yes, sir.
Q. How many?
A. I would have to look over my notes.

Q. Look over your notes and tell me how many there were?

A. You don't mean the Lyondale.

Q. I am speaking of Ross' silk mill, where you went to this **hole**?

A. I tested the water closet.

Q. I didn't ask you what you tested, I was asking you how many water closets there were?

A. We tested one—two.

Q. Were they both in the same building?

A. No, sir.

Q. How many closets were there in each?

A. They were both in the same building. Water closet in first floor of mill No. 1 and water closet on second floor of mill No. 1.

Q. Were there no other water closets in that building?

A. No, sir.

Q. Did you look for them?

A. Yes, sir.

Q. Did you go through the building?

A. Yes, sir.

Q. Well, who went with you?

A. Mr. Gibson and the manager Mr. Mockridge.

Q. Why did you go through the buildings,—to look for water closets?

A. Naturally, sure.

Q. Why didn't you believe what Mockridge told you about them?

A. We didn't take anybody's word for anything we did.

Q. You looked all through the building so that you could find the water closet?

A. Yes, sir.

Q. What do you mean by that, I would like to know. Do you say you did not believe what Mr. Mockridge told you and so you looked to see?

A. No, I didn't say that, I said in all our inspections we didn't believe anybody.

Q. I am asking about the silk mill; I am asking you what examination you made to find out?

A. We tested those two closets and were taken there by Mr. Mockridge.

Q. Did you examine the rest of the building to see if there was any more?

A. I think we made inspection and couldn't find any more.

Q. Where did you go?

A. Some of the buildings.

Q. Went through the whole building looking for water closets?

A. Yes, sir.

Q. How many buildings are there?

A. Off hand I will say two, but I will look.

Q. Cannot you tell without looking?

A. No.

Q. And yet you are ready to testify that you went through all of them?

A. Two is all I have got.

Q. That is all there is there, you know?

A. There must be another one, there is mill No. 3 and 1, there must be mill No. 2 somewhere.

Q. You didn't go through that then?

A. Evidently not.

Q. You don't know whether there is a water closet in that or not?

A. No, sir.

Q. Now you say that one of the water closets you did not test when you first went there, because it was locked up?

A. Yes.

Q. Why didn't you?

A. It was locked up.

Q. Well, didn't Mr. Mockridge unlock it?

A. It was boarded up, not locked up.

Q. Why was it boarded up?

A. It wasn't in use, they hadn't used it, and they said the same conditions existed when the Jersey City Water Inspector was there; made his affidavit to that effect.

Mr. VREDENBURGH: I moved that that be stricken out as another volunteer of the witness and hearsay testimony.

Mr. EDWARDS: No, you asked him to give that.

Q. How was it locked up?

A. Boarded.

Q. How was it boarded up?

A. With hemlock boards, two or three nailed right across the door; the jamb of the door was fastened tightly.

Q. Was there a door?

A. Yes.

Q. Were they new or old boards?

A. Well, I cannot just tell the age of those boards, but they looked pretty new.

Q. That was the reason you didn't test it?

A. That is right.

Q. You were, I suppose, very anxious to find out whether the closet did connect with the river or not?

A. We were certainly anxious to find out any closet that connected with the river.

Q. Why didn't you try to test this?

A. It was closed.

Q. Suppose it was, you could open it again, couldn't you?

A. I suppose we could, yes.

Q. You took it for granted that it did connect with the river when they shut it up?

A. We knew we were coming back, and we were going to be allowed to test it, which we did later on.

Q. That is the reason you didn't test it, you knew you would be allowed to test it?

A. It wasn't the reason it was closed up, but we did make a return trip and tested it.

Q. You understood at the time you went there that you were going to be allowed to do it some other time?

A. No, I don't think we did at that time.

Q. Why did you say so then?

A. Did I? I don't remember saying so.

Q. How did you know that you were going to be allowed to test it?

A. We imagined we would be allowed to test it, there was so much trouble up there, they were anxious to rectify everything that was wrong, they were very pleasant about it, and we were not refused anything.

Q. What was there wrong there that they wanted to remedy?

A. There was nothing, they didn't have it in use.

Q. You said they were anxious to remedy the wrong?

A. If there was wrong there, they claimed there wasn't.

Q. Why did they lock it up if it wasn't wrong?

A. I don't know, that is their part of it.

Q. Did you try to get into it?

A. No, sir.

Q. How near did you get to it?

A. Went right up close to it.

Q. Was it nailed?

A. Yes, sir.

Q. How do you know?

A. Saw the nails in the boards.

Q. Which end of the boards?

A. Either ends of the boards.

Q. Both ends?

A. Yes, sir.

Q. What was nailed fast?

A. Nailed fast to the partition, the boards were nailed right straight across the door.

Q. How many?

A. Two or three.

Q. How many nails in each end?

A. I didn't count those, there was enough to hold them.

Q. I suppose you could not have gotten in without knocking those doors in?

A. I didn't believe we had a right to knock them down.

Q. You thought you didn't have a right to take those boards down, and therefore you did not try to?

A. I don't think we had a right to force it; we hadn't any papers to force any man's property in.

Q. Was that the reason you didn't take these boards off?

A. That was one of the reasons, yes.

Q. How many men were there employed at that factory, men, women and children?

A. I didn't count them, there weren't many.

Q. What do you mean by that, two?

A. Of course there were two or three buildings as I have said before; in that particular building I don't believe there were ten people working.

Q. What were they doing, sitting around?

A. No, they were making silk I guess.

Q You say there were only ten working, what were the rest doing?

A. That is all I saw; all that were there was working.

Q. How many men were there employed in that building at the time you went there, in that mill?

A. I think they were mostly girls.

Q. Well, how many girls were there employed in that mill when you went there?

A. Probably ten.

Q. Not more than ten in the whole—

A. That is my opinion of it now.

Mr. EDWARDS: Do you mean the mill or the building?

WITNESS: This one particular building that was nailed up.

Q. I am asking you about the whole silk mill, how many men were employed?

A. I don't believe that I saw thirty people working in all their buildings.

Q. Then you think there were only thirty employees of that?

A. I don't believe I saw any more than that.

Q. Well, I am not asking you what you saw, I am asking you how many there were?

A. I don't know any more than what I—I didn't ask them, I didn't count them, I am telling you what I think from observation as I passed through the building.

Q. You made no investigation to find out how many were there?

A. I know as much about that as I do about my age I was present at my birth but I am only told I am so old, and I am as sure of that.

Q. Do you happen to know how many men are employed in the Iron works there of Richardson & Boynton?

A. I was told, I think over 400.

Q. Do you know about the Lyondale Dye works?

A. No, sir.

Q. Don't know how many men are there?

A. No, sir.

Q. Do you know about the Singleton silk mill, how many were employed there?

A. No, I do not know.

Q. Did you say the cesspool at the dye works was made out of this same loose stone?

A. The dye works,—we didn't see them.

Q. Didn't see them at all?

A. No, sir; they were closed over, blind cesspool.

Q. You spoke of the number of deaths in a given number of human beings in a drainage area, for instance, in the City of Newark or some other City. Do you think that that is at all affected by the amount of typhoid fever that may exist on the water shed of that city?

A. I don't quite catch the question.

(Stenographer read the question).

Q. Water shed of the drinking water of that city?

A. I don't quite catch your meaning yet. What part are you speaking of now, that I spoke of.

Q. You said you had made a study of the typhoid deaths in Cities?

A. In our city.

Q. You said that a rate above thirty or thiry-five would indicate that the water was bad?

A. Yes, sir.

Mr. EDWARDS: Would indicate there might be—rate from thirty to thirty-five would indicate something wrong in the shed, might be there.

Q. Now I ask you whether the rate would be at all affected, in your judgment, by the number of cases of typhoid fever which existed in the water shed?

A. You mean if there were cases of typhoid in the sheds—at the sheds?

Q. Yes, many we will say—many cases?

A. Why yes, I should say it would.

Q. The more typhoid fever cases in the water-shed the higher would be the rate of death?

A. I should say so.

Q. In the cities that used the water?

A. I should say so.

Q. Well, if there were no cases of typhoid fever in the water-shed you would take that as pretty good evidence that the water was all right?

A. Yes, sir.

Q. You said something about a match box under the culvert of the electric light place?

A. Yes.

Q. What did you mean by a match box?

A. I meant what I said, of course; by placing a little coloring matter in a match box and throwing—

Q. I am asking you about a match box, I am asking you what you mean by a match box, that is what I didn't understand?

A. A little small box which had contained matches, telescope match box.

Q. That was in the culvert?

A. Oh no, we threw it in?

Q. Oh, you threw it in?

A. Yes, sir.

Q. I understood you to say you threw some match boxes in the culvert?

A. No, we put some coloring matter in the match box and threw it down in the culvert; demonstrating how easy we would get the coloring from that point, if it need be,—could be placed there without even a man moving his body.

RE-DIRECT EXAMINATION.

Q. Now, Mr. Chandler, if you had typhoid in the Pequannock water-shed, as it is now constituted and policed, would that mean necessarily typhoid in Newark?

A. No, sir.

Mr. VREDENBURGH: Question objected to as not material.

Q. Now Mr. Chandler then what you mean by stating that the typhoid in Newark would correspond to the typhoid in the water-shed would mean provided it got into the water?

A. Surely.

Q. Would typhoid, in your judgment, in the Rockaway water-shed as now policed get into Jersey City?

Mr. VREDENBURGH: Objected to as immaterial and incompetent.

A. No, sir.

Q. I am speaking now of the Rockaway?

A. No, sir.

Q. You say there is no rule as to cementing privy vaults and cesspools in the Pequannock shed?

Mr. VREDENBURGH: He didn't say that.

Q. Is there any rule as to cementing privy vaults or cesspools?

A. No rule.

Q. Do you require that?

A. We don't.

Q. Why not?

A. We think it is better to have the bottom open.

Mr. VREDENBURGH: Objected to as incompetent and immaterial.

Q. Do you consider it necessary or advisable to cement the sides of privies and cesspools?

Mr. VREDENBURGH: Objected to as incompetent and immaterial.

A. I do not.

Q. Is it wise, in your judgment, to leave the bottom of the cesspool and the privy open?

Mr. VREDENBURGH: Objected to for the same reason.

A. Certainly do.

Q. Now you were asked as to the conditions of the Pequannock water-shed, have you seen any improvement in that water since the installation of the Cedar Grove reservoir?

Mr. VREDENBURGH: I object, he wasn't asked about that, and it is not re-direct examination.

A. Yes, sir.

Mr. VREDENBURGH: I object to this counsel asking questions which the former counsel examining him on direct, did not ask.

Q. What do you attribute that improvement in the Pequannock water-shed to?

Mr. VREDENBURGH: Objected to as incompetent and illegal, and not re-direct examination of this witness.

A. From the sedimentation reservoir at Cedar Grove.

Q. How does the Cedar Grove reservoir for the purpose of sedimentation, in your judgment, compare with the Boonton reservoir?

Mr. VREDENBURGH: Objected to because this witness has not shown any competency to speak as an expert upon the sedimentation, and he has not been asked about

> it, and he is being now examined by different counsel than examined him on his direct examination, and he did not ask him anything about it.

A. In my opinion it is a very much larger body of water, and a great deal safer than ours.

Mr. VREDENBURGH: I move to strike out the answer for the same reason.

Q. Now you were asked about the privy vaults, if you had seen any pipes running to the river; did you see any indication of pipes leading from those privy vaults?
A. Not the slightest.
Q. In your opinion would that have been a proper method of building the privy vaults?
A. No.
Q. Would it have been the ordinary way?
A. No, sir.
Q. Would that have entailed considerable expense?
A. Yes.
Q. Now, when you investigated the mine hole at Ross' at Wharton, did you take any means to ascertain its depth—did you do anything?
A. Yes, we tried to drop a stone,—several of them in—large cobbles, half as large as your head, and listened for them, but it was so deep we could not hear the stone hit anything.
Q. Now you say that there are three mills, according to your notes?
A. Ross is one.
Q. Some distance from the river—away from the others?
A. Yes, sir; I think I testified about a hundred and fifty feet.

Q. Now did you examine these water closets that were nailed up, when you came back?

A. Yes, sir.

Q. What did you find the condition at Ross'?

A. They were closets and of course there was nothing in them.

Q. Were they connected with the river?

A. We put the coloring in, we made the test.

Q. What was the result of the test?

A. No result.

Q. What did you conclude from that?

A. They were not connected with the river; they could not have been, with the test we made.

Q. You were asked relative to the jail at Dover, is there any out-let now into the river from the jail?

A. No, sir.

Q. Is there any opening from the jail to the river bank?

A. Absolutely none.

Q. You were asked if you considered the water in the Rockaway river below Dover polluted and contaminated—I now ask you if you consider the water as it leaves the Boonton reservoir in any degee polluted or contaminated?

Mr. VREDENBURGH: Objected to as immaterial, illegal and incompetent.

A. Certainly not.

Q. What effect has the reservoir upon it?

A. Sedimentation.

RE-CROSS EXAMINATION.

Q. You said that if typhoid germs were in the water of the Rockaway river they could not go down to Jersey City; why not?

A. They would go as far as the Boonton reservoir, in my opinion.

Q. Yes.

A. And there either die or settle.

Q. Are they lighter than the water?

A. They are heavier.

Q. Are they heavier than the water?

A. I suppose they must be.

Q. What makes you think so?

A. Well, I am not qualified to answer that question, Mr. Vredenburgh.

Q. What do you know about their length of life, anything?

A. I don't.

Q. What do you know about their ability to propagate in the reservoir on dead algea?

A. I don't know.

Q. What do you know about sedimentation; what is sedimentation?

A. I don't know anything about it at all.

Q. Is sedimentation effected at all by the currents in the reservoir?

A. I am not an expert and would not like to answer.

Q. Do you know whether there are any currents in the reservoir?

A. I don't.

Q. How do you know they would not pass through the reservoir?

A. I don't, perhaps.

Q. Why do you swear to it?

A. I know this much,—that I trust a good deal upon the bacteriological reports made to our office, and we believe one another; when a report comes to me making that statement, the bacteria reduced to so much, why I take it as being facts, and I believe it myself; that is my opinion, based upon the reports.

Q. Then your answer was based on some reports that you saw, was it?

A. On the working of it; yes.

Q. On the working of some reports?

A. Yes.

Q. What reports were they that you base your opinion on?

A. On our own; Cedar Grove.

Q. Well, do you think that the currents are the same in Cedar Grove as in this reservoir at Boonton, or do you know anything about it?

A. I don't know anything about it.

Q. Then you haven't any knowledge on that subject at all?

A. No, sir.

Q. Then you judge that this bacteria—same bacteria would die in the Boonton reservoir, because they died in the Cedar Grove reservoir?

A. Yes.

Q. Well, now, where is the report in the Cedar Grove reservoir from which you form your judgment?

A. In our office.

Q. Which were they, what year and what day?

A. Made every month, every week.

Q. Was there any particular one?

A. No particular one; all of them.

Q. How many bacteria entered the Cedar reservoir last month?

A. I cannot tell you offhand.

Q. Can you tell us within a hundred thousand on any particular day of the number of bacteria that entered Cedar reservoir from the river; within a hundred thousand?

A. No, never reached one hundred thousand,—one hundred thousand per centi-meter, I mean.

Q. You mean in a cubic centi-meter?

A. Yes, sir.

Q. I was talking about the tenth of a cubic centimeter?

A. I don't know.

Q. Do they measure bacteria by the centi-meter?

A. I think they do; I am not qualified to say.

Q. You said you saw somewhere a report?

A. I saw a report; yes.

Q. Was that of a cubic centi-meter?

A. Based upon cubic centi-meter.

Q. What did you find that?

A. Figured made out, based upon centimeter.

Q. How many bacteria was it per cubic centimeter?

A. Cannot tell you, but quite a load.

Q. Do you call the typhoid bacilli a bacteria?

A. Yes.

Q. You do?

A. Well, I don't testify to that.

Q. Eh?

A. I refuse to answer on that.

Q. I understood you to say you did not know whether it was a vegetable or an animal?

A. I don't.

Q. You don't?

A. No, sir.

Q. You don't know whether it is bacteria or not?

A. I am not a bacteriologist.

Q. How, then, did that help you to determine whether typhoid bacilli would pass through the Boonton reservoir or not?

A. From the reports.

Q. You said that was the report of the bacteria?

A. Yes.

Q. Well, you don't know whether typhoid bacillus is bacteria or not; now, how did those reports help you?

A. It showed no typhoid?

Q. Did you ever see a report that did show typhoid?

A. I have seen reports that showed bacteria, identical with typhoid.

Q. Typhoid is not a bacteria you said?

A. I don't know, I said.

Q. Well, how do you know it is identical?

A. From reading reports.

Q. Did you ever read of any bacteria that was identical with typhoid bacillus?

A. Only the reports that came from our laboratory.

Q. Which bacteria was it that was like typhoid bacillus?

A. Well, we don't know; the reports reads we find bacteria identical with typhoid; that is a bacteriological phrase, I suppose.

Q. You have seen reports which said that they find bacteria similar to typhoid bacillus, did you?

A. Well, I have seen those reports.

Q. Whose reports were they?

A. Dr. Connelly's, our bacteriologist.

Q. Have you seen Dr. McLoughlin's reports?

A. No, sir.

Q. You swore that if typhoid bacilli were in the Rockaway river they would not get to Jersey City because of this report of Mr. Connelly's, upon the Cedar Grove reservoir, that he did not find any bacteria in there like typhoid bacillus; is that what you mean to tell us?

A. I didn't say that he ever made a report on the Pequannock that there was anything identical with typhoid; I said he made reports, they have been of wells of the city; I didn't say he made reports from our Pequannock water that he found anything identical.

Q. I understood you to say that he reported that he did not find anything—any bacteria similar to typhoid bacillus?

A. In the water.

Q. In the Cedar Grove water, or water that went through Cedar Grove?

A. Yes.

Q. And it was from that that you concluded that the typhoid bacillus, if in the water of the Rockaway would die in the Boonton reservoir?

A. That is the teaching and lectures that I heard.

Q. That is where you got your information from, you said?

A. Yes.

Q. Now, then, you say something about lectures?

A. Yes.

Q. What lectures have you heard that gave you any information such as you can speak as an expert upon sedimentation?

A. I am not an expert on sedimentation.

Q. What lectures have you heard that would lead you to think that because Mr. Connelly said that the waters of the Cedar Grove had no bacteria in it, like the typhoid bacillus, that therefore the Boonton reservoir would protect Jersey City?

A. I have heard papers read for the last ten years before the American Public Health, and discussions for hours on the subject, and that is the general impression of all men who are up in that work, and we get our teachings—

Q. Have you ever heard of Professor Seidwick?

A. Yes, I have heard of him.

Q. He is a very prominent man; head of the Massachusetts College of Technology?

A. Yes, sir.

Q. Have you ever read his works?

A. No.

Q. Do you rely on him?

A. Oh, they differ a great deal.

Q. You said he did?

A. I didn't say him. I said these lectures and discussions by the American Public Health papers and discussions, and the majority of them—

Q. Were they on sedimentation?

A. I am speaking of the typhoid.

Q. Were they on sedimentation?

A. No.

Q. How do you understand the Boonton reservoir protects the people of Jersey City from the typhoid bacillus?

A. For the same reason that I am taught to believe that ours at Cedar Grove does.

Q. You have had typhoid bacillus in your—

A. No, I didn't say so; it would protect us.

Q. You think the Cedar Grove reservoir would protect you from typhoid bacillus?

A. Yes, sir.

Q. You have reason to think so, not because it ever has, but because Dr. Connelly says that there are no such bacteria in the Cedar Grove; is that about your argument?

A. You are mixing it up a little.

Q. Well, see if you can make it plain, then, what you mean by Dr. Connelly's report. You say that Dr. Connelly's report lead you to swear that the typhoid bacillus would die between the Rockaway river and Jersey City?

A. No, I didn't say so.

Q. What did you say about it?

A. I said the reports lead us to believe that there was no danger, as it had been in a large body of storage water, and that the reports that he makes showed, I believe,, a reduction of bactetria of ninety per cent.; all bacteria at the Cedar Grove reservoir since we have had that reservoir.

Q. Is that all that you have?

A. That is all I know.

Q. Do these reports show that the reduction of ninety per cent. is at all times, and at all seasons and under all circumstances in every time?

A. I am not speaking of every report; I suppose they may vary different seasons of the year, but that is the percentage of reduction, as a rule, I think.

Q. Is that so in case of ice, when it is frozen, too?

A. They may vary a little, I don't know.

Q. Well, you cannot tell us the number in the last report?

A. No, I cannot.

Q. Cannot tell us the number. Where does he analyze it; does he analyze the water every week?

A. Yes, every week.

Q. At what points?

A. The water is taken at the different parts of the city.

Q. But at Cedar Grove?

A. He takes it from the outlet and the inlet.

Q. Every week?

A. Every week; takes it from the different parts of the city, and also the intakes.

Q. Is it safer to have the closet over the stream and no privy vault at all?

A. I should say not.

Q. You would think it was a little safer to have a privy vault?

A. Certainly.

Q. If you have a privy vault is it safer to have it with small stones or big stones?

A. I don't think it makes much difference.

Q. If you have it does it make any difference whether it is from the river twenty feet?

A. As far as you can get it—it is better.

Q. Why?

A. Moral standpoint, if no other, as far as looks goes.

Q. Its location?

A. Yes; a privy vault might be as safe twenty feet from the river as it might be one hundred and twenty

Q. Safe from what?

A. From the contents going into the river.

Q. Well, the typhoid bacillus can pass some distance through the soil, cannot it?

A. I don't know; cannot testify to that.

Q. Then you are speaking with reference to a closet without regard to the typhoid bacillus?

A. Yes, I am speaking now of the contents of the closet without regard to what is in it.

Q. Whether it is infectious or not?

A. Yes.

Q. If it is not infectious, then it doesn't make much difference whether it is cemented or not?

A. Doesn't make any difference.

Q. If it is infectious you would prefer to have it cemented?

A. It depends entirely on the condition of the soil, too.

Q. Let us have those conditions that would make it better to have it open than closed, where it is infectious?

A. You are asking me the question?

Q. Yes, I am asking you.

Mr. EDWARDS: Do you mean the bottom?

Mr. VREDENBURGH: No, the whole privy vault.

A. It would be just as safe to have it open.

Q. Just as safe to have it open?

A. Sides and bottom, I should judge; that is my opinion.

Q. Don't you think there would be more chance for the infectious material to get to the river if it were open than if it were closed?

A. I don't think so.

Q. Why not; it would be easier to get out of the privy vault if it was open?

A. If it was closed we don't know where it would be dumped, after it was cleaned; the greatest danger is what to do with it when it is housed up in brick vaults.

Q. Then the greatest danger from typhoid patients is not that it would get into the river, but that where the deposit will be taken from the vault and put on the land; that is the danger?

A. Yes, or near the river.

Q. Well, isn't it more dangerous if the privy vault is open so that it gets right in the river?

A. The chances are that it wouldn't.

Q. What do you know about that?

A. I don't know unless I saw the vault; if I saw the individual vault I could tell you more about it.

Q. Wouldn't it be less likely to get in the river from that vault if it was tight than if it was open?

A. No, I think not.

Q. Why not?

A. For the reasons I have stated.

Q. What reasons; you haven't stated any yet?

A. I stated the danger is doing away with the contents of that vault after it becomes full; there is more danger with the vault becoming full and freshets running over, and no way for the liquid matter to get out of it at all; neglect of cleaning it; neglect to get somebody to have the power to clean it; the tenant might not have the right and the owner might be in

Europe. There are a great many more reasons why it should not be held up.

Q. Your judgment is that it would be better to get it right in the river?

> Mr. EDWARDS: I object to that question on the ground that there has not been any foundation for the testimony of the witness and entirely uncalled for.

Q. Your judgment is that it would be better to let the contents of the privy pass through the sides into the river—through the intervening soil—than it would be to seal the vault so that it could not escape through the sides or bottom?

A. Into the river did you say?

Q. Question repeated

A. I would not think it would be advisable to let it go into the river; I think it would be advisable to let it go through the soil rather than house it up; not necessarily get into the river because it is not water tight.

Q. I understood you to say you had no knowledge at all upon the question of how far through the soil the typhoid bacillus would pass and retain its vitality?

A. No, I haven't.

Q. Is it safer because the sedimentation is better?

A. I have heard of that, but I don't know anything about it.

Q. Why did you give your opinion here under oath if you didn't know anything about it?

A. I should think it would be safer, I said.

Q. Well, you don't pretend to know anything more about it than any other human being?

A. No, sir.

Q. You said you saw no pipe from the privy to the river, nor you saw no indication of a pipe?

A. No, I did not.

Q. You didn't examine to find out?

A. Well, examined from the banks of the river on several occasions, yes, but not from the vault side.

Q. You cannot tell whether the pipe was below the water?

A. No.

Q. Would it make any difference, Mr. Chandler, whether it was a pipe that led from the bottom of the vault to the river, or if it were a crevice in a rock that led from the vault to the river, so far as the infectious contents of the privy going from the privy to the river is concerned?

A. Are you speaking now of the cesspool and the vault; if I understand your question, no, it would not make any difference.

Q. I suppose you made no examination to see whether there was any crevice or holes in the stones or rocks leading from the privy to the water?

A. We did not.

Q. What did you mean then when you said that these privy vaults were all O. K.—were all right?

A. In good condition, in my judgment.

Q. What do you mean by good condition?

A. They were not full; no indication of their going to the river, and, in my opinion, far enough away to be safe, and that is the reason, in my opinion, I said they were O. K.

Q. I understood you to say you had no experience at all as to the distance that would be necessary to have cesspools from the river for the purpose of preventing infectious material from passing from the vault to the river?

Mr. EDWARDS: Objected to, because what he said is that he had no knowledge how far germs could travel.

WITNESS: That is right.

Q. I ask you whether you said that in your prior examination or not?
A. No, sir, I din't say so.
Q. You never said that?
A. No, sir.
Q. That is all.

Sworn to before me, (the signature being waived), this 28th day of March, A. D., 1907, at Jersey City N. J.

THOMAS FANNING, a witness produced and sworn on behalf of the defendant.

DIRECT EXAMINATION by Mr. Corbin:

Q. Where do you live and what is your occupation?
A. I live at Dover and am a mason and contractor.
Q. How long have you been at Dover?
A. 1882—or 1881 at least.
Q. Did you do some work on the property at 99½ Blackwell street?
A. Yes, sir.
Q. When?
A. This winter; I cannot answer exactly the date.
Q. Give the month?
A. I think in January.
Q. January, 1907?
A. Yes, sir, I think it was in January.
Q. What did you do?
A. I fixedthe vault—cesspool.
Q. Did you dig it up?
A. No, I dug between the vault and the river, and put in retaining wall; I went to the bottom of the vault and put in a retaining wall.

Q. How deep did you go?
A. About five feet or six.
Q. Six feet below what?
A. Below the top of the ground.
Q. Did you go below the bottom of the cesspool?
A. Yes, sir.
Q. How far below?
A. Probably a foot.
Q. How long a wall did you make?
A. About twelve feet.
Q. How big is the cesspool?
A. About ten.
Q. What was the material that you made the wall of?
A. Concrete, such as cement, sand and cracked stone.
Q. Is your wall water tight?
A. Well, I cannot say that; tried to make it so; it is not water proof so I cannot vouch for its being water tight.
Q. How thick a wall is it?
A. About twelve inches.
Q. As it is now constructed can the contents of the vault reach the river?
A. I should say not.
Q. Did you fill in around your wall after you finished it?
A. Yes, sir; filled in around the wall did I understand you?
Q. Yes.
A. No, I dug the hole and filled the hole in solid, that is the trench; there was no filling around it.

By Mr. VREDENBURGH:

Q. You mean the cesspool?
A. Back of the cesspool, to prevent it from getting into the river.

FURTHER DIRECT:

Q. You have a place on East Blackwell street, have you not—your office and stable?

A. This is at the same place.

Q. It is?

A. Yes, sir.

Q. Did you formerly have some privies overhanging the river there?

A. Yes, sir.

Q. Are they there now—those privies?

A. The houses are there.

Q. What are they used for?

A. Not at all; used for feed boxes for horses.

Q. What is the other one used for?

A. The other one is another property there and I cannot tell you; I haven't been into it.

Q. Are either of them used now for privies any more?

A. Not to my knowledge.

Q. Yours you have devoted to another purpose, you say?

A. Yes, sir.

Q. Do you know Mary Morris's property on Blackwell street?

A. Yes.

Q. What did you do there, if anything?

A. Built a vault.

Q. When?

A. Last week.

Q. Where is the vault?

A. Well, it is on the lot in the rear of the house, the number I cannot tell you.

Q. What runs into it from the house?

A. There runs a sink pipe into it.

Q. Any water closet lead to it?

A. Not to my knowledge.

Q. What has become of the old vault that was there?

A. They are there yet.

Q. Filled or what?

A. No, cleaned out but not filled.

Q. Are the two connected?

A. No.

Q. Which one is in use?

A. The new one.

Q. How far from the river is it?

A. 25x30 feet.

Q. Do you know a house known as the Seven Sisters?

A. Yes, sir.

Q. What street?

A. Bergen.

Q. What have you done, if anything, there lately?

A. Built two cesspools.

Q. To accommodate all the houses?

A. Yes, sir; that I believe is the understanding.

Q. All you have to do is with the cesspool and vault?

A. Yes, sir.

Q. Where did you build them?

A. In the yard, in front of the house.

Q. How far from the river?

A. Probably thirty or fourty feet, something like that; it is all of that.

Q. Did you do some work at the Mansion House, in the way of digging up pipes and vaults?

A. Yes, sir.

Q. When?

A. Last December, 1906 and January, 1907, I think.

Q. What did you do there?

A. I dug down and found pipes which I was requested to find and disconnected.

Q. Where were these pipes that you found?

A. They were in the rear yard, where they had formerly been for the old laundry.

Q. Running from the laundry to what place?

A. I cannot tell you where they went to, in the direction of the drain, the main drain went to the river, and they went in that direction.

Q. Where did you cut them off?

A. Close to the house.

Q. What did you do?

A. Connected the drain from the laundry with the cesspool.

Q. How far from the side of the house is the cesspool?

A.Fifteen or twenty feet.

Q. Did you dig a trench between the house and vaults, so that you could see all the pipes that were there?

A. Dug a trench along there, yes, sir.

Q. How deep?

A. Until I came to the bottom of the pipes and quit.

Q. Did you find any other pipes except those you have mentioned?

A. Only two.

Q. Did you build these cesspools, originally?

A. Yes, sir.

Q. Built them at different times?

A. Yes, sir.

Q. How long ago did you build the first one?

A. The first one about eight years ago or nine years ago.

Q. How many are there of them now?

A. Four.

Q. Are they connected?

A. Yes, sir.

Q. When was the last one built?

A. The last one was built in January, 1907.

Q. Are they in a row or all connected together?

A. Not in a row—there are three I think in a row, and one off from it.

Q. How many have solid matter and sediment, and how many has water?

A. One has solid matter; one is the receiver and the other is soakage.

Q. The other over-flows?

A. Yes, sir.

Q. Which one does the laundry empty into?

A. The laundry?

Q. Yes.

A. Do you mean the new laundry?

Q. Yes.

A. I don't know, I didn't do the plumbing

Q. You merely made the connection?

A. I built the cesspool, that is all; I didn't do the plumbing.

Q. But you said you cut off the pipe?

A. From the old laundry?

Q. And changed it?

A. I cut off the pipe from the old laundry; the old laundry was changed altogether, and a new laundry built, and I cut off the pipe.

Q. Do you know the Morris sctreet drain, so called?

A. Yes, sir.

Q. Is the Mansion House in any way connected with it?

A. Not that I know of.

Q. Well, you have had to do with the construction of pipes for the Mansion House?

Mr. VREDENBURGH: He said he wasn't a plumber.

Mr. CORBIN: But he built the vaults, as I understand it.

Q. Where does the Mansion House sewage go to?
A. In the cesspools.
Q. Who paid for you doing this work?
A. Who?
Q. For whom did you do this work, this last winter?
A. For the Jersey City Water Supply Company.
Q. Under whose direction?
A. Doctor Leal.

CROSS EXAMINATION by Mr. Vredenburgh:

Q. This was not a very expensive job that you speak of as being paid for by the Jersey City Water Supply Company, was it; how much did it amount to, about $100?
A. Yes.
Q. $50.
A. Yes, it amounted to $100 all right.
Q. And it consisted of building a vault at your place, 99½ Morris street?
A. It consisted of building a well there to protect the vault.
Q. And it consisted of building this cesspool for Mary Morris?
A. Well, that is not paid for.
Q. Is that to be paid for by the Jersey City Company?
A. I suppose so, but I say it is not paid for.
Q. Did it include also this work you did at the Seven Sisters?
A. No, sir, that is separate.
Q. Excuse me for asking you a little more about that 99½ Morris street, because I don't quite understand it. The wall that you built was between the cesspool and the river?
A. Yes, sir.

Q. And the cesspool was a tight cesspool or an open cesspool?

A. What do you mean, whether it was—

Q. Cemented all around and bottom?

A. No, sir, it was loose stone, dry stone wall.

Q. And the bottom was the ordinary bottom?

A. Yes, sir.

Q. Is this filled in land?

A. I suppose it is, I should judge it was.

Q. And this wall you built, did you go down to the hard pan with that?

A. Yes, sir.

Q. It was how long in front of you?

A. How long was the wall I built?

Q. Yes.

A. Somewheres along twelve feet, and it may be fourteen, I didn't measure it.

Q. How far is that wall from the river, do you say?

A. I should judge that wall was about fifteen to twenty feet; maybe more.

Q. And it is a straight wall between the cesspool and the river?

A. Yes, sir

Q. And a foot deeper than the cesspool?

A. Yes, sir.

Q. What, if anything, is there to prevent the water from the cesspool running around each end of the wall?

A. I don't know as there is anything if it goes far enough around.

Q. Well, is the cesspool in use, in connection with the house?

A. Yes, sir.

Q. Is there a closet in the house?

A. Yes, sir.

Q. How many closets use that cesspool?

A. Four, at least there is four families and no outside toilet.

Q. Four families?

A. Yes, sir.

Q. How many do they consist of?

A. The families are small.

Q. About three in a family?

A. Average three.

Q. So that about twelve people are using it?

A. Yes, sir.

Q. How long has that cesspool been there?

A. That cesspool has been there about three or four years, I cannot say which, I think about four years.

Q. How many times has it been cleaned?

A. Never, to my knowledge.

Q. Never was cleaned?

A. Not to my knowledge.

Q. What do you say the size and diameter of it was?

A. About ten feet across it, I should judge, ten feet in diameter.

Q. And from what you said, about five feet deep?

A. Five to six feet deep, something like that, yes, sir.

Q. This is Mary Morris's place?

A. Yes, sir.

Q. That has also a cesspool of a similar character?

A. Well, yes. There is nothing goes into that; all sink water.

Q. Where is their closet?

A. It is a combination of cesspool and vault; is a combination.

Q. The cesspool is used only for the drainage water from the sink?

A. That is all.

Q. But the vault is used for the human matter?

A. Yes, sir, and the pipe runs right into that same vault.

Q. And the pipe runs from the vault to this cesspool?

A. From the house to the privy as you may call it.

Q. To the privy?

A. Yes, sir, privy vault.

Q. How close is the privy vault to the river?

A. I should say about thirty feet; I haven't measured it.

Q. Is that loose stone too?

A. Yes, sir.

Q. It seems that the fecal matter don't get into the cesspool, it goes into the vault?

A. There isn't any cesspool.

Q. Oh, there isn't any cesspool?

A. No, the vault makes the cesspool; you see the pipe runs into the vault.

Q. How does the fecal matter get into this vault or cesspool; is there a water closet over it?

A. Certainly.

Q. Right on top of it?

A. Yes, sir.

Q. Then the pipe runs to the house for sink water?

A. That is all.

Q. That is built also of loose stone?

A. Yes, sir.

Q. And the land is filled in land there?

A. Yes, sir; well, some. I don't know that there is so much filling around there; I should not say so.

Q. Well, is that any deeper?

A. No.

Q. Do you recollect when you built it that you had trouble with water?

A. In building that?

Q. Yes.

A. Why certainly.

Q. What trouble did you have with water?

A. The only trouble was bailing it out.

Q. When you got down near the bottom the water ran in from some place?

A. Soaked in from some place.

Q. And you had to bale it out?

A. Yes, sir.

Q. Was that the same way when you built this wall that you speak of?

A. No, sir.

Q. Was it a different time of year; was that the reason of that?

A. No, it was a different location.

Q. Now the Seven Sisters, you built a vault there; is that on made land too?

A. Yes, sir.

Q. Is that cesspool also dry wall?

A. Dry wall, yes, sir.

Q. No bottom?

A. Well, it has a good gravel bottom, so that it makes good soakage.

Q. Did you have any rock—weren't there rock there, too; didn't you have some trouble with rock there?

A. Where?

Q. When you built the cesspool for the Seven Sisters?

A. Trouble with rock?

Q. Yes, or big stones?

A. I don't think so; all the trouble we had with rock was to get them there from the quarry to build it with.

Q. Were you troubled with water there?

A. Yes, sir.

Q. How did you get the water out there, bailing some part, or with a pump?

A. With a pump.

Q. I suppose the water there was worse than it was at the other place, when you were using the pump?

A. Yes, sir.

Q. You had to have a man using the pump all the time to get down?

A. Not exactly all the time; he could do a little other work in between.

Q. How deep was that from the surface?

A. About six feet; I think we went down between five and six feet.

Q. How much is the water of the river below the surface of the ground where the cesspool is?

A. I cannot say; I didn't measure it.

Q. Five or six feet?

A. Not more than that.

Q. Is there any brook or runway for water between the cesspool of the Seven Sisters and the river?

A. The sluiceway there.

Q. How near is that to the cesspool?

A. 25 feet.

Q. About 25 feet?

A. I should say about 25 feet; just a lane way in between.

Q. It runs parallel with the river, that sluiceway?

A. Yes, sir.

Q. Where does it go to the river?

A. Then by George Richardson stock house.

Q. Is there water in that?

A. At times.

Q. Is there usually water there flowing?

A. I think there is the biggest part of the time; there is more or less water in it.

Q. In times of freshets I suppose there is more?

A. Yes, sir.

Q. In times of freshets does the water of the river in the heavy freshets do the water of the river run over the top of the cesspools?

A. Well, I don't know; I have never seen it running over there, so I cannot say.

Q. How about yourself, does it rise up as high as the top of your cesspool?

A. I have seen it as high, but the other place where you are speaking of I haven't.

Q. Haven't been there when there was a freshet?

A. No, sir.

Q. You spoke of the Mansion House?

A. Yes, sir.

Q. As I understand it there was one old cesspool built some seven or eight years ago?

A. Yes, sir.

Q. Into which then went and now goes all the solid material from the house?

A. Yes, sir.

Q. And the pipes leading from that cesspool are so shaped that the solid matter cannot get out of it?

A. Yes, sir.

Q. Near the water?

A. Yes, sir.

Q. At the time it was built there was a connection made between the cesspool and the drain that ran down into the river? About eight years ago?

A. Yes, sir.

Q. Did you have anything to do with cutting the pipe that led from the first cesspool to the drain; did you have anything to do with cutting that off?

A. I put the pipe to the first cesspool and cut the drain apart in order to do it.

Q. When did you do that?

A. When Mr. Richards connected to that cesspool, six, seven or eight years ago.

Q. You built a connection ot that cesspool from where I am talking about, the one in which the solid material is?

A. That is what I am speaking of now. The drain was cut off before it was connected to any of them, you know.

Q. The drain was cut off before the cesspool was built at all?

A. No, the drain was cut off when the connection was made to the first cesspool; had to cut the drain off to get it in there.

By Mr. CORBIN:

Q. Before any cesspool was built at all the drain used to run from the Mansion House direct to the river?

A. Yes, sir.

Q. When the first cesspool was built, that was cut off and the drain led into this cesspool?

A. Yes, sir.

Q. And other cesspools added since?

A. Yes, sir.

FURTHER CROSS:

Q. You spoke of some of the pipes—the laundry pipe, for instance, never was cut off from the drain until you cut it off here this winter?

A. No, sir.

Q. It always went to the drain?

A. I don't know where it went out near—somewheres.

Q. You don't know that it went to the cesspool?

A. Nor I don't know that it went to the drain.

Q. Nor do you know that the plumber didn't put connection in between the old cesspool and the drain?

A. I don't.

Q. You don't know whether from the stable—there is a cesspool in the stable, center of the stable, isn't there?

A. Yes, sir.

Q. Do you know where the pipes from that go?

A. I didn't know there was any pipes from it.

Q. You don't know whether there is or not, do you?

A. No, sir, I do not.

Q. There is also a closet in the rooms occupied by the photographer, I think, and also the harness maker; do you know anything about those pipes?

A. No, sir, I do not.

REDIRECT EXAMINATION:

Q. What did the Jersey City Water Supply Company pay you for the work you recently did at the Mansion House?

A. $370.47, if I remember right.

Q. That is all.

Sworn to before me, (the signature being waived) this 28th day of March, A. D., 1907, at Jersey City, N. J.

CHARLES A. HALLGRINZ, sworn on the part of the defendant.

DIRECT EXAMINATION by Mr. Corbin:

Q. I believe you are a plumber and inspector of the City of Newark?

A. Yes, sir.

Q. Have you examined the vault at 14 Blackwell street, Dover?

A. That is in the row, I believe, 14 and 16, yes, sir.

Q. Did you go into the vaults?

A. 14 and 16; no, I wasn't in that vault.

Q. Did you examine them?

A. I examined it from the bank.

Q. Were they empty when you examined them?

A. Yes, sir.

Q. When was it?

A. That was the 9th of May, last year, 1906.

Q. Didn't you enter the cesspool at No. 16 or 14, one of those two?

A. Not I; I wasn't in that cesspool.

Q. Did you examine them to see whether there were any pipes leading into them?

A. Yes; I saw from the bank that there were pipes leading into them.

Q. Into which ones, if any?

A. I have a little sketch here, that I can refresh my memory from; 14 and 16 had the same cesspool, there was one cesspool for both houses.

Q. What did you observe about pipes, if anything, going into those?

A. At that time the pipe from No. 16 went direct to the cesspool, but the pipe from No. 14—well, there was a pipe leading from that direction; there was a connection between somewhere, apparently to the drain.

Q. What from, houses or sinks or water closets or what?

A. Sinks and water closet.

Q. You didn't put in blueing or any test of that sort?

A. No, sir, I didn't.

CROSS EXAMINATION by Mr. Vredenburgh:

Q. When did you see this cesspool on the bank?

A. The 9th of May.

Q. Of what year?

A. 1906.

Q. Where did you stand on the bank?

A. I kneeled down and looked over right into the bank.

Q. What bank?

A. That is the earth on the top of the cesspool.

Q. Is there any earth on top of the cesspool?

A. No; all open through the man-hole of the cesspool.

Q. What was the bank which you said you stood on?

A. The bank of the cesspool, on top of the cesspool, the earth over the cesspool, with the exception of the man-hole. The man-hole was taken off at the time and there was another man in the cesspool when I was there.

> Mr. CORBIN: We admit it was connected, we discovered it was connected, and there was no necessity of putting him on, but I was a little misinformed as to what was done, but we concede that that was done.

Q. At No. 14, you or your partner found that the pipes, while they appeared to go to this cesspool did not actually go there?

A. Not the one from 14, at that time.

Q. It appeared to go to the cesspool, but in point of fact somewhere or other it turned off and went into the drain?

A. That is the time we discovered 14 ran to the drain.

Q. And the drain ran to the river?

A. Yes, sir.

Q. How far was it from the drain to the river?

A. At this house?

Q. Yes, where this pipe entered the drain?

A. Well, do you mean in a direct line to the river, or on a line of the pipe?

Q. On the line of the pipe.

A. Following the line of the pipe?

Q. Yes.

A. I should imagine that would be not less than five hundred feet of pipe in between that place and the river.

Q. But direct to the river, how far?

A. Probably about 475—

Q. About 25 feet longer by the pipe than it would be direct?

A. Yes, sir.

Q. That is all.

Sworn to before me, (the signature being waived) this 28th day of March, A. D., 1907, at Jersey City, N. J.

EDWARD P. COULSTON, sworn on the part of the defendant:

DIRECT EXAMINATION by Mr. Corbin:

Q. You are a plumber?
A. Yes, sir.
Q. Were you down in the vaults of 14 and 16 East Blackwell street, last May?
A. I wouldn't say whether it was 14 or 16, or 12 or 14, it is right on the corner.
Q. Was it with this last witness, Mr. Hallgrinz?
A. Yes, sir.
Q. It was the vault that was on the corner?
A. Yes, sir.
Q. On what?
A. On the corner of the alley; I forget the name of the street now.
Q. Did you go down into the vault?
A. Yes, sir.
Q. Did you find any pipes connected with it, and if so, what?
A. Yes, sir.
Q. What did you find?
A. I found the house on the corner and the house that stands on the rear of the alley, I think, Morris street.
Q. You found pipes coming from those?
A. Yes, sir.
Q. Did they have fixtures?
A. Yes, sir; the fixtures were tried, and there was part of the second house we did not connect to the vault.
Q. What did you discover about that?
A. That was connected to the drain that ran to the river, but what part I cannot tell you without referring to the plan.

Q. Did you afterwards cut off the pipe of that house which was then emptying into the drain?

A. I didn't, no, sir.

Q. Were you there when it was done?

A. No, sir.

Q. I show you Exhibit D-16, being a map, and particularly the part of it showing—

A. That enters the Mansion House; this is the part—here is the cesspool, there is the cesspool and this is the corner house and that was next to the corner.

Q. You show me the part of the map which is at Blackwell and Morris street?

A. Yes, sir.

Q. Can you indicate here which is No. 14 and which is 16?

A. This is No. 14.

Q. Put it on with pencil?

A. It is marked there.

Q. It is there indicated on the top of the map?

A. Yes, sir.

Q. You found 14 to be what?

A. This part of it was connected to the cesspool, and that part that takes in the water closet and basin on the first floor, water closet and bath tub on the third floor are connected to the drain that run to the river.

Q. What are these red lines that run down toward the cesspool?

A. Dr. Leal told me afterwards that they had been cut off and connected.

Q. That indicates some new work then that was not there?

A. Yes, sir.

Q. But the result of your test and inspection there showed a connection from house No. 14 water closet back to this drain which ran to the river?

A. Yes, sir.

Q. You didn't know that when you went there?
A. No, sir, not until the test was made.

Mr. CORBIN: Well, we admit that that was there.

Q. Did you enter the cesspool on the Mays property at the rear of Dr. Hunter's office?
A. Yes, sir.
Q. When?
A. On October 23d, 1906.
Q. Did you examine to see whether the fixtures from the house were connected with that cesspool?
A. Yes, sir.
Q. Were they?
A. Yes, sir.
Q. Was there an outlet from that cesspool—from the old drain on to the river anywhere?
A. No, sir, there wasn't.
Q. Was it empty so that you could see it?
A. It was empty within about, I should judge, ten inches; the water was in there when I was there.
Q. Did you look to see if Dr. Hunter's office was connected with this cesspool?
A. When the water closet was flushed in Doctor Hunter's office I think it was flushed by Mr. Gibson, and I was in the cesspool at the time, and I could hear when he pulled the chain at the tank and the water came to the cesspool very shortly afterwards, within a few seconds.
Q. Is there any pipe or outlet to that cesspool?
A. There is no outlet to the cesspool, no, sir.
Q. Any connection between it and the river?
A. No, sir.
Q. Did you go through the conduit at Richardson & Boynton's stove works with Mr. Chandler, at the time he has testified to this morning?
A. Yes, sir.

Q. When was that?

A. On October 29th, 1906; I was through there with Mr. Chandler; the day before I was through the majority of it myself.

Q. What pipes, if any, were there connected with that drain?

A. There were—the one which the Richardson & Boynton—

Q. Yes.

A. There was a small pipe, they claimed that came from a spring.

Q. Whereabouts was it; on what part?

A. That was down underneath the foundry, or right at the edge of the foundry, I cannot say positively.

Q. What kind of water was coming out of that pipe?

A. Clear water.

Q. Where was the other pipe you saw?

A. There was another pipe that came from the wash sink in the foundry room.

Q. And was there any connection of any kind by pipe or otherwise opposite or anywhere near the privy arrangements where the wagon stands, the privy arrangements on the surface?

A. Yes, sir.

Q. What was there there?

A. The first day I was in that sewer or conduit, whatever you call it, the pipe had been plugged up, and it hadn't been plugged up very solid, and I suggested to the superintendent of the works that we have that cemented up more thoroughly and it was done, and the morning that Mr. Chandler and I went down it was cemented all.

Q. Which end of it was plugged up and cemented?

A. The end that led into the conduit.

Q. Where did that pipe go to?

A. From the appearance it went toward the old water closet.

Q. Is that the pipe that opened at the foot of the wagon, through the ground?

A. From all appearance it ran that direction, I cannot cay.

Q. Did you observe the different levels?

A. Yes, and if that ran over to where that wagon was why it is pretty nearly on the same level with the bottom of that conduit.

Q. And you say after you went there alone, the first day, it was closed up with cement, concrete?

A. It was more thoroughly cemented up; of course the first day I was in there, there were a couple of small places, and I suggested to the superintendent that he ought to have it cemented up more properly, and he did so.

Q. When were you last there where the wagon arrangement is?

A. I wasn't there after that.

Q. What had been done up at the wagon end; was the pipe there then opened, closed or what?

A. I couldn't see any at the wagon.

Q. Couldn't see any pipe there at all?

A. No, sir.

Mr. VREDENBURGH: Are you talking about the pipe that went toward the water closet?

Mr. CORBIN: No, I am talking about the place where the wagon stood as a privy arrangement; there was a pipe there in the ground.

Mr. VREDENBURGH: Is this the same pipe which he says went toward the water closet, or is that another pipe?

Mr. CORBIN: He says that this pipe which he saw stopped up inside of the conduit he thinks was about the location where it probably was—this old thing that went to the privy arrangements.

WITNESS: It is the only pipe that is on that side, and it is almost direct from the water closet.

Q. And the pipe that you saw sealed up inside you think that may have been the one from the water closet?
A. Yes, of course, not seeing it uncovered, but I cannot say positively.
Q. But the other one near the water closet you cannot see at all?
A. No, sir.

CROSS-EXAMINATION by Mr. Vredenburgh:

Q. I understood Mr. Chandler said that he went through there with some one, some plumber, and I suppose he meant you?
A. Yes, sir.
Q. Did you go any further through that conduit than he went that day?
A. I was about seven or eight feet ahead of him.
Q. Well, he said that he stopped at the man-hole nearest the outlet, didn't go any further than that manhole; did you go further than the manhole?
A. I guess that was the manhole we went into.
Q. Well, did you go any further in that direction than that manhole?
A. Towards the outlet?
Q. Yes.
A. Yes, sir; we went down underneath the foundry to get in the first manhole, the other side of the foundry; went up, then came back and went to the

mouth of the conduit within about, I should say, twenty feet.

Q. Of the mouth of the conduit?

A. Yes, sir; and then came back and went out.

Q. Of the same manhole?

A. No, the second manhole, because it was easier to get out.

Q. When you went up in the opposite direction to the mouth, how far did you go up in that direction, to the end of the conduit?

A. No, sir; to the second manhole.

Q. You, therefore, did not know what entered the conduit above that?

A. No, sir.

Q. Now, this pipe that you say was stopped up with cement, is there anything to prevent that cement being taken out, if a person attempts to take it out?

A. Have to use a hammer and chisel to cut it out; yes, sir.

Q. Now, it was said that some of the stuff that came off the wagon ran down and got into this same conduit; did you see any crack or other way other than this pipe in which that could get in that conduit?

A. No, sir.

Q. Did not?

A. No, sir.

Q. You did not see any crack in it?

A. Nothing out of the ordinary; little crack up along the top.

Q. Was the conduit concrete all around?

A. Yes, sir; it was that wide (indicating), and just about high enough so that I could walk in that position (illustrating), arched over the top.

Q. Between four and five feet high?

A. Yes, sir.

Q. How many people lived in this 16 Blackwell street?

A. That I cannot tell you.

Q. Was it a tenement house or a single dwelling house?

A. Well, I think the store on the corner took up two floors, and I think there is one family on the top floor; and the second building, I think, there is a family on the second and third floor, I am not positive.

Q. It is a sort of an apartment house?

A. Well, according to the rules, why an apartment house would have to be composed of three families or more, and this is not composed of three.

Q. This is composed of two?

A. Two.

Q. One word about Mr. Hunter; Mr. Hunter's cesspool was of what material, stone or cement?

A. Stone.

Q. Wasn't it cemented at all?

A. No, sir; not at all; I think it was what we call a dry wall.

Q. What was the bottom?

A. The bottom was of earth.

Q. Not a cemented bottom?

A. Not a cemented bottom; no, sir.

Q. You were inside of this cesspool at Hunter's?

A. On the Mays property?

Q. Yes.

A. Yes, sir; about five o'clock in the evening.

Q. Did you make any examination to see whether there was any other drain leading from this building towards the river?

A. Which building is that?

Q. This Hunter building?

A. There was another drain that ran through the basement of the Mays building, and had leader connections to it.

Q. That was not the building that Hunter was in?

A. That is, the leaders from the Hunter building went into the same drain that ran through the Mays property.

Q. Did you make an examination of the ground around the building to see whether there was any other drain except that one which you now speak of?

A. Yes, sir.

Q. What examination did you make?

A. I examined, at the closet bowls in every one of the buildings was Mr. Gibson while I was in the cesspool.

Q. And you saw everyone connected with the cesspool?

A. And instructed him which to go to operate, and not operate the second one until I informed him, and in that way I got track of all the closets and sinks that emptied into the cesspool.

Q. You made up your mind that every sink and every closet did empty into this cesspool?

A. Yes, sir; on the Hunter property and the Mays property.

Q. Did you make any further examination to see whether there was any drain that lead from that building to the river?

A. No, sir; nothing outside of the leader connection.

Q. You were satisfied that these water closets did enter into the cesspool, and you made no further examination to see whether there was any other drain?

A. No, sir.

Q. That is all.

Sworn to before me,
(the signature being waived)
this 28th day of March, A. D.
1907, at Jersey City, N. J.

The further examination of witnesses, etc., in this matter stands adjourned until Friday, the 29th day of March, A. D. 1907, at the hour of ten o'clock in the forenoon of said day, at the office of Messrs. Collins & Corbin, Washington street, Jersey City, N. J.

IN CHANCERY OF NEW JERSEY.

Between

THE MAYOR AND ALDERMEN OF JERSEY CITY,

Complainants,

and

PATRICK H. FLYNN, et al.,

Defendant.

Continuation of examination of witnesses pursuant to the adjournment last had, at 10:30 A. M. on Friday, the 29th day of March 1907; at the office of Messrs. Collins & Corbin, Jersey City, New Jersey.

Appearances as before.

CHARLES A. VAN KEUREN, sworn for defendant; recalled for

FURTHER DIRECT EXAMINATION by (Mr. Corbin).

Q. You are the engineer of the city of Jersey City?

A. Yes.

Q. Do you know the location of the water pipes in Jersey City in the vicinity of Christ Hospital?

A. Yes.

Q. You know the location of Christ Hospital on the easterly side of Palisade avenue?

A. Yes.

Q. How is water supplied to Christ Hospital by Jersey City?

A. It is delivered through the 6 foot pipe of the Jersey City Water Supply Company into the 24 inch main at the intersection of Summit avenue and Carlton avenue; it runs in a northerly direction through Summit avenue to Manhattan avenue; easterly in Manhattan avenue to Central avenue, the Manhattan pipe being a 20 inch main; at the intersection of Manhattan avenue and Central avenue is connected with an 8 inch pipe. This pipe runs in a southerly direction, intersecting all the cross streets to the east; the connecting pipes are carried to Palisade avenue and there they are connected with a 6 inch main; another connection at Manhattan avenue and Carlton avenue is made with a 20 inch pipe—by a 20 inch connection, which is carried to Franklin street and there connected with a 16 inch line and that in turn connects with Webster avenue, the Webster avenue pipe being 6 inches in diameter. This Webster avenue line is carried nine blocks of 200 feet each, and there connected with a cross line between Central avenue and Palisade avenue and reinforces this.

Q. Reinforces what?

A. To give an additional supply from the Webster avenue pipe being connected with the Franklin street 16 inch pipe; that is, you have two connections—one on Central avenue and another one on Webster avenue.

Q. Is the sources of these two connections the same?

A. Yes, sir; the same pipe.

Q. Where does the water come from into both of these sections?

A. As I said before, through the Jersey City Supply Company 6 foot pipe.

Q. Directly?

A. Yes.

Q. Does any of the water supplying Christ Hospital come from the Jersey City reservoir?

A. No.

Q. Now, what distance does the water have to travel from the 6 foot pipe to Christ Hospital?

A. I scaled it here a moment ago and it was 4,500 feet.

Q. About what length of time would you judge it would take the water to go that distance during the middle of the day?

A. Five feet a second probably.

Q. That would be how many minutes?

A. That would depend upon the draft upon the pipe.

Q. Well, in the middle of the day?

A. About 5 feet a second.

Q. About 15 minutes, would it not?

A. It would be more than that.

Q. Five feet a second would be 300 feet a minute, and if it was 4,500 feet it would be between fifteen and sixteen minutes, would it not?

A. Yes, sir; that is right.

Q. What is that map you are testifying from?

A. It is sheet number 25 of a collection of maps that I carry with me in my buggy.

Q. Belonging to the city?

A. Yes, sir; but there are maps on a larger scale than these, but these are handy for me.

Q. And you have these in use constantly?

A. Yes, sir.

Q. This sheet number 25 also shows the two city reservoirs?

A. Yes.

Mr. CORBIN: We offer in evidence—instead of the original map—a copy of it to be certified by Mr. Van Keuren.

Q. Will you send us a copy of the map for use in this suit?

A. Yes.

To be marked Exhibit D "Map water main, sheet No. 25."

Q. Will you mark in pencil where Christ Hospital is located so that we can have it in the copy?

A. Yes, sir; at the southeast corner of Laidlaw and Palisade avenues.

Q. You may cross examine.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. This map which you produce is on what scale?

A. Four hundred.

Q. 400 feet to the inch?

A. Yes, sir.

Q. The top of the map is north?

A. The right hand side of the map is north.

Q. And have you marked upon it where the Jersey City Water Supply Company deliver their water to Jersey City?

A. I have not shown the large pipe, but I will have that done if you want it.

Q. I do not know what you mean by that large pipe.

A. The 6 foot supply main.

Q. I do not understand what you mean by the 6 foot supply main.

A. The Jersey City Water Supply Company 6 foot main from Boonton. We have no control over that at present at the point where it connects. Therefore, we do not show it on our maps.

Q. The Jersey City Water Supply Company supply water to Jersey City through a 6 foot main?

A. Yes, sir.

Q. That 6 foot main ends where?

A. It connects with the high service supply on the corner of Summit and Carlton.

Q. Summit and Carlton streets?

A. Avenues.

Q. Does the 6 foot main continue on beyond that?

A. Yes, sir; it continues on to the reservoir.

Q. To the reservoir?

A. Yes, sir; in a southeasterly direction; it goes both north and south.

Q. Do you show on this map the reservoir that the 6 foot main is continued to?

A. I do not show the connection; I show the reservoir, but not the connection—not the supplying company's connection.

Q. Then the two reservoirs which you show here are both connected with the 6 foot pipe of the Jersey City Water Supply Company?

A. Yes, sir.

Q. What is the size of the connecting pipe to each reservoir?

A. Thirty-six.

Q. Inches?

A. 36 inches from Carlton avenue to number two reservoir.

Q. Is that the eastward or westward reservoir?

A. Eastward reservoir; and at number three, the easterly reservoir is connected with three 16 inch mains—five of them; well, I am not certain whether five or four; there are several.

Q. You say the 6 foot main goes to both reservoirs. Where does it divide or branch off to the different reservoirs?

A. On the northwesterly corner of Summit avenue and Troy street.

Q. It divides there into how many pipes?

A. Six.

Q. How many of those go to the most easterly reservoir?

A. Five small 16 inch pipes.

Q. Five small 16 inch pipes?

A. Yes, sir.

Q. What is the difference between a small pipe and a 16 inch pipe?

A. No difference, only that we have been talking about 36 inch pipes and I said a small size or 16 inch pipe connected. It is a smaller size and I call it 16 inch pipe.

Q. To the westerly reservoir what goes from this branch—the branch that leads to the westerly reservoir; is that a 36 inch or 30 inch pipe?

A. I am not positive, but it is one or the other.

Q. Now, how fast does the water pass through the 6 foot pipe before it reaches this branch that you speak of?

A. That is according to the draft they are supplying, of course.

Q. Well, have you made any investigation to find out?

A. I have not; no, sir.

Q. So that you don't know?

A. Well, it wouldn't take long to investigate it.

Q. So you don't know how fast it goes?

A. I have never calculated it.

Q. Before this 6 foot pipe branches to go to these reservoirs, there is another pipe which leads from it and finally gets in some way—in the way you have described, with a tap at the Christ Hospital—where is that?

A. The high service pipe is a pipe that is originally connected with the pumps—the pump house, and is forced up into the higher territory.

Q. And that connection is how far from the place where you said it branched—about?

A. Do you mean between the reservoir connections and the point where we connect with the high service pipe?

Q. With the pipe that goes to Christ Hospital.

A. About 500 feet

Q. What is the size of that connection?

A. 24 inches I think.

Q. 24 inches, you think?

A. Well, I won't be positive whether there are two 16 inch or three 16 inch, or a 24 inch; but my recollection is that it is a 24 inch.

Q. That 24 inch pipe is an old pipe or a new pipe?

A. Well, our 24 inch pipe or the city 24 inch pipe was a connection that the water company made.

Q. Does the city pipe go to the 6 foot main?

A. The water company brought their pipe up to reservoir at a point where the water was diverted into the high service reservoir; they made a connection and there was a short piece of new pipe there connected with the old pipe which was originally laid about twenty years ago or more.

Q. Then there is a new pipe for a short distance from the 6 foot pipe to the old main of the city?

A. Yes, sir; probably 30 or 40 feet.

Q. Then there is a 24 inch pipe running from that point in which direction?

A. North.

Q. How far does it run north before it makes any turn?

A. It goes to Manhattan avenue, a distance of about 800 feet—no, it is not as much as that; it is about 600 feet, I should judge.

Q. Where is the elbow which turns in Manhattan avenue northeast to the 6 foot main?

A. That is what you asked me just now, and I said about 600 feet, and you are asking the same question.

Q. No, that is the farthest turn; now, which is the closest turn to the 6 foot pipe?

A. I do not get your meaning.

Q. When I speak of an elbow I refer to a point in the pipe there at right angles or a lesser angle.

A. Well, the first connection where they supply their water is, as I said, at the corner of Manhattan avenue and Carlton avenue.

Q. Is there a bend in the pipe?

A. Yes, sir.

Q. At what angle?

A. About right angle.

Q. And then it runs up Manhattan avenue about 600 feet?

A. Yes, sir.

Q. Is there a bend there?

A. Yes, sir.

Q. Which way does it bend there?

A. East.

Q. And at what angle?

A. Right angle.

Q. How far does that 24 inch pipe continue in that direction?

A. It is not 24 inch at that point; it is reduced to a 20 inch pipe.

Q. Where was it reduced from 24 to 20?

A. At that point at Manhattan and Summit.

Q. How far does it go straight from there?

A. About 700 or 800 feet.

Q. On what street?

A. On Central avenue.

Q. What way does it turn there?

A. North.

Q. At what angle?

A. About 90 degrees.

Q. How far does it run there?

A. In the neighborhood of 100 feet.

Q. Does it continue to be a 20 inch pipe still?

A. Yes, sir.

Q. Which way does it turn?

A. Here (indicating on the map)—east.

Q. At what angle?

A. 90 per cent.

Q. How far does it run east?

A. 1,600 feet.

Q. What is the size of the pipe?

A. 16 inch.

Q. Where was it reduced from 20 inch to 16 inch?

A. Well, I do not think you want that piece. You want it from Webster avenue and that is 1,200 feet. This connection was cut off here at the bridge.

Q. Is it 16 inch the whole distance—the whole 1,200 feet?

A. Yes, sir.

Q. What way does it turn, then?

A. Northerly.

Q. At what angle?

A. About 90 per cent., with a 6 inch pipe.

Q. What is that?

A. Through a 6 inch pipe.

Q. Then it has been reduced from a 16 inch to a 6 inch pipe?

A. Yes, sir.

Q. Where?

A. At Webster avenue.

Q. Then how far does it run southerly?

A. Less than 1,600 feet.

Q. About 1,600 feet?

A. Less than 1,600 feet—between 1,500 and 1,600 feet.

Q. What is the size of that pipe?

A. 6 inch.

Q. Where does it run then?

A. West.

Q. How far?

A. 300 feet through a 6 inch pipe.

Q. What way does it run then?

A. South.

Q. How far does it run then?

A. 300 feet.

Q. Has it reached Christ Hospital yet?

A. No, sir; I will get to that afterwards.

Q. What is the size of that pipe?

A. 6 inch

Q. Where does it turn again?

A. It crosses the intersecting streets in an easterly direction an everage distance of 1,200 feet, and connects with a 6 inch pipe in Palisade avenue which supplies Christ Hospital.

Q. Where does it turn again?

A. I have just answered that—with all the connecting streets at right angles with the intersecting streets.

Q. These different streets are at right angles?

A. Yes, sir.

Q. And there are pipes in all of them?

A. Nine of them.

Q. In nine of the streets?

A. Yes, sir.

Q. Are there pipes in each of those streets?

A. Yes, sir.

Q. Leading to Palisade avenue?

A. Yes, sir.

Q. Those pipes are of what size?

A. Seven of 6 inch size and two of 8 inch size.

Q. Then those nine pipes are all connected with the former 6 inch pipe that you spoke of?

A. The one that supplies the direct connection.

Q. Well, with the one that you have been telling us about—that is the direct connection?

A. To Christ Hospital, yes, sir; the one that runs to the front of the building. Is that what you mean?

Q. Yes. Now, what avenue do you refer to as being the avenue in which the pipe—the 6 inch pipe was in, before or at the time you said it connected with these nine pipes?

A. The nine pipes are connected at Webster avenue; and I want to go further than that, if you will allow me to continue; I will explain to you about the other pipes.

Q. Well, never mind. What avenue was it in that you have just spoken of, that the nine pipes connected with?

A. Do you mean in answer to your question?

Q. Yes, in answer to my question.

A. The main is in Webster avenue and Baldwin.

Q. Webster avenue?

A. No, sir; the two of them.

Q. Well, first let us get Webster avenue. How far did it run in Webster avenue?

A. You already have that.

Q. Very well, tell me again. How far did it run in Webster avenue?

A. About 1,500 feet, between 1,400 and 1,500 feet.
Q. And then it turned into Baldwin avenue?
A. Yes, sir.
Q. And then into Webster?
A. No, sir; it turned into Prospect street, west.
Q. In Prospect street—well, what is the angle at which it turned there?
A. 90 per cent.
Q. How far does it run and in which direction?
A. Westerly, 300 feet.
Q. That is all in Baldwin avenue?
A. Prospect street, and then it connects with a pipe in Baldwin avenue 6 inches in diameter.
Q. Now, in what direction does it run in Baldwin avenue?
A. Southerly.
Q. What is the size of the pipe in Baldwin avenue?
A. 6 inch.
Q. How far does it run in Baldwin avenue southerly?
A. 2,300 feet.
Q. Which way does it turn then?
A. Easterly, through a 6 inch pipe, through Hoboken avenue a distance of about 1,200 feet.
Q. Up to what avenue?
A. And then connected with a six inch pipe in Palisade avenue.
Q. From there where does it run?
A. It runs in a northerly direction a distance of about 2,800 feet.
Q. To where?
A. Through Palisade avenue.
Q. To where?
A. Booraem avenue to the Ravine Road bridge.
Q. From there where does it run?
A. Well, you have been right around now up to Webster avenue. Now you can ask me about a certain avenue again if you want to.

Q. What does it connect with? (referring to the last question.)

A. There is a dead end at that point.

Q. Where is that dead end?

A. At the Ravine Road and Booraem avenue.

Q. Now, does any water which passes through that pipe possibly get to Christ Hospital?

A. That is the pipe that supplies it.

Q. Where does it supply it?

A. At the intersection of Laidlaw avenue and Palisade avenue.

Q. You said there were nine pipes running through nine different streets from Webster avenue to Palisade avenue, didn't you?

A. Yes, sir.

Q. What does those nine pipes connect with?

A. The pipe in Webster avenue—I think I spoke of Webster and Baldwin avenue. There were nine pipes connected at Webster—that is, there were two in Webster avenue and seven in Baldwin avenue—nine in all.

Q. What does those pipes connect with?

A. What do they connect with? A. Why, wherever they connect in Webster and Baldwin avenue.

Q. Well, what did they connect?

A. I don't know what they connected. I do not understand your question. These nine different connections spoken of are extended or are also extended in a westerly direction to Central avenue and there connected with the Central avenue pipe, which extends from the 20 inch main at Manhattan avenue and Central avenues southerly to Hoboken avenue.

Q. Hoboken avenue, do you say?

A. Yes, sir.

Q. What is the angle of these pipes at the bend connection?

A. They vary—it is between 80 and 90 per cent.; there is a little difference in the angle.

Q. What is the size of those pipes?

A. They are all 6 inch pipes instead of the two 8 inch pipes, as I said before.

Q. What is the size of the pipe that connects with Hoboken avenue?

A. Formerly it was a 6 inch, but we are relaying it with a 12 inch line now.

Q. Well, what is it now, 12 inch or 6 inch?

A. 6 inch now.

Q. Christ Hospital north or south of the point where they connect?

Mr. CORBIN: Which connection are you speaking of?

Mr. VREDENBURGH: I am speaking of where these nine pipes connect.

Mr. CORBIN: Connect with what, Mr. Vredenburgh?

Mr. VREDENBURGH: The Hoboken avenue pipe.

A. Christ Hospital is located about the centre of the easterly ends of these cross pipes—just about the center.

Q. This water which goes to Christ Hospital—what is the name of the most southerly of those pipes, or what is the name of the street in which the most southerly of those pipes is?

A. Why, Hoboken avenue.

Q. Is Hoboken avenue—are those nine pipes you speak of in Hoboken avenue?

A. Yes, sir.

Q. Is Christ Hospital in Hoboken avenue?

A. Palisade avenue.

Q. How far is Hoboken avenue south of Christ Hospital on Palisade avenue?

A. About 1,400 feet.

Q. 1,400 feet?

A. Yes, sir.

Q. Can any water from this 6 foot main get to Christ Hospital through Hoboken avenue to Palisade avenue?

A. Yes, sir.

Q. Which is the next street north of Hoboken avenue of the nine streets that has the nine different pipes that you have mentioned?

Mr. CORBIN: I object to this line of testimony as not proper and as entirely unnecessary and a waste of time. The map itself shows all these facts and I object to the testimony as not competent or pertinent to any issue in this case and as making a prolonged occupation of time, which it is important to us in order to take our testimony in the case.

Q. Does this map, which has been introduced in evidence, show the names of the streets at all?

A. Not all of them. I think I can answer your former question now, if you want me to.

Mr. VREDENBURGH: (To the stenographer.) Please read the question.

The stenographer reads as follows:

Which is the next street north of Hoboken avenue of the nine streets that has the nine pipes in that you have mentioned?

A. St. Paul's avenue.

Q. Does the water from the 6 foot main get to Christ Hospital through that pipe also?

A. Yes, sir.

Q. Is that so of these nine pipes?

A. Yes, sir; all the nine.

Q. You also spoke of another connection with this 6 inch main in addition to these nine, didn't you—a dead end, which is at the Ravine Avenue Road bridge or Baldwin street?

A. There is a pipe line there, 6 inch main, at the intersection of Webster avenue and Ravine avenue, which extends easterly about 600 feet and is connected at Palisade avenue with an 8 inch pipe.

Q. Does that water from that pipe also go to Christ Hospital?

A. By way of Webster avenue, yes, sir.

Q. So that it is impossible to tell, Mr. Van Keuren, when you draw the water from the tap at Christ Hospital which one of those ten pipes is supplying water that is drawn at any particular time, is it not?

A. Yes, sir; we have no way of telling exactly unless a test is made.

Q. And nobody else can tell, can they?

A. Well, if you made a test, you could.

Q. Then you don't mean to say—

A. (Interrupting.) The draft would make a difference which place the water came from.

Q. Then the draft would make a difference?

A. Yes, sir.

Q. And by draft you mean the amount of water drawn?

A. Yes, sir.

Q. By the different houses and other places along the line of this pipe—between this 6 foot main and Christ Hospital, don't you?

A. Yes, sir.

Q. Do you mean by your testimony that it took five feet per second for water to pass along a given pipe between the 6 foot main and Christ Hospital—

do you mean to say that you have ever measured it between those points?

A. I scaled it on this map a few moments ago, roughly only.

Q. Well, how does scaling on the map determine how fast the water would pass through a pipe?

A. It does not. It gives the distance, and when you ask how long it took to deliver water at a certain point we have got to know the distance of the point of delivery.

Q. Well, I want to know what examination you have made to ascertain how fast the water goes at that point?

A. I have not made any calculation. I simply know that there is a certain amount of water consumed in that territory and I know the diameter of the pipes, which would give me an idea of about how much water was delivered.

Q. Well, that would not give you any idea at all, would it, of the water these various pipes—it might be water from one pipe or another pipe?

A. Well, I give you the average only; that is all I have made any calculation upon, just as I told you.

Q. Now, the main—the water main in Palisade avenue and Hoboken avenue passing to Christ Hospital as far as Baldwin avenue is an 8 inch main, is it, all the way?

A. No, sir; 6 inch all the way.

Q. 6 inch main all the way?

A. Yes, sir—no—yes, that's correct; 6 inch all the way.

Q. Do you know what is the size of the tap of the pipe which connects the 6 inch main to the Christ Hospital—the size of the pipe is?

A. I don't know.

Q. Your calculation of the size of the pipe and as to the speed of the water calculated all the sizes of these pipes, or only one?

A. I made no calculation of that.

By Mr. EDWARDS:—

Q. You only made an estimate?

A. Yes, sir; that's all.

RE-DIRECT EXAMINATION:—

Q. You speak of this service as high service; why do you speak of it in that way?

A. Because this water is what is known as high service; that is, it is the territory above the reservoir and it must be delivered at a head greater than the radius of our present reservoir, the reservoir being 135 feet above tide water.

Q. At what radius do you get the water at the main pipe at Carlton avenue?

A. 210 feet head.

Mr. VREDENBURGH: Question objected to as not material and as not redirect examination and as incompetent and irrelevant.

Q. What is the head of the reservoir?

Mr. VREDENBURGH: Objected to for the same reason.

A. 135 feet.

Q. All these streets and pipes that you have mentioned in your cross examination by Mr. Vredenburgh are in this high service section?

A. Yes, sir.

Q. Or high service district?

A. Yes, sir.

Q. That also includes many other streets to the north?

A. What is that?

Q. That high service district also includes many other streets to the north?

A. Yes, sir.

Q. Which are not shown on that sheet or map which you have?

A. Not on this sheet, no, sir.

Q. Can any water get from the reservoir into these high service pipes?

A. Oh, yes; downstairs.

Q. You don't understand me. Can the water get from the reservoir into these pipes that you have spoken of?

A. Oh, no, sir; water would not get from that; they would come back into the reservoir.

Q. They would have to run up hill to get into those pipes, is not that so?

A. Yes, sir.

FURTHER CROSS EXAMINATION:—

Q. What do you mean by saying that these pipes supply water to the north?

A. I meant the streets north of Manhattan and Grant avenues and Franklin street are streets included in the high service territory and above the reservoir—further north.

Q. How far further north?

A. It is over a mile.

Q. Near Booraem avenue?

A. No, sir; you said north of Palisade avenue—less than a mile or in the neighborhood of a mile.

Q. Do they run to dead ends, too?

A. No, sir; they are cross connected at Paterson avenue with several streets. The reason for this dead end on Booraem avenue is the bridge and has never been connected beyond there.

Q. Can you say how far Christ Hospital was from that dead end?

A. No, sir; I don't think you have asked me that question.

Q. Well, how far is it?

A. You did not ask me how far it was from Hoboken avenue.

Q. Well.

A. 1,400 feet from the reservoir to the dead end at Booraem avenue.

Q. What is the connection, Mr. Van Keuren, between the 6 inch main and the main—

A. (Interrupting.) On what street?

Q. The 6 inch main and the pipe that leads to the 6 inch main to go to the high service, how is it controlled?

A. 6 foot or 6 inch; I don't know what you mean.

Q. I mean 6 foot.

A. There is a valve connection.

Q. And who controls that?

A. The Jersey City Water Supply Company; they operate it.

Q. Then the servants of the Jersey City Water Supply Company operate that connection?

A. All their connections; they operate all their connections.

Q. Well, Well, I speak of that connection, Mr. Van Keuren?

A. Yes, sir.

RE-DIRECT EXAMINATION by Mr. Corbin:—

Q. This territory that you designate as high service has been supplied in the same manner from the 6 foot pipe of the Water Company ever since it was turned on in the spring of 1904, was it not? Or in other words, ever since you ceased pumping it to the high service?

A. Yes, sir; now you've got it.

Q. When was it you ceased pumping?

A. Two or three years ago—two years ago I think it was—two years ago last summer.

Q. Do you mean the summer of 1904?

A. Yes, sir; that's it.

Q. And for this high district or high service district the water has been incessantly flowing there, night and day, ever since, from the 6 foot main of the Water Supply Company?

A. Yes, sir.

RE-CROSS EXAMINATION:—

Q. At any time during that time, Mr. Van Keuren, have you had to use the pumps at the reservoir for the high service main?

A. Not to supply them; no, sir.

Q. Well, not to supply them, but if you have had to use them at all?

A. They are in commission only in case of a break on the 6 foot line so that they can be operated.

Q. Have you any time operated them temporarily or for any other purpose?

A. Do you mean for supplying water?

Q. Yes, for putting water in pipes?

A. No, sir.

Q. Has any water been pumped from the reservoir into these pipes since the Jersey City Water Supply Company opened the valve which let the water from the 26 foot main into these pipes you have spoken of?

A. No, sir.

RE-DIRECT EXAMINATION by Mr. Edwards:

Q. Between Laidlaw and Booraem avenues on the Palisade avenue pipe, or the cross streets making connection with that pipe?

A. Palisade avenue?

Q. Yes.

A. They are all connected with it.

Q. Now, when you speak of dead ends what is the total distance of that dead end, length of it?

A. The dead end is probably 150 feet in length.

Q. And it is not a dead end all the way from Laidlaw street?

A. It is dead from the avenue north.

Q. That is less than a block?

A. Well, it is almost—it is 200 feet about; it is over 150 feet.

Q. That's all.

FURTHER CROSS EXAMINATION:—

Q. What do you mean by that?

A. I mean there is no connection.

Q. The pipe extends up and at about here (indicating)?

A. But there is no circulation between these points.

Q. What circulation is there for the next 50 feet?

A. Well, there is no pipe beyond that; it is a dead end.

Q. I mean this way from that (indicating)?

A. Not at all, until you get to the intersection of the avenue, then the conditions are the same. They are alike the entire length of Palisade avenue.

Q. Well, I understood you to say that it was dead for 150 feet?

A. That is if you left the dead end out and didn't speak of it at all. You understand there is no supply beyond that.

Q. What do you mean by dead end, Mr. Van Keuren, when you said there was 150 feet, and I think Mr. Corbin corrected you by saying 130 feet, but whichever you did say was the dead end of the pipe, I want to know what you mean by that?

A. I mean there is a connection made at the intersection of Palisade avenue and Reservoir avenue, and the pipe extends northerly for a distance of 150 feet and there it ceases and that is the end of it.

Q. And there are no houses connected with it?

A. Do you mean beyond that?

Q. No, I mean in that 150 feet.

A. Yes, there are two or three houses connected with it.

Q. Then what do you mean by that it is a dead end pipe?

A. The pipe is old up to the bridge, but does not cross it.

Q. Why do you speak of this 150 feet?

A. Because that is the length of it.

Q. Length of what?

A. From the pipe where it is connected with Reservoir avenue.

Q. But in that 150 feet I understood you to say there are several house connections?

A. Three new houses have been built there near Booraem avenue and they are connected with that pipe; that pipe has been extended within two years to that point.

By Mr. EDWARDS:—

Q. To connect those houses?

A. Yes, sir; to connect those houses.

FURTHER CROSS EXAMINATION:—

Q. Now, in the next 150 feet are there house connections?

A. There is no pipe beyond this point, that is the end of it; there is no pipe after that point.

Q. Well, I am speaking of 150 feet in the other direction.

A. Well, of course, then you are taking me down to Palisade avenue and there is circulation the whole length of Palisade avenue.

Q. What do you mean by circulation—I do not understand the use of the word; what do you understand by dead end?

A. I mean a pipe that at the end of it is dead and has no circulation beyond there?

Q. And it is dead for how far?

A. Dead; beyond where there is no drawing from it; where there is no circulation; where there is circulation it is a live pipe.

Q. Well, now, Mr. Van Keuren, you speak of a dead end of a pipe; do you refer to a pipe in which there is water but from which nothing is drawn to the houses?

A. Where there is no through pipe line connection, there is no through circulation between that and any other pipe.

Q. Is there any water drawn from that Palisade avenue pipe by any other pipe between that dead end and Christ Hospital?

A. Yes, sir; of course there is.

Q. How many streets?

A. All of them.

Q. Well, I think you said those connected the 6 foot main with the Palisade avenue pipe?

A. So it does.

Q. How, then, is the water drawn from Palisade avenue pipe through these other pipes? I should think that those pipes furnish water to the Palisade avenue pipe and not draw it from it.

A. That is what I did say exactly. I said those cross pipes supply Palisade avenue and that is what I have said all along.

Q. Then the Palisade avenue pipe is dead except so far as—

A. (Interrupting.) The Palisade avenue pipe is not dead; it is a pretty lively pipe, if I may tell you. There is 2,700 feet of pipe on Palisade avenue where there are connections and where it is gridironed.

Q. But is there any pipe leading from that pipe drawing water from it in the whole distance?

A. There is no pipe leading to it.

Q. Leading from it—that draws water from it?

A. All the buildings along Palisade avenue are connected with that 6 inch pipe.

Q. Now, I did not ask you that question, Mr. Van Keuren, although I am glad to have that answer. I am talking about the pipes in the streets and I want to know whether you intended to say, or to be understood, that the pipes in the street draw the water from the Palisade avenue pipe or furnish water to it.

Mr. CORBIN: Why can't they be both? It is a mere matter of pressure as to which way the water goes, and I do not think it is fair to take up so much of our time in this way. I object to this evidence as occupying valuable time for apparently the obvious purpose of consuming time for no useful purpose and as inquiring into matters which are not within the knowledge of this witness and which it is merely intended to delay.

Mr. VREDENBURGH: I object to this interruption of my examination. I object to being continuously interrupted when putting questions to this witness. I object to the constant interruptions by counsel for the other side in my examination of this witness.

Mr. CORBIN: If you do not know what a dead end is, you are the only person in the room who doesn't know it.

Mr. VREDENBURGH: I do not desire to occupy more than one minute of time required to understand what the witness means, but I intend to take as much time as is necessary for me to understand what the witness does mean. He is your witness and I am trying to understand what he has said. I do not believe any one in the room understands what he means.

Q. Do you understand the word dead end the same as Mr. Corbin understands it?
A. I understand that it is a pipe that is not connected with any other pipe; that is to say, it is connected at one end but not the other.
Q. One end of Booraem avenue?
A. Yes, sir.
Q. One end of this pipe is in Booraem avenue?
A. Yes, sir.
Q. The other end is where?
A. One end on Reservoir avenue and the dead end is at Booraem avenue within a few feet of the bridge.
Q. With no pipe connected with it?
A. No pipe in Booraem avenue; no, sir.
Q. Therefore, the whole distance is a dead end, as you use the term, is it not?
A. Yes, sir; that is my phrase.
Q. That's all.

RE-DIRECT EXAMINATION by Mr. Edwards:

Q. The circulation of that end depends entirely upon the draft from the houses?
A. Yes, sir.
Q. Now, one other question as to Palisade avenue. How is Palisade avenue, from Hoboken avenue to Palisade avenue built up?

A. Well, it is fairly settled; it is not a business street; it is a residential section.

Q. Solidly built up with residences, is it not?

A. No, sir; not solidly built up. Probably not over half of the area is built upon; it will probably average four houses on the block.

Q. That's all.

DR. EDWARD A. E. WORL, sworn for defendant.

DIRECT EXAMINATION by Mr. Corbin:—

Q. Where do you reside and what is your profession?

A. I live at 271 High street, Newark, New Jersey, and I am a physician by profession.

Q. What is your employment or occupation?

A. I practice medicine and I am connected with the Board of Health of Newark, New Jersey.

Q. What is your position with the Board of Health?

A. I am superintendent of contagious diseases.

Q. How long have you been in such position?

A. Since 1891.

Q. Where were you educated for the practice of medicine?

A. At Columbia College, then the College of Physicians & Surgeons in the medical department.

Q. Were you a graduate of any college before that?

A. Four years a Princeton prep.

Q. Having made a study of the matter of contagious diseases?

A. Yes, sir.

Q. Due to sanitation?

A. Yes, sir; particularly more or less since 1891, or say particularly for the last ten years back.

Q. Now, the last year—1906, were you employed by the Board of Health of the City of Newark in regard to the increase of typhoid fever cases in Newark?

A. Yes, sir.

Q. What were you employed to do in that connection?

A. Why, we noticed that there was an increase in typhoid fever over the normal amount and particularly so beginning the early part of November. The increase was rather striking and Mr. Chandler began an investigation. We first examined the water supply—we always did examine the water supply; we made a large number of examinations, and there was nothing in that.

Mr. VREDENBURGH: I object to the witness stating what he terms "we." He must speak of his own personal knowledge.

Q. Proceed.

A. I began to prepare a list like the one I now produce (witness produced a paper and handed it to counsel), giving the name of the party that had the typhoid as reported to the Board of Health, the address of the party and the milk supply of the party.

Q. Let me see that paper, please? (paper handed to counsel.) You took this data from where?

A. That was copied from the official reports of the Board of Health.

Q. After you looked into the water supply you then looked into the milk supply?

A. We made out lists of such cases as came in—we made lists giving the name of the party, the address of the party which had typhoid and the milk supply of the party who had typhoid.

Q. You have produced here a paper headed, "Typhoid fever from November 19th to 26th."

A. Yes, sir.

Q. What does that paper show—who made it up?

A. Well, it was made up at the request of Mr. Chandler, but under my direction.

Q. Under your direction?

A. Yes, sir.

Q. The first column gives what?

A. The name of the party who has typhoid.

Q. And the second?

A. The address of the party who has typhoid.

Q. The last column?

A. The milk supply of the party who has typhoid.

Q. From what is this made up?

A. From the official records of the Board of Health of Newark, New Jersey, reporting cases of typhoid.

Q. There is no year mentioned on this—what year does it apply to?

A. 1906.

Mr. CORBIN: I offer this in evidence.

Mr. VREDENBURGH: I object to it.

Marked Exhibit D —, "Exhibit Newark Typhoid Cases, November, 1906."

Q. I notice in the last column that in almost every case the milk supply is indicated as Borden's; what does that mean?

A. The dealer who furnished the milk to the family where the patient was.

Q. After finding this did you make an investigation as to the milk supply?

A. Yes, sir.

Q. What did you do?

A. I don't know where to begin.

Q. Now, can you tell us where you went to find the source where the milk came from to the patient who had the fever?

A. Yes, sir; after we made out this list we made out similar lists and sent them out right along, and we found that more than 80 per cent. of the typhoid fever cases came from one source of milk supply.

Q. Came from people who used the Borden milk supply, is that what you mean?

A. Cases of typhoid fever that were reported to us came from the same source of milk supply.

Q. Same milk?

A. Yes, sir; we found that the vast majority were traceable to this source of milk. We then located the source at one particular station and under orders of the health officer of the Board of Health I was ordered to visit that station, and I started for it November 22, 1906. My instructions were to proceed to that station and as far as possible to get all the typhoid cases in Oxford and its vicinity and to ascertain if there was any relation between the typhoid cases and the milk supply.

Q. Did you go to Oxford?

A. Yes, sir.

Q. Did you investigate the matter?

A. Yes, sir.

Q. What did you find?

A. November 22d I went to Oxford and I visited the health officer there and asked him if there had been any typhoid cases within the last three or four months and I asked him to give me all the cases that he knew of. He gave me three cases. I afterwards found several others in that vicinity; that is to say in Oxford and its vicinity. One of those cases I saw November 23rd; it was on a farm about five or six miles outside of Oxford; and that was one of the cases given me by the Oxford Board of Health. The case was of a girl named Pauline Waldon.

Q. In the township of Preston, was it not?

A. Well, Preston is near there; this farm was not far from there; it was a little place some five or six miles outside of Oxford and it was kind of a run down old place, only good for raising milk, I guess; the surroundings were bad and it was an old house.

Q. Was the milk from that farm brought into the Borden milk supply?

A. Yes, sir.

Q. Now, go on and state what you found there relating to typhoid fever?

A. Well, the house was old and the first thing I noticed when we got there was a gutter projecting out of a window, apparently, and I immediately went inside to see where the gutter came from, and I found that that gutter was the overflow from a sink inside the house and took the slops from there. I asked the person of the house if they emptied their slops through that gutter and she said yes. Then I went outside and I noticed that the end of the gutter projected beyond the window and that the flow was out on the ground and that the slope from the house was downward—like this (indicating); the house stood on a high point so that the slope was forward and downward, and about ten feet from the door of the house there was a well.

Q. What?

A. Surface well, uncurbed and apparently almost even with the surface of the ground, and the flow from the gutter from the house ran down the ground towards the well.

Q. Was the effluent from the drain going into the well?

A. Yes, sir.

Q. Was the well, the water supply for the house?

A. Yes, sir.

Q. How far from the well was the house?

A. Ten to twelve feet.

Q. Did you ascertain whether that was the water that was drawn to wash the milk pails with?

A. Yes, sir; I went back to the house and asked where they got their water from to wash the milk pails with, and they said the only water they had was that from the well; I asked them if they were sure about that, and they said yes, they had no other water to use.

Q. Well, did you find out where the water came from for the cooling house of the milk?

A. Yes, sir, that came from the well, too. The cooling house was still further down on the slope beyond the well. I took a sample from the well and from the water in the cooling tank besides. And then I went back to the house and questioned the girl who had been sick. I said, "When were you taken sick"? She said "About the time of the fair." I said "When was that"? From about September 25th to the 28th, she said; she was sick and had a headache and one thing and another. I said to her "How late did you milk the cows? Do you milk the cows"? She says, "yes, some times I am the only one that milks the cows." I said "How late did you milk them?" She said she milked them the 5th day of October. I said "Were you sick at that time?" She said, yes sir. I said "When were you delirious"? She said the 7th or 8th of October. I said "When was this case reported to the station or the officials?" She said October 14th. So that she had been milking these cows up to the 5th day of October—all that time. I said to her "Is that so?" She said yes, sir. I then ascertained that it was not until October 14th the doctor pronounced the case typhoid—at least they told me he pronounced it typhoid a day or two before that, so that she milked these cows before she had typhoid fever, and that was in addition to the fact that the water was contaminated—there was contamination of the water and the cooling tank which contaminated this milk which was delivered to the Oxford station for Borden's milk supply.

Q. What did you conclude from these facts?

A. Well, I concluded the same as the other doctors did; that we should shut off the supply at once—that day, because that girl was only cut off from the milk supply about October 14th.

Q. In your judgment was there danger of pollution and contamination and infection from that case?

A. I know there was.

Q. Did you find any other case of typhoid up there?

A. Yes, sir; I did.

Q. In your opinion could typhoid in Newark have come from that case?

A. Well, it naturally follows that typhoid in Newark follows the law of epidemics and we know that certain diseases follow from these milk epidemics.

Q. Did it, in your opinion, come from this typhoid case in Oxford?

A. Yes, sir; I am positive that it did.

Q. What did you do in Newark as the result of this examination of yours and what you discovered?

A. Why, the moment I got back from this case I got to the telephone and telephoned Mr. Chandler—I was in communication with him all the time and was sending him letters and my lists; so I called him and said "I think I've got it." He said would you cut off that milk supply, and I said I certainly would.

Q. Did they cut it off?

A. Yes, sir; they did.

Q. Well, now, after Borden's supply was cut off at Newark, what happened in regard to typhoid fever?

A. Went right down.

Q. How rapidly?

A. Well, it dropped right in the first week in December; we had 102 cases in November.

Q. How many in December?

A. Forty-nine.

Q. How soon did it get back to normal?

A. I think it was back to the normal about the middle of December.

Q. To what extent did you cut off this milk supply?

A. We cut off this entire station.

Q. That is, you mean the Oxford station?

A. Yes, sir.

Q. Does that apply to all the Borden milk that came down to Newark, or simply from that station?
A. No, sir.

Q. Did they bring milk from other stations?

A. Yes, sir; from Florida and Pine Ridge, I think.

Q. The only one you wanted to cut off was the Oxford station?

A. Yes, sir; because I had positive information in regard to that.

Q. Have you had trouble with typhoid since then, or did it get back to normal?

A. We have not had but seventeen cases this winter, I think, so far.

Q. Did the Borden people assist you in this investigation?

A. Yes, sir; they offered us every assistance and sent a man with me.

Q. That is all; you can cross examine Mr. Vredenburgh.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. I understood you to say that you went to Oxford on the 22d of November, 1906?

A. Yes, sir.

Q. And when you got there you went to the Health Officer of the town?

A. Yes, sir.

Q. And asked him about the typhoid fever patients that he knew of?

A. I said "Give me your cases here for the last three or four months."

Q. And he gave you three or four?

A. Yes, sir.

Q. You subsequently found two or three others?

A. Yes, sir.

Q. One of the cases he gave you was that of a girl who was sick at a house five or six miles from Oxford?

A. Yes, sir; about that, as nearly as I can tell.

Q. And you went there to that house first on the 23d the next day?

A. Yes, sir; the 23d to the best of my recollection.

Q. And the first thing that attracted your attention unfavorably was the pipe which led from the sink?

A. No, sir; the gutter—sort of a gutter sticking out of the window.

Q. How high above the ground?

A. I did not measure it and I could not say but it was sloping like this (witness illustrated).

Q. Was it as high as your head from the ground or higher?

A. No, my impression is it was not as high as my head, but perhaps as high as my arm is now (illustrating).

Q. Up to your shoulders?

A. I should think so but I am not definite about this; it was just sticking out of the window.

Q. Five or six feet from the ground?

A. Yes, sir.

Q. What was it, a wooden gutter?

A. Yes, sir; I think it was a wooden gutter.

Q. And it protruded from the house about a foot?

A. Yes,, sir; I should think so.

Q. Was it an open gutter or closed?

A. Just a shell scooped out.

Q. Open on top?

A. Open on top.

Q. How far did it go into the house?

A. It was connected with the sink in some way.

Q. Did you see the connection?

A. Yes, sir; it was an overflow from the sink.

Q. The sink was an ordinary kitchen sink?

A. Yes, sir.

Q. And was in the kitchen?

A. I don't know what they call that room; it was in their general room in which they ate and cooked in too; it was the only room that I saw in his house.

Q. Was there a cooking stove there?

A. Yes, sir; stove, chairs and table.

Q. Now you say the ground was on a grade?

A. Yes, sir.

Q. About what grade was it, in your judgment?

A. It was down like this (Illustrating).

Q. Well, we can't get that on the record, Doctor, you will have to say something about it?

A. Well, a pretty good slant.

Q. Well, you think the fall was six inches to a foot, or was the fall one inch in a foot—that is a pretty big fall to walk up?

A. I should say it was about like this (illustrating); it is a hilly country, and when you are not going up you are going down.

Q. What is the nature of the ground outside of the house, is it grass where this point from the water would reach the soil?

A. Well, it seemed to be littered up ground; the surroundings were dirty. There were loose chips and stones. I think there was quite a number of stones there; it was kind of a clutted up place.

Q. Well, by chips you mean wooden chips?

A. Yes, sir.

Q. Was that the character of the surface of the soil from there down to the well?

A. Yes, sir.

Q. Was the grade of the land from there to the well about the same grade for the whole distance, or was it a different grade at different points?

A. The trend was down like this (illustrating); for instance here was the house, then came the soil and it was sort of down hill like this (again illustrating); the house stood up here and the ground sloped right down.

Q. Was the slope about the same degree from the house to the well?

A. I think it was fairly uniform, yes, sir.

Q. Fairly uniform?

A. Yes, sir.

Q. When you came to the well you examined that I suppose?

A. Yes, sir.

Q. Was there a curb to the well?

A. Well, it was kind of loosely built.

Q. Was it stone or wood or brick—the size of the well?

A. I should think it was loose stone.

Q. Did you examine it carefully to see whether it was loose stones or not?

A. I just satisfied myself that it was fairly flush with the ground; I saw that it was not cemented.

Q. How did they get that water from the well?

A. Why they dipped down into it with a cord and bucket, I presume, I did not see them doing it.

Q. How deep was the well to the surface of the water in it?

A. I don't know, I could not say.

Q. Was it four feet or fifty feet or what?

A. With regard to the well I have no means of telling, sir.

Q. Didn't you look down the well?

A. Yes, sir.

Q. Did you see the water when you looked down?

A. I could see some little distance down.

Q. Couldn't you tell how far that was?

A. I could not, no, sir.

Q. Couldn't you tell whether it was 20 feet or 50 feet?

A. No, sir; I could not answer that; it might run through to China for all I know.

Q. But I am referring to the surface of the water?

A. Oh, the surface of the water?

Q. Yes?

A. It was low; it seemed to me to be low down in the well; I imagine the supply had been low, I think I asked the woman that question, and if you will allow me to refer to my book I may be able to tell you.

Q. Well, I was not so anxious to know whether it was down low or not, as to know what distance the surface of the water was from the top?

A. I don't remember.

Q. You cannot form any judgment about that?

A. No, sir.

Q. Was it more than 25 feet?

A. No, sir.

Q. Less than 25 feet?

A. Yes, sir.

Q. To the best of your recollection?

A. Yes, sir.

Q. Now the size of the well was 4 or 5 feet across?

A. Yes, sir.

Q. An ordinary country well?

A. Yes, sir; an ordinary country well.

Q. Did you measure the distance of the well from the end of this gutter?

A. No, sir.

Q. But you judged it was about 15 feet you said?

A. I judged it was about 10 to 15 feet from the door.

Q. What door?

A. The door of the house passing outwards to the well.

Q. How near was the door to the end of this gutter?

A. Well, it would be the length of a good sized room.

Q. Then the end of the gutter was 25 or 40 feet from the well, wasn't it?

A. I don't think it was as much as that, I don't think so, it was 10 or 12 feet from the house; it may have been as much as 24 feet—possibly 24 feet, but I decline to commit myself to the exact number of feet as I did not measure it.

Q. Well, could you see from the well to the gutter or did the corner of the house intervene?

A. No, the gutter stuck right out, it was almost the first thing you saw.

Q. When you stood at the well did you see the gutter?

A. Yes, sir.

Q. Nothing intervened between that and the well?

A. No, sir; stuck right out at the side of the house.

Q. Did you notice at the end of the gutter whether there was any fecal matter?

A. Not in the gutter—do you mean on the ground?

Q. Yes, on the ground?

A. It was kind of muddy when I got there; I did not notice any.

Q. Did you notice any fecal matter in the sink?

A. No, sir.

Q. What is your idea, that in that sink fecal matter was dumped, or was it only used for urine?

A. Only slops. A young girl and her mother there, I was not very well acquainted with them, I asked them what they did with their slops.

Q. Slops?

A. Yes, sir.

Q. Was there an outhouse privy connected with this house?

A. There was, but that was still higher up on the slope—no, I think the outhouse was down near the cooling tank with a little stream of water running out of it, if I remember right—yes, it was near there.

Q. Did you examine the outhouse with any care?

A. Why, you could see right under it, there was kind of a little brook running along there.

Q. I asked you the question did you examine the outhouse with any care?

A. It was not necessary because you could see the whole thing at one glance.

Q. But I am asking you whether you did or not?

A. Yes, sir.

Q. You did examine it with care?

A. Yes, sir.

Q. What is the size of the outhouse?

A. I did not measure that.

Q. Did you notice whether it was stoned up?

A. It was an old wooden building, an old shack.

Q. And the fecal matter was right out on the surface?

A. It ran right through into this little brook—it was not a brook, it was a little bit of a current down there.

Q. Where did this brook or current run to?

A. I don't know.

Q. Did you follow it?

A. No, sir.

Q. Did you notice where it came from?

A. No, sir.

Q. Your conclusion was that the typhoid bacillus from this girl passed into this sink somehow, and from that sink got into the well, was it?

A. It would not be necessary to prove that it contaminated the water; it had contaminated the milk, and that is all it was necessary to prove.

Q. I don't think that quite answers my question?

A. You asked me if it was my conclusion that it came from this sink. No, sir; it was not my conclusion; my conclusion was that the typhoid fever came from this girl.

Q. Yes, from the pouring of the urine or fecal matter into the sink, and so on into the well?

A. It might have gone out that way, or if she milked the cows it might come in that way because she milked the cows to the 5th or 6th of October, and she then had the fever on her.

Q. Which way did you conclude that this typhoid epidemic in Newark came from, by the girl milking the cows or from the excrement from the girl, from the fecal matter from the girl?

A. It did not make much difference—I could conclude both ways; all that it was necessary for me to do was to show the connection between that milk and that girl; it might be one way or another.

Q. So you did not make up your mind which way it did come?

A. I made up my mind positively it came from the milk.

Q. Well, I did not ask you that. I asked you whether you concluded it came from the girl or from the milk?

A. Do you mean to ask whether I made up my mind one way to the exclusion of the other way?

Q. Yes.

A. I did not make up my mind that it came exclusively from one way or the other, that is to say, I did not conclude it came exclusively from the girl so as to exclude any other way; no, sir.

Q. Well, which in your judgment was the most probable way?

A. Oh, I did not make up my mind that way at all; I just established the fact that it came from the milk and I did not care which way it came.

Q. I am asking you now about your judgment, if you have any; if you have not any I do not press the question; did you have any judgment as to that?

A. I say that both ways were possible.

Q. And there you left it?

A. I left it there, both ways were possible.

Q. Did you see any evidence, Doctor, that this matter from this wooden gutter ran over the edge of the well into the well?

A. Yes sir; it was trickling down; there was a stream running at the time I was there; I noticed the stream of water running in the gutter and trickling down, and you could see where it ran close to the well, within a few inches of the curb.

Q. And that as far as you could trace it, to within a few inches of the curb?

A. Yes, sir.

Q. Now you say that this typhoid fever may have come by the girl milking the cow?

A. Yes, sir.

Q. When did she cease milking the cow?

A. On the 5th of October.

Q. How did the typhoid bacilli get from the girl to the cow?

A. Which way—I could not describe that.

Q. Can't you tell how the typhoid bacilli got from the girl to the cow?

A. You are talking now about the method of milking the cow?

Q. Yes.

A. From the girl.

Q. Do I understand you, Doctor, to say that the typhoid bacilli would be on her hands while she was milking the cow, and would get from her hands into the milk?

A. Yes, sir.

Q. That is your theory is it?

A. That is the way it was.

Q. Well, do you say that a person who has had typhoid fever for one week or ten days, would have the bacilli on their hands?

A. It first appears in the stools, as a rule, on the seventh or eighth day.

Q. Well, does she get that on her hands from the stools, or do they exude from her skin with the sweat?

A. The girl would be more likely to get it on her hands from the stools.

Q. Well, does the bacilli come from a person by sweat or any other way through the skin?

A. No, sir; they have made tests with the scarlet spots on the stomach, and I believe they suceeded in cultivating bacteria from that; that is one method, and then bacilli have been cultivated from the rose-colored spots on the abdomen, which appear the second week of typhoid, and there have been cases where—rare cases where these rose colored spots where inhalation goes on, but I never saw them. I am trying to bring out the fact that the common method is by fecal contamination from the feces and discharges.

Q. Discharged fecal matter or urine discharges?

A. Yes, sir.

Q. Now, Doctor, you made up your mind that it was possible for this epidemic to come from that girl milking the cow up to the 5th or prior to the 5th of October?

A. Yes, sir.

Q. How did you ascertain that she had milked the cow?

A. I did not say that.

Q. You did not?

A. No, sir.

Q. What did you say then?

A. I say as far as milking the cow is concerned, it is possible, but there is also the other method, by the discharge of urine or feces from the sink.

Q. Both are possible?

A. Yes, sir; the method by the milking of the cow is possible to the 5th of October, and the other method is possible.

Q. How did you ascertain that the milk which was milked from the cow by this girl, prior to the 5th day of October, came to Newark.

A. It was sold at the milk station there.

Q. How do you know that?

A. Because they had a record of it at the station. Every man has got to deliver his milk there before 11 o'clock every morning at that milk station.

Q. Well, was this girl the only person who milked the cows at this place?

A. Generally, yes, sir; they only had a few cows; they have the records at the station where this milk was delivered at the station.

Q. So you concluded from what she said to you that this milk which came to that station—that same milk came to Newark. You could not tell at all that the milk from the cow the girl milked, came to Newark, you judged it might?

A. The milk was brought to the station and dumped into a great big receiving tank, so that all the milk was in bulk before it came to Newark, they averaged up to 12,000 quarts a day there.

Q. They have at this depot a large tank receptacle for milk?

A. Yes, sir; it is a station as they call it, it is not the railroad depot, it is what they call the milk station, a great big building.

Q. Well, is all the milk from that section of the country delivered at that station and put in one receptacle, or is the milk in cans from each farmer?

A. It is in cans when they drive up to the station; then each can is weighed on a scale, and then the man takes off the top of the can and smells it, and also if he has any reason to think the milk is of a high temperature he takes the temperature, and if it passes the muster of his inspection and supervision, it is accepted.

Q. What do you say is done with it?

A. It is smelled, weighed and the temperature taken, that is, its temperature is taken almost every time, and if it is at all suspicious, a sample is taken but that is only occassionally, and then the milk is dumped into this great big receptacle.

Q. Then it is taken from that receptacle to be distributed in Newark, for instance?

A. No, it is first pumped upstairs where there are two or three big tanks—it is pumped up by machinery, and from there I think they have, I should say two or three big tanks, may be four, I think there is an extra tank there in use, and from there it runs into a large pipe and then goes down onto the first floor again.

Q. Isn't the cream separated from the milk first?

A. Yes, sir.

Q. And then reunited?

A. Yes, sir.

Q. It all goes through that process?

A. Yes, sir.

Q. Then is it condensed?

A. No, sir; that is not done there, that is at a different point.

Q. Then the milk that was furnished to these persons who were made sick, was that condensed milk or not?

A. No, sir; it was the ordinary cows milk raw.

Q. Then the raw cows milk is drawn from that same tank?

A. Yes, sir.

Q. It all goes through the same process?

A. Yes, sir; there are 5,000 gallons of milk in one milk can.

Q. Well, a tank containing several thousand gallons of milk?

A. Yes, sir.

Q. And from there?

A. From there it goes through a process where the cream is separated from the milk; the milk is creamed and the cream put back into the milk, then the milk is put into bottles and those bottles are sent to Newark.

Q. And it was from that milk, in your judgment, that these people were made sick, is that right?

A. Yes, sir.

Q. Did you find any other cases or did you examine any other cases of typhoid fever by their Doctor?

A. Yes, sir; I made up my mind he did not report to me all the cases up there, or else he did not know of all of them.

Q. Did you find any other cases that were suspicious?

A. Yes, sir; I found other cases and two in the the town—Mr. Brown, the undertaker, and another lady.

Q. Was there danger that these infectious germs would get from those people into the milk?

A. Well, that station supplied milk to those people.

Q. Well, how would the infection get from the town into Borden's milk?

A. Are you going to ask me to prove the relation ship? I cannot prove any relationship between that.

Q. Can you trace any relationship between any other sick person than this girl—I mean in addition to that you have already described?

A. I could not go through so elaborate a process, no, sir. There was a little boy they told me that was sick, who was getting milk at the station, and I found that he had milk through that station all through his illness.

Q. How did that injure the milk that came to Newark.

A. I am only saying there was a case of typhoid fever in this family that got milk from that station.

Q. Was there any other case in which you thought likely there might come infection?

A. Yes, sir; I thought there was a chance, yes, sir; but I could not give you absolute proof—not the same absolute proof that I can in this case, I cannot give you the chain of evidence, but I take this little boy as an example.

Q. You used the word contaminated, as applied to milk; what do you mean by that word as applied to milk?

A. Contaminated?

Q. Yes.

A. Well,—when the milk shows evidence of intestinal pollution.

Q. You said the water is also polluted in the well?

A. Yes, sir.

Q. Did you take a sample of the water in the well?

A. Yes, sir.

Q. What do you mean by the word contaminated as applied to the water?

A. Water in which there was intestinal pollution.

Q. What do you mean by intestinal pollution in the well?

A. Evidence that there had been fecal matter getting into the well.

Q. What evidence was there?

A. Coli bacilli.

Q. On an analysis of the water it was found that the water of the well had coli bacilli in it, is that so?

A. Yes, sir.

Q. In what quantity of water, was it 1-10th centigrade or 10 centigrade, or what?

A. Oh, we only examined a few drops, I could not say exactly.

Q. You don't know what quantity?

A. No, sir.

Q. In which the b. coli was found?

A. No, sir.

Q. That is true also of the sample you took from the cooling house?

A. The mere fact of the presence of it is all I wanted. If they were present then the water was contaminated, if I only found a half dozen there.

Q. Then if you only got a half dozen b. coli in the water it is contaminated, is it?

A. Yes, sir..

Q. And unfit or unwholesome to drink?

A. I don't say that, sir.

Q. Why do you say that is enough?

A. Because it establishes the evidence that I am after that there has been some contact with animal intestines, and that animal intestinal pollution has got into that water. How much is only to be determined by another series of experiments, but it is enough if I can find in a sample certain evidence that it is there.

Q. Without regard to the size of the sample?

A. Why, the record is so many to the centigrade usually. Of course you have got to have a standard.

Q. What is the standard?

A. Why, the amount of bacteria to the centigrade.

Q. Well, I am not talking about bacteria, I am talking about coli bacillus?

A. You asked me how I knew the water was contaminated, and I said because it had coli bacillus into it.

Q. I asked you to what extent?

A. I don't know; it may have been a great many, it depends upon the sample you get; some samples vary.

Q. I am talking about the sample you took; I want to know if you can tell us from it what quantity you found; did you make any tests at all?

A. Well, to my mind it was evidence of contamination.

Q. If there was any bacillus coli in what condition?

A. My point is that coli bacillus ought not to be in the well.

Q. So that it don't make any difference what the quantity of water as if there is any b. coli there it is contaminated water, in your judgment?

A. Yes, sir; pure water has no coli bacillus; as to how much would hurt you I dont' know; some fellows can drink it.

Q. But you don't mean to infer, Doctor, that coli bacillus will hurt you at all, you can drink any quantity of them—or did you say they are injurious?

A. I would not care to drink them.

Q. Why not?

A. Because; do you want my personal reasons?

Q. Yes.

A. Because I don't like to taste any other person's excrement for one reason.

Q. Is it because it is dangerous, Doctor?

A. If I don't get typhoid fever, I am likely to get indigestion or fermentation of some kind, in fact, I am not qualified to make any further answer; I have never eaten excrement enough to tell what its effect will be; I haven't eaten the excrement of other people, I let other people make those experiments.

Q. Well, do you think that a person who drinks water in which there is b. coli is drinking the excrement of some human being?

A. Yes ,sir; human or animal.

Q. And it was your idea that it is not only disgusting but is injurious to health?

A. I think so.

Q. Did you find, Doctor, at the time this milk was being used in Newark that there was also an increase in diarrhoea?

A. Yes, sir; that was true.

Q. And you thought the increase in diarrhoea might be attributed to the same cause, didnt' you?

A. I did not at the time, but I do now think so; I did not at the time because we were working of course in the dark; but bowel trouble is a predisposition toward typhoid, and there were many cases of increased diarrhoeal troubles.

Q. Especially in infants, I suppose?

A. Yes, sir.

Q. But it did not reach the stage of being typhoid fever?

A. I would rather say that typhoid in the young is sometimes ill-defined and more like diarrhoea.

Q. The number of fever patients, I understood you to say were about 149?

A. Yes, sir.

Q. How many deaths were there?

A. 102 in November and 49 in December.

Q. You don't mean that number of deaths, Doctor?

A. No, sir; 102 cases in November and 49 in December.

Q. How many deaths?

A. They ran 7 per cent.

Q. 7 deaths, or 7 individuals, out of each 100?

A. 7 per cent.; that was the mortality of the epidemic, and that does not harmonize with the mortality for the year; the mortality for the year; the mortality for the year would be 326 cases and 50 deaths, and that is close up to 15 per cent.

Q. What did you mean by your former answer, 7 out of each hundred died out of those that were taken sick?

A. Yes, sir.

Q. And you mean also that during a time, that is, a normal time of the year, 35 out of each thousand die?

A. No, sir; that would not be right.

Q. 15 out of each hundred died?

A. Yes, sir; and I say that in normal times we had 326 cases with 50 deaths, which would be 15% in the year. We were trying to put this epidemic by itself, and we figured out that it resulted in a low mortality, about 7%.

RE-DIRECT:—

Q. It was at a favorable time of the year, wasn't it, Doctor?

A. Yes, sir; and we had a low mortality.

AUGUST STOECKEL sworn for defendant.

DIRECT EXAMINATION by Mr. Corbin:—

Q. Where do you reside?

A. 641 Montgomery street, Jersey City.

Q. What is your occupation?

A. I am manager of the Borden's milk establishment of Jersey City.

Q. Is that a Company that has a station at Oxford?

A. Yes, sir.

Q. And you have charge of the Jersey City milk station?

A. Of the depot here, yes, sir.

Q. During September, October and November of 1906 did you receive milk daily from Oxford?

A. We received some, that is, we received 30, 40 or 50 boxes a day or about that; it might average 20 boxes every day.

Q. What do you mean by a box?

A. 12 bottles to a box.

Q. Is that milk sold in Jersey City?

A. I could not tell you where it was sold; it was sold in West Hoboken, town of Union and different places.

Q. Did you sell any in Jersey City from that depot?

A. Well, we scattered it around; the wagons would drive up and take milk away from that depot for distribution.

Q. Whose wagons?

A. Our wagons would drive up to the depot, that is, to the platform; this milk is all unloaded on the platform, and then they load this milk right over the trucks to the wagons.

Q. And that is for the purpose of distribution to customers?

A. Yes, sir.

Q. Some of whom reside in the district of Jersey City?

A. Well, it may have been distributed in Jersey City, or it may have been in Hoboken or Union. The milk we got from Oxford always came in with any other milk that came to that station, and we never can say where it is to be distributed, town of Union, West Hoboken or where.

Q. Does other milk come from different stations to that place?

A. Yes, sir.

Q. And then you say some of it may have gone to Jersey City and some to West Hoboken or elsewhere?

A. Yes, sir; I cannot tell where it goes.

Q. Did you at any time discontinue receiving milk from Oxford?

A. Yes, sir.

Q. When?

A. Well, Doctor McLaughlin called in to see me about the milk, and asked me whether we were getting any milk from Oxford, and I told him we got 40 or 45 boxes according to the receipts, and I showed him what we were getting from there, and he told me then about this trouble; I did not know anything about it at all. He came to see me and I said I would stop it, and I did stop it right away.

Q. When did you do that?

A. Just after Dr. McLaughlin told me about it.

Q. Did he ask you to stop it?

A. Well, he told me there was a typhoid case up there, and he warned our people about it, and they said we should not take any more milk from there.

Q. What day did you stop it coming from Oxford?

A. I cannot tell the exact date.

Q. Can you tell the month?

A. Well, it was the same month that Dr. McLaughlin came to see me.

Q. It was when he came up to see you and asked you about it or told you about it?

A. Yes, sir.

Q. For how long a time did you discontinue receiving milk from Oxford?

A. Well, I believe the first lot of milk we got from there after that was the 25th of this month.

Q. The 25th of March 1907?

A. Yes, sir; the first milk from Oxford.

Q. Then you discontinued it in the fall of 1906 at the time Dr. McLaughlin mentioned that there was typhoid up to a few months ago?

A. Yes, sir.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. The milk you receive from Oxford comes in at what station?

A. D. L. & W.

Q. Where is that, at Hoboken?

A. Yes, sir.

Q. Does any of that milk go on over to New York?

A. Well, I will tell you how that is, the milk that we receive down there at Hoboken is what is left over of the milk that comes from Newark, the balance that is left over comes down to Jersey City, and is unloaded on the D. L. & W. platform.

Q. It comes to Hoboken you mean?

A. Yes, sir.

Q. It does not come to Jersey City?

A. We call it Jersey City.

Q. You call the D. L. & W. freight house Jersey City?

A. Yes, sir; it is 18th or 19th street, and we call it Jersey City on this side, and the other side we call Hoboken; it is partly in Hoboken and partly in Jersey City.

Q. Now that milk from Oxford came, as you say, to Newark?

A. Yes, sir; it stops there first.

Q. How can you tell whether all the milk that came from Oxford was left at Newark or not?

A. How can I tell?

Q. Yes.

A. Well, they generally get their supply from there; of course we get milk from different stations, and they may get from different stations milk at Newark. But what there is left over we get—there may be 20 or 25 boxes and that comes down to Jersey City and we get it, and if the Jersey City wagons happen to be there they will get it, if not they will not get it; it may go to New York, Brooklyn or Staten Island and they will get it.

Q. Can you designate in any way the milk you received at Jersey City at the Delaware, Lackawanna & Western depot as being from Oxford, as distinguished from the milk from any other station on the D. L. & W. road?

A. No, sir; I cannot.

Q. There are many stations on the D. L. & W. Road?

A. Yes, sir.

Q. From which you receive milk do you not?

A. Yes, sir; for instance we send off an order, and we get 20 at Oxford and 24 from New Berlin and 24 from Delhi.

Q. Do you know when the milk comes to the freight office whether it comes from Oxford or any other particular station?

A. Yes, sir; we get our receipts to show where it comes from.

Q. Well, now, do you know whether you did receive at this depot any milk coming from Oxford during the fall of 1906?

A. Yes, sir; about 20 to 25 cans during the fall.

Q. 25 cans a day?

A. Yes, sir; sometimes, and sometimes two or three times a week; sometimes we get 18, 16, 20 and 25.

Q. In this depot at the D. L. & W. from Oxford?

A. Yes, sir; up to that time, after that we stopped it.

Q. You don't tell us what day you stopped it, why don't you do that?

A. Well, you will have to take Dr. McLaughlin's statement of that, he will give it to you.

Q. We want you to give it to us?

A. I cannot give it to you.

Q. Did you make any note of it?

A. No, sir; I don't say why I should, I had no reason to make a note of it.

Q. I should think you would have made a note that you stopped getting milk from Oxford on account of what Dr. McLaughlin told you?

A. Dr. McLaughlin came and told us about this case, and of course we gave orders to receive no more milk from Oxford.

Q. What did you do with the milk that came from Oxford after that?

A. We did not receive any.

Q. What became of the milk?

A. I suppose they used it for condensing or something else, I don't know what they did with it, I know I did not get any and we have 39 plants from which we can use milk, I know we never received any here at Jersey City that came from Oxford from that time until this month.

Q. But you don't know what became of the milk?

A. No, sir.

Q. Where did you buy your milk in Oxford?

A. Oh, it is contracted for from the different farmers.

Q. And you don't know what became of that milk afterwards?

A. No, sir.

Q. You never heard of any complaint of typhoid fever from that milk after Dr. McLaughlin spoke to you about it?

A. Hear any complaint of typhoid?

Q. Yes.

A. Not from our milk?

Q. I mean about it creating any typhoid fever?

A. No, sir; it may have been from the milk we received, but from the amount of customers we serve and the amount of milk we serve to them, it would be pretty hard to tell.

Q. Well, I understand you cannot say now that any of that milk that came from Oxford from September to November, was delivered in Jersey City?

A. Well, I told you, of course I cannot tell the date we stopped, but it was after Dr. McLaughlin had been there to see me. We had received milk, as I told you before, from that place up to that time, but after that we discontinued getting any milk from Oxford.

Q. Did you deliver any milk in Jersey City that you received from Oxford, to your knowledge?

A. Milk received from Oxford?

Q. Yes.

A. Do you mean before Dr. McLaughlin came to see me?

Q. Yes.

A. Yes, about 18 to 20 boxes.

Q. Do you mean each day or week or month?

A. Per day, or at least two or three days a week, I would not get it always from that place.

Q. Was that all delivered in Jersey City?

A. It was scattered all over the county, from Bayonne to headquarters.

Q. How much was delivered in Jersey City itself?

A. You could not tell anything about that because a Bayonne wagon may drive up and he get 15 boxes and the town of Union wagon drive up and he will get 10 boxes; Union Hill may be the next one or Bergen, and they take 12 boxes; you cannot tell where it goes. We don't call up Bayonne or the town of Union to see about that.

Q. That is all.

RECESS.

ALLEN D. CUDDABACH, heretofore sworn for the defendant, is recalled.

FURTHER DIRECT EXAMINATION by Mr. Corbin:—

Q. Have you made any observations recently as to the flowing out and going out of the ice in the Boonton reservoir?

A. Yes, sir.

Q. When did you begin your observations, and how did you continue your observations?

A. I began the observations last Saturday.

Q. Give the date of the month?

A. March 23d I believe.

Q. And continued when?

A. Continued daily, up until the present day with the exception of one day.

Q. Did anybody assist you in the observations?

A. Yes, sir.

Q. Who?

A. Mr. Mackintosh.

Q. Did you have a transit or other instrument for the purpose of observing?

A. Yes, sir; we located the edge of the ice daily by means of a transit.

Q. When you began was the entire lake covered with ice?

A. Except a small portion of it at the inlet.

Q. Have you made any observations to see where the fall took place first?

A. Yes, sir.

Q. Have you a map here?

A. Yes, sir.

Q. Do you know how thick the ice became during this last winter at the reservoir?

A. Not from personal observation, no, sir.

Q. I show you this may already offered in evidence marked Exhibit D. 11 in this case, entitled map of Boonton reservoir, showing float experiments September, November and December 1906. Now Mr. Cuddabach, have you put anything in pencil upon this map to indicate your observations on the ice?

A. I have marked in pencil or in crayon in two colors alternating from brick color to yellow each day, the edge of the ice as they measured it.

Q. Now the nearest one to the inlet as I examined it, the line nearest to the inlet seems to be a yellow line?

A. A brick colored line; that line represents the position of the ice on Saturday, March 23, at about 3 P. M. in the afternoon.

Q. You have marked March 23 on the map?

A. I have marked it on the line.

Q. That is the line marked March 23, 1907, 3 P. M. is it?

A. Yes, sir.

Q. What does that indicate?

A. That indicates that the portion of the reservoir between that and the inlet was free from ice; all the rest of the portion of the reservoir north of that line had ice.

Q. Did you make an observation on the 24th?

A. Yes, sir.

Q. How is that indicated?

A. Yellow line marked March 20, 1907, 12 o'clock noon.

Q. That indicates the edge of the ice that day?

A. Yes, sir.

Q. Did you make any observation the next day?

A. Yes, sir; March 25th; that is indicated by a brick colored line marked in two places March 25, 1907, 1.30 P. M. That was approximately the time when the location was made.

Q. And the radius within that curve is that open water?

A. Yes, sir; and outside is covered with ice.

Q. That seems to extend further up towards the head of the reservoir?

A. Yes, sir; extends to a point opposite the island.

Q. State the other observations you have made and how they are indicated?

A. The day following, March 26, the line was not located by instruments as on the previous days but was located by standing on the bank of the reservoir and sketching it in on this map as the ice appeared on that day, and the line is made dotted to indicate that it is not the exact location.

Q. That line strikes the island?

A. Yes, sir; this side of the island was entirely free of ice.

Q. The north side of the island?

A. Yes, sir; and an observation made two days afterwards on the 28th, on the side next to the dam no observation being made at the outer end of the reservoir showed the ice to have got out to this point (indicating).

Q. The free water was down to this point running across the lake?

A. Yes, sir; located from this point here.

Q. Parallel with the dam?

A. Yes, sir; practically parallel with the dam.

Q. Do you know what date the ice was entirely gone out?

A. Not from personal observation, no, sir.

Q. These lines you have laid down indicate correctly or approximately the open water on these days?

A. They indicate—that is, the first three lines indicate it as correctly as it can be located by any instrument; the 4th line the 26th, was just sketched from observation, and also the 5th line.

Q. Did you go out in a boat at any time?

A. Yes, sir.

Q. On this last day?

A. The date of March 25th. That line was accurately located by two transits, and an observation taken at the edge of the island by boats.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. It appears then that on the 23d of March 1907 the ice extended to the actual stone of the spillway; is that so?

A. Why, I would not say that that was so, as there is now quite a little water running over the spillway, and there was at that time a small clear space above the spillway.

Q. Was any water running over the spillway on the 23d day of March last?

A. Yes, sir.

Q. And did it continue to run over that spillway from that time until you ceased your observations?

A. Yes, sir.

Q. Increasing in quantity or not each day?

A. Well, I cannot give you the exact figures, but I should say from general knowledge, decreasing slightly in quantity.

Q. That would be your judgment?

A. That would be my judgment.

Q. Now around the gatehouse, how was the ice there on the 23d day of March?

A. From the point where I observed the reservoir I could not see any open space of water there, I was not at the dam but from these points where I observed the open space,—if there was it was not visible to me.

Q. On the 23d of March how thick was the ice?

A. I did not measure it.

Q. You went on the ice?

A. No, sir; I was not on the ice.

Q. You were on the shore?

A. Yes, sir.

Q. But you went one day on the lake in a boat?

A. Yes, sir.

Q. That day how thick was the ice?

A. I did not measure the thickness of the ice tha- day, but along the edges where we went on the ice, I should say it was 5 or 6 inches thick as near as I can tell, it was very rotten.

Q. Was it thicker out in the reservoir that day or thicker where you saw it, in your judgment?

A. I don't know.

Q. You wrote out 26?

A. 25th I think.

Q. Was there any open water at any time when you observed this reservoir, at what is known as the Parsippany dyke?

A. I did not go clear out to the Parsippany dyke but from observing at this point (indicating)—

Q. Don't say that, just describe it so it can go on the Stenographer's notes?

A. Nearer the mouth of the river, and an observation from a point northwest of the island I say there was no open water visible.

Q. So far as you know during the whole time you were making these observations, the end towards the Parsippany dyke was solid ice?

A. Yes, sir.

Q. Now, during any of these days did you notice any ice coming down the Rockaway river?

A. No, sir; I did not.

Q. You did not observe any?

A. No, sir.

Q. Do you think you would have seen it if any had been coming down?

A. I think I should have seen it.

Q. Do you know how much later the ice breaks up on the Rockaway river than in this reservoir?

A. I think the ice is broken up on the Rockaway river first.

Q. Why do you presume that?

A. Because of my personal knowledge the ice is broken up in the river lower down, and there have been raised in that water which would tend to help break it up and carry it down.

Q. Well, it is a little cluttered up above there on the Rockaway, is it not?

A. Yes, sir.

Q. There are dams up above to which the ice is frozen to?

A. Yes, sir.

Q. You don't know whether those points are broken up, do you?

A. I am only speaking of the river.

Q. You are not speaking of those ponds above?

A. No, sir.

Q. Do you know whether or not there was ice in the Rockaway river this winter?

A. Not from my own personal knowledge.

Q. Were there any channels in this ice in any direction?

A. The last day, or on the 26th of March there were some channels shown in the ice from the edge.

Q. And they ran all the way across the reservoir or only partly across?

A. Well, partly across I would say when I saw them; for instance a channel west of the island four or five hundred feet ran in towards the south shore, there is a crack in the ice I should judge.

Q. Did you notice any channel running towards the overflow?

A. No, sir.

Q. These channels were about how wide?

A. First there were slight openings, and gradually the ice melting they became wider.

Q. That is all.

FRANK MACKINTOSH, a witness heretofore sworn on the part of the defendant being recalled for further examination in chief by Mr. Corbin:—

Q. Did you assist Mr. Cuddabach in making these observations of the ice the latter part of March 1907, at the Boonton reservoir?

A. I did.

Q. Who handled the transit to make the actual observation?

A. I did.

Q. And recorded them correctly?

A. Yes, sir.

Q. Have you examined the map that has these lines put upon it?

A. Yes, sir.

Q. Is that correct?

A. Yes, sir; to the best of my knowledge.

Q. Do you know how thick the ice became on the Boonton reservoir during the winter of 1906-7?

A. The greatest depth, by measurement, was 18 inches.

Q. Where was that?

A. Near the gatehouse.

Q. Did you measure the depth at any other place?

A. No, sir.

Q. When was that?

A. I can't say the exact time, but I should judge possibly a month ago.

Q. That would be the latter part of February?

A. Yes, sir.

Q. Has the ice entirely disappeared from the surface of the reservoir now?

A. It has between the island and the dam as far as I could see.

Q. When did it finally disappear between the island and the dam?

A. This morning was the first day.

Q. And it is now March 29th?

A. Yes, sir.

Q. And you refer to this morning of March 29?

A. Yes, sir.

Q. Did you see it today?

A. Yes, sir; this morning.

Q. And yesterday?

A. Yes, sir.

Q. Where was the last ice between the island and the dam to disappear?

A. Last night the ice was in the cove to the north of the spillway; that was the last that I saw of it.

Q. And that was all the ice you say remaining at that time over at the island?

A. Yes, sir.

Q. And that was gone this morning?

A. Yes, sir.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. How does the ice go when it does go, does it go over the spillway or does it melt?

A. I don't know but I think it melts.

Q. It does not break off in blocks and go over the spillway?

A. I have not seen it.

Q. As far as your observation goes the ice melts?

A. Yes, sir.

Q. Did you notice this opening of the ice channels in the ice before yesterday?

A. I noticed these channels you speak of the day Mr. Cuddabach and I made the sketch without any instruments; that was the first day.

Q. That was the first day you noticed that?

A. Yes, sir.

Q. In what direction did that run, from the island towards the dam?

A. I think they ran about south of the island, possibly southwest.

Q. The southerly end would be where?

A. Towards Parsippany dyke, that is the lower end of the dyke, the southerly end.

Q. The northerly end would be where?

A. Above the island.

Q. Were there any channels between the island and the dam?

A. Not that I remember seeing, no, sir.

Q. Were there any channels near the spillway?

A. I don't think so.

Q. How much of the water at the spillway was open the day you went there in boats?

A. I could not say, sir.

Q. You cannot remember?

A. I don't know, sir.

Q. You made no observation at that time as to that?

A. No, sir.

Q. Wasn't there a channel at that time from the Rockaway river inlet to the spillway?

A. On the day we went out in the boats?

Q. Yes.

A. No, sir.

Q. But you don't remember when that channel did open?

A. Not at the time; no, sir.

Q. How many days if you can tell me after you went there in the boat?

A. I think about three days; I think yesterday morning the channel was open.

Q. Well, around the gatehouse, when did the ice leave there?

A. That I could not say, sir.

Q. It has not left there yet?

A. Yes, sir.

Q. There is no ice now south of the island, I mean between the island and the dam?

A. No, sir.

Q. But beyond there is ice?

A. I could not say from personal observation.

Q. You don't know whether there is ice above the island or not?

A. No, sir.

JAMES GIBSON, sworn for defendant.

DIRECT EXAMINATION by Mr. Corbin:—

Q. Where do you live?
A. Paterson.
Q. What is your occupation?
A. Inspector for the Water Company.
Q. Have you been in Dover and up and down the Rockaway valley this last winter?
A. Almost continuously, yes, sir.
Q. Did your duties take you there?
A. Yes, sir; they did.
Q. Has the Rockaway river through Dover been frozen over this winter?
A. No, sir.
Q. How is it between Dover and Wharton, has it been frozen over there?
A. There has not been a suspicion of ice on the river between these points.
Q. Can you speak of its condition below the river?
A. No, sir—well, from a point where the river enters Dover and through there which is quite a sweep, just about a mile, I can.
Q. What did you observe there?
A. Free of ice.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. I don't quite understand what you mean by no suspicion of ice?
A. Between Dover and Wharton.
Q. Wasn't there ice on the banks?
A. Yes, sir; I saw ice along the banks in from the line of the river, from the well defined line of the river.
Q. You mean there was no suspicion of ice in the channel of the river?
A. Yes, sir; it was remarkably free from it.

Q. Why do you say it was remarkably free, what was there about this ice that makes it freer than any other year?

A. I intend to make it so but my observation was more continuious than any other year.

Q. Was there anything in this winter which made less ice on there than any other winter?

A. No, sir; but the fact of the intensity of the cold made it attract my attention and the strangeness of there not being any ice on it, and I observed it more for that reason.

Q. It was an usually cold winter in that section?

A. Yes, sir; in the whole of that section of the country.

Q. Was there ice in the canal at Dover?

A. Yes, sir; there was ice on the canal, that is, on parts of the canal.

Q. Was there ice in the canal wherever there was water?

A. Yes, I should say so but I have not observed the canal particularly.

Q. Well there must have been ice because wherever the water stopped it froze?

A. Yes, sir.

Q. There was no difference in any part of the Rockaway valley in that respect, was there?

A. No, sir.

Q. And if the water remained quiet enough it would freeze?

A. Yes, sir.

Q. Well, there are some ponds in the Rockaway river below Rockaway, are there not?

A. Yes, but I haven't observed those very much; I was very largely at Dover all this winter.

Q. You don't mean to say that there wasn't any ice down there?

A. On the contrary I suppose there was.

OTTO H. SCHALK, sworn for defendant.

DIRECT EXAMINATION by Mr. Corbin:—

Q. Where is your residence?
A. 455 4th avenue, Newark.
Q. What is your occupation?
A. Food and drug inspector of the Board of Health of the City of Newark.
Q. What was your education and preparation for that office, where were you educated?
A. At Stevens Preparatory School one year, and in the Freshmen's class at Stevens.
Q. How long have you been employed in the Board of Health?
A. 11 years.
Q. In what capacity?
A. Sanitary inspector and inspector of food and drugs.
Q. Is that your sole occupation?
A. Yes, sir.
Q. Did you make an examination in the fall of 1906 in Jersey City in relation to the question of the origin of typhoid cases in Jersey City?
A. I did.
Q. What examination did you make, and when and what?
A. In December I was instructed by the health officer of the Board of Health of the city of Newark to visit a number of places in the city of Jersey City where typhoid fever was existing, and a list was given me by the Board of Health.
Q. When?
A. In December, and I was instructed to interview either the patient or members of the family where the disease existed and find out from them if any cause was given as to how the disease might have been contracted.

Q. Do you say where the fever was then existing or had existed?

A. The list was of the names and addresses of persons where typhoid fever had existed or was existing at that time.

Q. How many cases were on your list for examination?

A. 70 names.

Q. Did you look into all of them?

A. I did.

Q. Now how many of the 70 names on your list were you able to find?

A. 58. I did not find all of the people themselves; some may have been at the hospital or dead, but I found where the case had existed in 58 instances.

Q. So that you could identify them?

A. Yes, sir.

Q. Why couldn't you find the others as well?

A. In some cases the people had never been heard of, and I was told they never existed at the house that was given, and others the number of the streets were wrong.

Q. What period of time did this list of 70 cases cover?

A. About two weeks.

Q. That is you spent two weeks on it?

A. Yes, sir.

Q. During what period of time had these 70 cases extended over?

Objected to because the witness must speak of his own information.

Q. They existed or had previously existed?

A. On my list opposite each name was the date the case was supposed to have been reported to the Jersey City Board of Health.

Q. And what period did that cover?

Objected to for the same reason.

A. September to November.
Q. Have you got the list here?
A. I have.
Q. Let me see it, please?
A. (Same produced).
Q. Who gave you that list?
A. That is my report of the list and here is the list itself.
Q. You have the list here which is embodied in your report?
A. Yes, sir.
Q. This purports to be your report of December 13, 1906 to David B. Chandler the health officer of the Board of Health of Newark, is that right?
A. Yes, sir.
Q. And you say you identified 58 cases; did you inquire into the question of where those cases had obtained their milk supply?
A. Yes, sir.
Q. And who was supplying milk to their houses?
A. Yes, sir.
Q. What did you find in that respect?

By Mr. VREDENBURGH: Objected to as mere hearsay and incompetent and illegal.

It is one of the questions I always ask in every case where the milk supply comes from.
Q. Did you investigate the milk supply in these cases?
A. Do you mean whether I followed up the supply?
Q. Did you find out where the supply came from?
A. Yes, sir.

Q. Did you find out whether any of it came from the Borden people?

A. About one-third of the cases.

Q. Did you keep a memorandum of the cases where you found the milk came from Borden?

By Mr. VREDENBURGH: I object to the answer as hearsay entirely, and I object to this evidence for the same reason.

Q. Will you speak from any memorandum you have as to what places you found to which you traced the milk supply as coming from Borden?

A. Well, there was Borden's milk supplied to 206 9th street, Pete Golden was the name.

By Mr. Vredenburgh: All of these answers are objected to for the same reason.

Q. Proceed.

A. F. W. Eaton, 357 5th street; Margaret Gleason, 245 First street; H. J. Deedmeyer, 119 Glendenny avenue; W. J. Ward, 278 Union avenue; Mary Rue, 77 Boylan street; Albert Embleton, 172 Boyd avenue; Albert Bogtle, 425 Montgomery street; John Barrett, 458 Wayne street; Mrs. Jos. Ford, 7 Magnolia avenue; Cristina Gabler, 77 Court House place; Henry Leuthaur, 118 Prospect street; John Heitman, 304 Summit avenue; Leopold Bennar, 925 Bergen street; L. Cochran, 143 White street; L. C. Ewell, 145 Danforth avenue; John F. MacDonald, 87 Woodlawn avenue.

Q. Did you trace up any of these cases to see whether any of them came from out of town to Jersey City who were already sick at that time?

A. Why, I always get that, what the Doctor attributed the case to first; in several cases the Doctor said (interrupted).

Objected to.

Q. Let us see how many there were.

By Mr. VREDENBURGH: I object to what the Doctor said.

A. 7 cases.
Q. 7 cases of what?
A. Where the Doctor told me they were due to out of town causes.
Q. Did you find out whether any of them come to Jersey City when they were already sick?
A. Yes, sir.
Q. How many?

Objected to for the same reason.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. The 7 that you mention are among the names you have given us?
A. No, sir.
Q. Well, take the case of Margaret Gleason, where do you say she lived?
A. 245 First street.
Q. Did you see her?
A. No, I saw the nurse.
Q. You saw the nurse?
A. Yes, sir; I saw her nurse.
Q. How did you know she was her nurse?
A. She said so.
Q. Who?
A. The nurse said she was the nurse attending her.
Q. She told you she was the nurse?
A. Yes, the nurse attending Mrs. Gleason, who was not bad sick.
Q. Nurse of who?
A. The patient.

Q. At the time you got there somebody was sick in the house as you understood?

A. Yes, sir.

Q. And you heard that her name was Margaret Gleason?

A. Yes, sir; that was the name on my list.

Q. And you saw somebody who said she was the nurse?

A. Yes, sir; I asked her if Margaret Gleason lived there, and she said yes, sir, but she was sick in bed; then I asked her who she was, and she said she was the nurse attending her.

Q. Did you get her name?

A. No, sir.

Q. Who did you ask about the milk supply?

A. I asked the nurse.

Q. How did the nurse know what milk she drank four weeks before that time?

A. I don't know.

Q. What did you ask her—I mean to say did you ask her where they got the milk?

A. No, sir.

Q. If it was from any particular source?

A. No, sir; I simply asked her who furnished milk for the family.

Q. That is all you asked her who furnished milk for the family?

A. Yes, sir.

Q. You did not know whether the family got any milk for the person who was sick?

A. That is what I was asking about.

Q. I want to know what you asked the nurse?

A. I asked her if she had taken this milk before and after her sickness, coming from Borden.

Q. Well, you don't know whether the nurse knew what milk she had taken before she was sick?

A. I simply asked the nurse what she knew and she told me.

Q. She was the nurse for the sick woman?

A. That is what she said.

Q. Then you understand she came there after the woman was taken sick?

A. I understood so.

Q. So you asked her what milk the woman drank before she was taken sick?

A. I asked who supplied the milk to the house.

Q. Then you have given us the information you got from the nurse who told you what milk this woman received before she was taken sick?

A. Yes, sir.

Q. That is all the information you got?

A. Yes, sir.

Q. You don't really know whether she was the nurse or not?

A. Only what she told me.

Q. You don't know whether the woman had typhoid fever or not, do you?

A. Only what was on the report and what the nurse told me.

Q. That is about the same information that you received in regard to all the other patients?

A. No, sir; in some cases I saw the patient.

Q. Which patient did you see?

A. I saw a number of them.

Q. Can you pick out one patient?

A. Yes, sir.

Q. Who?

A. I saw Pete Golden, he was in bed.

Q. Peter Golden?

A. Yes, sir.

Q. How did you go to him?

A. I had him on my list as Gordon, and I went to the house and asked if Mr. Gordon lived there, and they said no, but Mr. Golden did. I said did he have a case of typhoid fever and they said yes, and that he was then in bed, so I went up to the bedroom and talked with him.

Q. You did not see Gordon at all?

A. No, sir, but I did see Mr. Golden.

Q. But not Gordon?

A. It should have been Golden; he said he had typhoid fever.

Q. Did he say his name was Golden?

A. No, sir, his name was spelled wrong; his name was Golden.

Q. You had spelled it wrong?

A. No, sir, I took it from my list. He said his name was Golden and that Gordon was wrong; his name was Golden and he had a case of typhoid fever, and was attended by Dr. Sellof; that was on the report.

Q. Did you talk with him?

A. I did.

Q. Did you ask him where he got his milk from?

A. Yes, sir.

Q. Did he say?

A. Borden.

Q. He told you he got his milk from Borden?

A. He did.

Q. Was it milk that he had got that day from Borden?

A. What is that?

Q. Was it milk he got that day from Borden?

A. He said he was getting his milk right along from Borden. He said he commenced getting his milk from Borden—he said he had been using Borden's milk some time before he was taken sick.

Q. What do you mean by quite sometime, did he say quite sometime?

A. Yes, sir.

Q. What did you understand him to mean by that?

A. I asked him whether he had had it for sometime before his sickness, and he said yes he had used it for the last three or four months before his sickness.

Q. Did he say how often he got the milk?

A. I am not sure whether he did or not.

Q. Did he tell you what quantity he got of the milk?

A. A quart bottle.

Q. Did he say he got it in a quart bottle?

A. Yes, sir.

Q. Did you see any of the bottles?

A. No, sir.

JAMES GIBSON recalled for further direct examination by Mr. Corbin:—

Q. You said that you were employed by the Jersey City Water Supply Company?

A. Yes, sir.

Q. How long have you been in their employ?

A. I should judge about 3 or 4 years, ever since they have been in business.

Q. Have you been all that time located on the Rockaway water shed?

A. Yes, sir.

Q. Before that time who were you employed by?

A. East Jersey Water Company.

Q. What did you do for them?

A. Same thing, inspected the water shed.

Q. Is that your daily employment?

A. Yes, sir, and has been for 10 years.

Q. Have you any other employment?

A. No, sir.

Q. Just state what your duties are, what it is you do in the way of inspecting the water shed?

A. I take every possible observation; I remove and cause to be removed by moral suasion or legal form, anything in my judgment appears to be undesirable.

Q. Of what distance have you charge?

A. Of the entire Passaic water shed.

Q. You are located more particularly on the Rockaway?

A. Since the last four years.

Q. Before that you had to look after the whole of it?

A. The whole portion of the Passaic water shed.

Q. But now you look after that portion of it which is above the Boonton dam?

A. Yes, sir.

Q. Have you in those 3 or 4 years since you have been there on the Rockaway water shed caused removals of privies and other things?

A. I have, sir.

Q. What extent in number?

A. The total number, to the best of my recollection and belief—I lost my data in the Paterson fire—but it would not be less than 500.

Q. 500 what?

A. Water closets, privies, pig pens and sinks.

Q. How did you go about it to cause them to be removed?

A. Well, Mr. Corbin, I found that the entire sentiment among the people was hostile when I went there first, so I cultivated the acquaintance with the head people, the large manufacturers, large property owners, superintendents, &c., so that I came into very close judgment with them, and I used all the moral power that I was able to employ.

Q. What was the method, as a rule, in these 500 cases in which you say removals have been made; by whom have they been made?

A. By the owners.

Q. Under your suggestion?

A. Yes, sir, mainly by a compromise position. I tried to get them as far away from the water as possible, and they tried to get as far away from the back door as possible, so we generally compromised by getting every inch I could get, and some of these places have been removed a second and a third time; after the big flood three or four years ago the water mark went up, and I used that as an argument with them, and I appealed to them on the score of decency, as a rule.

Q. Have you proceeded by legal measures in some cases?

A. I have.

Q. By what kind of proceedings?

A. Under the law of 1897.

Q. By summary proceedings before a magistrate?

A. Yes, sir; and I got judgment in every case.

Q. In how many cases?

A. In 10 I should judge.

Q. Have you proceeded in Chancery cases?

A. Yes, sir, in Boonton, against the law of the State.

Q. How about Dover?

A. In Dover against the Schwartz estate.

Q. Under whose instructions did you work, who were you working with?

A. Almost exclusively with Dr. Leal.

Q. Was Dr. Leal employed by the same Company?

A. Yes, sir, and Dr. Leal was at my elbow.

Q. What are your instructions as to what you shall do?

A. Going back to the very beginning, my instructions were to remove everything that appeared in my judgment objectionable, and when there was any doubt, to refer to Dr. Leal, and confer with him, and frequently and almost always I have at his convenience, brought him on the spot.

Q. Was he on the ground with you?

A. Very largely. I guess he has seen three-fourths of these cases, and perhaps he has seen them all.

Q. Sometimes then you would act by yourself, and you would also act upon his judgment?

A. Almost entirely, yes, sir.

Q. To whom do you report when you find things you think objectionable?

A. To Dr. Leal.

Q. How frequently did you report?

A. Sometimes we saw each other every few days, and then again it might be weeks apart; I was almost always at his elbow or at his call, to make statements to him or Mr. Gardner; I am always in the saddle as regarding Sundays, holidays or other days.

Q. Or even Good Friday?

A. Yes, sir, which I regret.

Q. You spoke of factories and mills in the water sheds?

A. Yes, sir.

Q. Have you caused them to make changes?

A. Yes, sir.

Q. Have the changes been made?

A. In every instance, yes, sir.

Q. Have you made investigation to see whether closets which were full have been emptied at the proper time?

A. I have, and I have co-operated in those matters and brought in the good offices of the health board to co-operate in some instances, and many times when it did not concern the water shed, I have co-operated in order to have one hand wash the other.

Q. Have you caused them to remove these objectionable features?

A. Yes, sir; I have.

Q. And have procured the assistance of the Board of Health to do it?

A. Yes, sir; and by moral suasion and otherwise.

Q. Have you induced them to do it in some cases?

A. Yes, sir.

Q. You spoke of some hostile feeling at first; how is that now, is it in anywise changed?

A. It is very radically changed; I think to-day I have the good-will of every material person in the water shed, officials, owners, managers, manufacturers and inhabitants.

Q. Have you looked into the question of the existence of the night soil?

A. I have.

Q. Where?

A. In Dover, Boonton and several other places where I came in touch with it, but in Boonton and Dover particularly.

Q. Have you followed that up wherever it was possible to do so?

A. Yes, sir; I have got in touch with the costermongers, and made friends with them, and have appealed to their better judgment. Of course, I realize that a great deal of their work was done in the dark of the night, and if they did not want to follow my suggestions they could do as they pleased, but I never found any instance of that.

Q. Have you succeeded in bringing about a change in that regard?

A. Yes, sir, by having them remove the night soil to safer places, and having them cut manure pits through and taking this stuff and mixing it with stable manure and sell it to farmers to spread it on the field in that way.

Q. What have you to say as to the general condition of Dover as to the pollution of the Rockaway River now as compared with the time you went there three or four years ago?

A. They are diametrically opposite at the present time to what they were then. When I went there no one in Dover had any conception of the river except as a sewer; everything hung over it; water closets and sleepers taken from the railroad and extended out even without a wall and the excrement dropping into the water of the river.

Q. You mean fecal dropping?

A. Yes, sir, even without a wall to protect it.

Q. How many were there of that sort in Dover?

A. Along the banks there; well, there would be all of that sort immediately over the bank to the river probably from Sussex street all the way down to the white bridge, probably there would be 75.

Q. Are there any there now?

A. Not a one; some of the boxes are there but they are used for other purposes.

Q. Were there also pipes carrying sewage and other fecal matter into the river?

A. Yes, sir; notably the Morris street pipe.

Q. Did you take up the question of the correction of that?

A. I did.

Q. Are any of those pipes now in existence, as far as you know, carrying matter into the river?

A. To the best of my knowledge I swear honestly and truly and without reservation that there is not any.

Q. Now some cases have been developed during the progress of this case like 14 East Blackwell street where the connection by pipe to the river was found where it had not been suspected?

A. Yes, sir.

Q. Have you done anything towards those cases?

A. I have in every instance and that in particular.

Q. At No. 14 East Blackwell street had you been there before that was discovered?

A. Frequently.

Q. Had you had changes made at that place?

A. I did; all these places were changed under my supervision.

Q. How did it happen that No. 14 East Blackwell street got into the river?

A. 14 and 16 are twin houses, and in the rear of it was a brick house used for—at one time for an engine, and subsequently for a storehouse, a brick structure, and under that the pipes were placed, and in getting under there a job at 14 East Blackwell street was left to a plumber's assistant, who through inability or cussedness or inadvertence did not make the final change as he should have done.

Q. How about the other place?

A. 16 was corrected; that was demonstrated beyond any peradventure as well as the other properties on that block. I have all the other owners in perfect touch with me and in perfect sympathy with me.

Q. You don't think that was a willful action of the owner of the property?

A. On the contrary, Mr. Richards, the owner, who is now dead, gave the work, at my instance, in good faith, to the most reputable plumber in the town, and the largest, Mr. P. T. Kerr; he gave it to a competent man and I have Mr. Woodhull's affidavit to show that it was correct—that in conversation with the boy it was brought to his attention in the meantime.

Q. Then it was the neglect of some subordinate by which it occurred?

A. Yes, sir; a mere boy; and the same was true of the Lancaster house at one time; inadvertently that wasn't discovered until after the work was completed and paid for.

Q. When new houses go up do you keep an oversight of them?

A. I watch them invariably.

Q. Do you go to see them?

A. I never miss a chance.

Q. And when new houses are going up do you make suggestions as to sanitary matters?

A. Frequently.

Q. Suggestions on these questions?

A. Yes, sir; whenever in my judgment it is called for.

Q. Were they followed—are your directions followed?

A. Invariably. Mr. Corbin, if you will permit me to say it, a score of the leading men there say that I have accomplished marvels without friction, and I have never asked them to go into their pockets and spend money. Mr. Searing, the former Mayor of Dover, paid $323 for excavation upon his land only last week or week before without my asking it.

Q. These precautions and instructions you have mentioned, do you still keep them up to this time?

A. Every moment of my time every day.

Q. As the water shed is improving is it necessary to keep up these instructions?

A. I think so, and it always will be, and that the good will of the people along the water shed will always be a necessary asset; I have always got my eye on that end of it, but manage it so as not to antagonize them. I have been blamed for being too gentle with them when I had the law and the facts on my side, but I have got there just the same. I never go to law with these people if I can help it; I use moral suasion and reason, and people there will do anything for me that is necessary.

Q. Do you think that there are many people there who willfully pollute the stream?

A. Speaking of Dover, I think to a marvellous degree I have secured the good will of the people and have even preached and educated upon that question; it is marvellous how few there are that will be contumacious, one or two only; Schwartz in one case, with whom we had a suit is the only one I can recall.

Q. Have you notices or circulars printed and delivered to the factories literally calling attention to the subject?

A. I have had copies of the law printed.

Q. And have you used them?

A. Yes, sir; that is one of my strongholds.

Q. You talked with the people about these matters?

A. I do when necessary; I generally tell the men that obedience to the law makes good citizens, and I also speak to them about the question of disease once in a while, but I use that as a lever, as a threat.

Q. Did you ever find any case where you were led to suppose that the owner willfully attempted to secrete a drain that was polluting the stream?

A. I would say that I never had a case where it arose in that way, where I believed on examination that it was really so.

Q. You never found that to be the case?

A. No, sir, not in later years.

Q. Now, take Schwartz's place, what about that—was Mr. Chandler sued in regard to that?

A. Yes, sir.

Q. There was a cesspool built at Schwartz's place before that, wasn't there?

A. Five years ago; oh, yes, several years ago; it was in 1900, I think.

Q. Who caused that to be done?

A. I did.

Q. Has another been built since then?

A. Two, and there is another being built now; it was commenced the week before last.

Q. Did you see them building it?

A. I did; yes, sir.

Q. Are you able to testify as to their being emptied at times?

A. Yes, sir; they are—well, they have overflows.

Q. But you have spoken of changes at various places which you think amounted to as many as 500 in number?

A. Yes, sir.

Q. And you spoke of being on the water shed before the Jersey City Water Supply Company went there?

A. Two years ago next March.

Q. Were the majority of these cases of change or improvement made before or after the Jersey City Water Supply Company came there?

A. Before the fire in Paterson, which was in 1902.

Q. Then you were attending to that already while you were in the employ of the East Jersey Water Company?

A. Yes, sir.

Q. And at the time you were looking after the whole of the Passaic water shed?

A. Yes, sir, I was.

Q. Have you any standing instructions for your duty in respect to cases of typhoid fever?

Mr. VREDENBURGH: I object to that question.

A. I have.

Q. State what they are.

A. To report them to the doctor invariably and to hunt up the particular case and all the data that I can pertaining to it.

Q. Do you in fact report them?

A. Invariably I communicate with the Board of Health or any one else that I can get information from, but I always make it a point to inquire from the Board of Health.

Q. You look over the ground yourself to see what the conditions are?

A. Always, I never hear of a case without doing that.

Q. Do you report the conditions you find?

A. I do, and I get all the information I can gather in regard to it.

Q. And if conditions are not favorable then Dr. Neil takes a hand in it?

A. Invariably, sir.

Q. Does he go on the ground with you?

A. Oh, yes, sir.

Q. And do you continue your investigations and your work during the winter as well as during the summer?

A. I am always on the job, sir; and I have friends everywhere, even outside of the cities and I can get information from my acquaintances and the people who reside in the neighborhood because of their friendship for me; so that I may honestly say I have a thousand agents on the shed whose good will I have and who have confidence in me.

Q. Outside of Dover, what have you to say as to the conditions prevalent to-day as compared with the conditions prevailing before?

A. Diametrically opposite.

Q. What do you mean by that?

A. In the early days when I went to the water shed everybody's conception of the Rockaway River was to use it as a sewer. To-day the contrary is the case and there is a disposition to meet the law and obey the requirements of the law and the disposition is to take the law as their guide.

Q. Is that true with respect to the country districts?

A. Yes, the whole water shed from the Passaic River up; I have taken in all the branches of it, night and day, during all seasons, but, of course, during the last season I have been almost exclusively in and around Dover and Boonton; that is,for the last two years.

Q. Mr. Corbin—you heard Dr. Chandler testify here as to his inspection of various places and coloring matter, did you?

A. I did.

Q. Were you with him when he went to those places?

A. Yes, sir.

Q. What part did you take in those cases?

A. I did the dosing as we call it; I put in the powder or whatever we used, and he was the official timekeeper.

Q. Did you put the coloring in in every case in his presence?

A. Always.

Q. And at the time and places when it was done?

A. Yes, sir; and he took the time.

Q. Now you heard his testimony, didn't you?

A. Yes, sir.

Q. Has he given a correct recital of what occurred?

A. Yes, sir; there is no change to be made in it as I know of.

Q. You did not observe the effluent as it came out in the stream?

A. Much more frequently than the testimony of Mr. Chandler would lead you to suppose. I went down and saw it.

Q. But there were others who were observing that part?

A. Yes, sir; that wasn't our end—Doctors Neil and Holland.

Q. Are you familiar with John Moller's saloon?

A. Yes, sir.

Q. Did you see the cesspool that was built there?

A. I did.

Q. Did you see it when it was being built?

A. Yes, sir; it was built under the supervision of the local health officer.

Q. Were there pipes connected with it to carry anything from it?

A. Nothing from it, but all to it.

Q. Did you see the Mansion House cesspool constructed?

A. I did, every one of them, even the first.

Q. Were any pipes leading out of those?

A. Only from one to the other.

Q. Any towards the river?

A. None.

Q. Now the Henry Meisol cesspool; did you see that constructed?

A. Yes, sir.

Q. What have you to say about that?

A. There was a connection with the river there originally.

Q. It did go to the river?

A. Yes, sir.

Q. Has that been rectified?

A. Oh, yes, sir; that has all been stopped; that was one of the first in that section of Dover to be removed. It was removed in 1898, I think.

Q. Did you see the cesspool constructed in the rear af 14 and 16 East Blackwell street?

A. I did; I carried the order for the ironwork; it is in a little alley covered over with large iron girders, which were made at the rolling mill there.

Q. Is there any pipe leading out of that to the river?

A. Not at all, sir..

Q. Did you see the cesspool constructed in the rear of Dr. Hunt's office?

A. Yes, sir.

Q. And is there any pipe leading out of that to the river.

A. No, sir, there is not.

Q. How many buildings are there at Ross' silk mill near Port Oram?

A. All kinds of buildings there, sir; about six, I should judge.

Q. Did you see the work put in there for the disposal of the sewerage of that place?

A. I saw the changes made there and that sewerage has all been disposed of by being connected with an old mine, and I have seen pipes running to it.

Q. Where is all the sewerage of those buildings carried to now?

A. Into this old mine.

Q. And goes into the top of the mine, does it?

A. Yes, sir, right into it.

Q. How long ago was that made?

A. To the best of my recollection about four years ago.

Q. How deep is this pit into which it goes?

A. Well, I threw the stone in that Mr. Chandler testified to and I could only hear sort of a rumbling sound and then ceased. It seemed to be very, very deep, but I couldn't form any accurate estimate as to the real depth of it.

Q. Hundreds of feet deep?

A. I should say so; it is an old mine.

Q. Heard no noise from it when you threw down the stone?

A. No, sir; except what I told you.

Q. And that sewerage goes down to a level far below the level of the Rockaway River?

A. Oh, yes, sir; the average abandoned mine would be 500 feet probably in depth, and this is an abandoned mine.

Q. Is it dry, as far as you know?

A. Yes, sir; as far as I know; I couldn't see into it.

Q. And does all the sewerage from that silk mill go into that old mine now?

A. It does; yes, sir.

Q. Did you see the vault built for 68, 70 and 72 Richards Avenue?

A. I did.

Q. And is there any pipe leading out of that, or drain of any kind?

A. No, sir.

Q. Is it properly built?

A. Yes, sir; it is properly built.

Q. Now I ask you the same question with reference to the Mayor's office of West Blackwell street —the Pierson property?

A. Yes, sir.

Q. What do you have to say as to that?

A. That's the same answer—no pipes; it is an ideal place.

Q. Now 78 Richards Avenue; did you see that building?

A. Yes, sir; I saw that also.

Q. Any pipes there?

A. No, sir; changed the line of that from where their first intention was to go and made a second digging there so as to get it further away from the line.

Q. 29 and 31 Myrtle Avenue; did you see that constructed?

A. I did.

Q. Is there any pipe leading out of that, or drain of any kind, to the river?

A. Oh, no, sir.

Q. Is it properly built?

A. Yes, sir; it is properly built.

Q. The bottom of this cesspool is earth or gravel, I suppose?

A. Mother earth, yes, sir.

Q. You have spoken of the owners in this case, or in many cases, doing this work in accordance with your instructions and insistment?

A. Yes, sir.

Q. Does the Company which employ you also make corrections at the same time?

A. They have in extreme cases, but I have always tried to get it done the other way preferably.

Q. Going on the theory that the people have no right to pollute the stream?

A. That's right; yes, sir. In cases of churches, or in cases of charity, where it would not be proper, we have—

Q. (Interrupting.) Well, never mind. Now in the Mansion House and the houses in the neighborhood of it are the leaders which bring the rain water from the roofs connected with the Morris street drain?

A. They are.

Q. But formerly, as I understand it, not only were those leaders connected, but the water closets as well?

A. Yes, sir; that was the system which Mr. Richards put in at a cost of $1,400.

Q. That was in there before you went there?

A. Yes, sir, the system was there. The owners of that property on that block had joined in it with him.

Q. And the change you made was to cut off the sewerage, leaving the roof water or the rain water to flush that?

A. Yes, sir.

Q. So that the Morris Street sewer still carries all the roof water or rain water through it?

A. Yes, sir.

Q. Does it carry also the surface water from the streets?

A. No, sir, it does not; now when I say it doesn't, I think in the hotel yard there is one open and perhaps that may get in there, but I am not so sure about that.

Q. Can you produce coloring at the mouth of the Morris Street drain at any time?

A. Yes, sir.

Q. How?

A. I would go to these roofs of these houses and do it.

Q. By putting it in the rain water leaders that were there?

A. Yes, sir.

Q. Did any of the water closets anywhere in Dover, or any of the sinks, connect with this Morris Street sewer?

A. No, sir, I have no knowledge that there is anything of the kind now.

Q. How many were there originally?

A. Well, that whole block included the bank, Richards' store, and the Lehman store, and Roberts' store and various stores, all drain in there; and I think two other properties besides the Dollard property next door and the Lindsley house, and the reason there was no more was because Mr. Richards was the autocrat of the town and where he had a prejudice against anybody they couldn't drain in that sewer for love or money.

Q. Everything of that kind has been cut off, has it?

A. Every one of them, in every case.

Q. Did you see the cesspools constructed at the row of houses at Wharton, near the canal?

A. Yes, sir.

Q. The houses in which the young man had typhoid fever?

A. Yes, sir; I had those constructed five years ago, first having the closets moved back from the canal and built on solid masonry; and the sinks were cut off at the same time, as they became gutted and broken; they have since been all taken out.

Q. When did you last attend to them?

A. I think it was in December; I am not positive; I think it was December.

Q. What is the provision at the houses known as the "Seven Sisters," in Dover?

A. There are two up-to-date vaults, built of solid masonry; I think Mr. Fanning testified to it here. He said he saw them constructed.

Q. Is there any connection with the stream or river from those houses?

A. No, sir.

Q. Did you see the new vault at Henry Morris' house?

A. Yes, sir.

Q. Where is that?

A. East Blackwell street.

Q. Any connection between that and the river?

A. No, sir; all the sink water goes to the vault.

Q. There was a sink there?

A. Yes, sir; but that goes into a separate place. It goes into a new vault 30 feet distant in good soil; I wanted to get it 30 feet further away but the owner kicked and I had to make a concession.

Q. Did you see the new vault constructed at George Parks?

A. Yes, sir.

Q. What has been done there?

A. The old privy was filled in—emptied first and filled in after.

Q. Are the old privies gone?

A. Yes, sir; and the sink likewise.

Q. Is the sort of which you are describing going on up to the present time?

A. Every moment sir.

Q. Do you know of any case now in Dover or elsewhere on the water shed where the water closets are polluting the river or stream by being connected with them?

A. I do not know of a single case.

Q. Or any sink?

A. I don't know of one now.

Q. Now you are still engaged in this work, are you?

A. Yes, sir.

Q. And if you should discover anything of the kind what would be your duty?

A. To remove it; I am always after them.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. Mr. Corbin, you were employed by the Jersey City Water Supply Company when?

A. When this new contract was entered into; I don't know the date, but I should think it was three or four years ago.

Q. When Mr. Gardner first became interested in any way with it?

A. Yes, sir.

Q. You were then employed by the Jersey City Water Supply Company and have been in their employ ever since?

A. Yes, sir.

Q. Have you been in any one else's employ during that time?

A. The East Jersey Water Company.

Q. Now are you still in the employ of that company?

A. Yes, sir.

Q. You are still in both companies' employ?

A. Yes, sir.

Q. When you went up after first being employed by the water supply company how many water closets did you see overhanging up there?

A. I don't think I saw them at that time; I said I saw them when I first went on the ground.

Q. But I say when you first went up for the Jersey City Water Supply Company how many were there?

A. I wouldn't think there were over seven—not over seven.

Q. Not that overhung? How long before that had the other 700 been removed?

A. I didn't say 700; I said 500.

Q. Well, how long before that had the other 500 been removed?

A. Well, they had been continually there and remained there about the first six months that I was on the shed, before I attempted to move any. I was making myself familiar with them.

Q. How many were removed in the year before you were employed by the Jersey City Water Supply Company?

A. I couldn't tell you, sir.

Q. How many do you think?

A. Well, we have been removing them from there every month—five, sometimes ten and sometimes less.

Q. Well, how many the year before, we will say?

A. I don't think there is one year but what we removed from the water shed some halfdozen.

Q. What years were they?

A. Well, 1898; the 8th day of May—

Q. (Interrupting) How many water closets did you remove in 1898?

A. I don't know.

Q. About how many?

A. I was largely around Morristown and Summit.

Q. Yes, but I am talking about the water closets in Dover.

A. I don't think I removed any, except at Richardson's establishment where we got the vaults built there.

Q. I said water closets built over the stream?

A. 1898?

Q. Yes.

A. I cannot really tell you.

Q. How many were over-hanging the stream, privies, when you went there in 1898, in Dover?

A. Well, I don't know.

Q. Cannot tell us how many there were?

A. I don't know.

Q. Well, that is what I am asking you?

A. I don't know.

Q. How many did you remove in 1898?

A. I don't know, but my best recollection is, I should think about thirty.

Q. Thirty in 1898?

A. Probably.

Q. In the city of Dover?

A. Yes, sir.

Q. How many in 1899?

A. I think that year was blank, it was either that or the following year was blank.

Q. How many the next year in 1900, did you remove in Dover?

A. Well, probably a hundred.

Q. One hundred in 1900?

A. Yes, sir.

Q. 1901?

A. No less.

Q. Another hundred?

A. Yes, sir.

Q. All privies over-hanging the stream?

A. No, sir; they weren't over-hanging the stream.

Q. Well, I will have to ask this over again. I am asking you about privies over-hanging the stream. Now I return to 1898, how many water closets did you remove that over-hung the stream in the city of Dover, in 1898?

A. About seven or eight or maybe 12.

Q. How many in 1899 in the city of Dover that over-hung the stream?

A. They were along immediately on the stream, about 15 I should think that year.

Q. How many in 1900?

A. I think that was the blank year, as near as I can remember.

Q. You removed none in 1900?

A. I think that was the blank year.

Q. In 1901?

A. Not less than one hundred.

Q. Privies that over-hung the stream?

A. No, not overhanging the stream, no, sir.

Q. That is all I am asking about; privies that over-hung the stream, and I will have to repeat my question again. I want to ask you about just those that over-hang the stream, how many did you remove in 1898, that over-hung the stream?

A. Well I don't understand your question.

Q. Very well, now then how many did you remove that over-hung the stream in 1898?

A. I don't know, but I judge about seven.

Q. How many that overhung the stream in 1899?

A. About 12.

Q. How many that overhung the stream in 1900?

A. I don't think any.

Q. How many that over-hung the stream in 1901?

A. Well, you use the word over-hanging—over-hanging and running to the stream are two different things.

Q. Well, how many did you remove in 1901?

A. That ended it; there were no more there.

Q. Did you remove any water closets that over-hung the stream in 1902?

A. No, sir.

Q. Did you remove any water closet that over-hung the stream in 1903?

A. No, sir.

Q. Did you remove any water closet in 1904 that over-hung the stream?

A. No, sir.

Q. Did you remove any water closets that over-hung the stream in 1905?

A. No, sir.

Q. Did you remove any water closets that over-hung the stream in 1906?

A. No, sir.

Q. So that all you removed that over-hung the stream were 19, and those you removed seven in 1898 and twelve in 1899?

A. Yes, sir; that is my best recollection at this time.

Q. Now you said that the good will of the people was a very important asset?

A. Yes, sir.

Q. And that you had acquired that?

A. Yes, sir.

Q. Why is it an important asset?

A. I will give you one illustration. The factory at Powerville, we had a little difficulty with them when we had the law suit in Boonton. The men in charge there working for the Lord estate—I was in touch with them every day, giving them cigars and taking a drink and chatting with them, and always speaking about the decency of keeping the stream clean, and no matter what the issues were between the water company and them the fact remained,—there were three or four hundred people living along that water and decency required it should be kept clean, and in view of that, if a dead chicken or any dead animal came down there after that they would take them and bury them, but before that time they didn't do it, because they were angry.

Q. What do you mean by saying that the good will of the people was an important asset which you had?

A. Well, they seemed to yield to my suggestion of decency, and propriety and preserving the waters from foul things.

Q. And do you think you have that important asset?

A. I think I have very largely, sir; you could find it out yourself if you should go up there.

Q. Then it is personal to you, is it?

A. I think so, very largely, sir; of course I think the methods I adopted succeeded with the people.

Q. Some other man would not have succeeded very well?

A. Well, I think I have been marvellously successful. I have gained their friendship and I can refer to the people who worked with me.

Q. Is it the male portion of the inhabitants who are in love with you or the female?

A. Well, I would like to say female, but my modesty prevents me; both I would say.

Q. That is all.

Sworn to before me, (the signature being waived) this 29th day of March, A. D. 1907 at Jersey City, N. J.

Further examination of witnesses etc., adjourned until Tuesday, April 2d, 1907, at Jersey City, N. J.

IN CHANCERY OF NEW JERSEY.

Between

THE MAYOR AND ALDERMEN OF JERSEY CITY,

Complainants,

and

THE JERSEY CITY WATER SUPPLY COMPANY,

Defendants.

Taking of depositions in the above stated matter, before the subscriber, a Master in Chancery of New Jersey, pursuant to the adjournment last had, at the hour of eleven o'clock in the forenoon of Tuesday, April 2, 1907, at the office of Messrs. Collins & Corbin, 243 Washington street, Jersey City, N. J. in the presence of Mr. James B. Vredenburgh and Mr. George L. Record, counsel for the complainants, and Mr. William H. Corbin and Mr. William D. Edwards, counsel for the defendants.

Said examinations being taken in shorthand, question and answer in full, and the signatures of the witnesses to their depositions waived.

GUSTAVE MUNSON, sworn on the part of the defendants.

DIRECT EXAMINATION by Mr. Corbin:—

Q. Mr. Munson, what is your business?

A. Superintendent of Joseph Wharton's mines.

Q. How many mines does that include?

A. That includes all of the Hibernia range, Richard mine at Wharton, Scrub-oak mine north of Dover, and Ross' Iron mines in Northern New York.

Q. How long have you been superintendent?

A. I have been superintendent for Mr. Wharton five years.

Q. Before that what were you?

A. 22 years with the Glen Iron Company.

Q. Superintendent?

A. Yes, sir.

Q. How long have you been in the mining business altogether?

A. About 30 years.

Q. What are the conditions as to sanitary accomodations in the mines?

A. We try to be as good as we can.

Q. What provisions do you make—it is about the same in every mine, is it?

A. Yes; we allow no deposit to be made, of course, anywhere near where the men are working; they use old abandoned levels when there is no use for them.

Q. Do you allow such a place to be put up where it can reach the mine water?

A. No, sir; the water runs from southwest northeast, you know; of course, if we cut through the pillars why the water goes down all the time.

Q. You make a special point to have these places away from all possible contact with the water?

A. Yes, sir.

Q. Are the men ordered to go to those places?

A. Yes, sir.

Q. Do you force them as far as possible?

A. Yes, they are discharged if they are known to go any where else.

Q. Is the water from those mines used for drinking purposes, generally?

A. Yes, sir.

Q. Is there more than one supply?

A. Until three years ago it was the only supply at Ore-land, what we call Upper Hibernia.

Q. Well, do they still drink the water from the mines at Upper Hiberna?

A. Not on the surface, they drink it in the mine; of course the miners drink the mine water.

Q. Do they do that in all the mines?

A. Yes, and on the surface we pump the water from the brook in the valley below; we have a pumping station there, and pump it up from feed water, and it is about the only water they have at Ore-land for use of any kind.

Q. What proportion of your water at Hibernia is condensed before discharged into the brook?

A. It is all condensed excepting 150 gallons a minute.

Q. Have you any idea of condensing that?

A. Yes, sir.

Q. How soon?

A. Well, we thought to do it before now, but the weather has been so severe this winter we could not do it; we have to put a hot well underneath the railroad track.

Q. When this is done then no water uncondensed will be discharge into the brook?

A. No, sir.

Q. What is the temperature of the condensed water?

A. I haven't that; I have taken the temperature of it several times, and I have it at the office.

Q. You cannot remember how high it was, approximately?

A. I would not want to say.

Q. Did you ever know a case of typhoid fever in the Town of Hibernia or in connection with any of these mines?

A. No, sir.

Q. During all your experience there?

A. No, sir.

Q. Are you as careful as possible as to sanitary conditions in Hibernia village and other places?

A. Yes, sir.

Q. Have you removed a number of the out houses and so on, at my request?

A. Yes, sir; my instructions from Mr. Wharton is to be extraordinary careful.

Q. You have told me that any time we wanted anything done you would be willing to do it?

A. Yes, sir; glad to do it.

Q. And you have done a great deal already?

A. Yes, sir; about everything you told me I guess, as far as I know.

Q. The mine water as discharged has sometimes a cloudy appearance, to what is that due?

A. To the sinking of the shaft, where that is sinked it keeps the bottom stirred up and makes—

Q. Fine dust?

A. Yes, sir.

Q. Is there any sulphur in the water too?

A. Yes, sir; some sulphur too.

Q. In your opinion do these various mines you speak of in the Rockaway valley or the little settlements in connection with them, including Hibernia, pollute the Rockaway river?

A. I think not, doctor.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. Why have you taken these extraordinary precautions at Hibernia village?

A. Well, first it was Mr. Wharton's wish, he is the man that inspects those things to the minutest detail he would notice the condition and if it didn't seem to be just right he would call my attention to it, and ask me to remedy it, and after that then Doctor Leal here, and Doctor Herold and others came there and they made suggestions that would improve the condition, and I did that. That is about the only reason I can give for it.

Q. What was the trouble which Mr. Wharton saw?

A. Well, I don't recollect anything in particular, there was an old house, mining house, that was just above where we are, No. 3 mill we call it now, and the drainage from that house wasn't very good, and it wasn't kept very clean around it, and we ordered it demolished.

Q. What demolished?

A. The house.

Q. Do you refer to the privy?

A. No I refer to the living house. It set very low in the ground and there was no way to drain from it.

Q. Is the descent from these houses to the brook rather steep or not?

A. No, moderate descent from the house to the brook.

Q. In the other cases how are they, in the village generally?

A. Well, it is a moderate descent from all the houses to the brook.

Q. What is the character of the land, stony or otherwise?

A. It is a rather rocky surface; very rocky surface in fact.

Q. How are the vaults of the houses built, are they blasted out of the stone or put on top of the stone?

A. They dig down in the soil; it is loose stone principally in the valley; the solid out crop, you don't get to that until you get up to the mountain side some distance.

Q. There is no solid out crop along the stream?

A. There is a solid out crop near the hotel where the stream passes right over it; that is a sort of a link between the two chains of mountains I think.

Q. Will you tell us what you did as to the out-houses?

A. In cases where the vaults were filled or nearly so we dug new ones and removed them and dug the vaults usually seven feet deep.

Q. How many vaults did you build?

A. Quite a number.

Q. Well, how many, four?

A. Oh, yes, more than that; we built them from time to time all the time, but I remember we made a general cleaning up there one time and removed some eight or ten.

Q. What was the vault built of?

A. Stone.

Q. Laid up in cement or loose?

A. Loose stone.

Q. And the bottom was what?

A. The bottom was the dirt.

Q. It wasn't cemented or stoned?

A. No, sir.

Q. What do you mean, Mr. Munson, by condensing water?

A. Why we pass it through either a surface or inject a condenser that the steam is condensed by hitting the water.

Q. That is, you cool the steam by the water?

A. Yes, sir; it gives the benefit of the vacuum.

Q. That is all.

Sworn to before me,
(the signature being waived)
this 2d day of April, A. D.
1907, at Jersey City, N. J.

Adjourned until Thursday, April 4, 1907, at 10 o'clock.

IN CHANCERY OF NEW JERSEY.

Between

THE MAYOR AND ALDERMEN OF JERSEY CITY,

Complainants,

and

THE JERSEY CITY WATER SUPPLY COMPANY,

Defendants.

Before his Honor Vice Chancellor Stevens.
Mr. James B. Vredenburgh and Mr. George L. Record, appearing for the complainants.
Mr. William H. Corbin and Mr. William D. Edwards, appearing for the defendants.

Transcript of shorthand report of the evidence given upon the trial of the above stated cause, on Thursday, April fourth, nineteen hundred and seven at the Chancery Chambers, Newark New Jersey.

Mr. VREDENBURGH: There is a matter which I find on looking at the testimony this morning does not appear. It ought to appear upon the record and I supposed it would be upon the record. That was, that at the last meeting in your Honor's presence, just as we do now, I stated that during the time of the adjournments the Board of Health of the County had served a notice on the city, under that section of the specifications of the contract, which perhaps your Honor will recollect, in regard to any particular cases of pollution, and said that it had been served, and I would either offer that then or wait until my time came to offer it. I thought that would go on the record. It finally resulted that I should wait and offer them in the regular time, and if they were proper evidence the court would pass upon them. That ought to have appeared on the record, I think, at the time I made that motion, but it does not; and I now renew my offer.

There is another matter that is not of vital importance, but is of some importance to me because I think this matter is unfair toward the complainant. Senator Edwards offered in evidence and marked as an exhibit a document entitled as follows: "Defendant's Exhibit, Minutes of Board of Street and Water Commissioners, W. J. Knight, M. C. C." I objected to them and they were passed over to me to have them compared with the minutes. Now, I have had them compared, and as I now see, they are objectionable and I object to it as evidence. May I call your Honor's attention to it now?

Mr. EDWARDS: What we did, your Honor, was this. We offered in evidence the minutes of the Board of Street and Water

Commissioners during this whole period and said we would call the attention of the court to the specified extracts from the minutes that was a compact way of putting it in; and that is the minute that we submitted. We offered all of the minutes in evidence, but this is what we proposed to print.

The COURT: What is the number of the exhibit?

Mr. EDWARDS: It is marked "Defendant's Exhibit Minutes of Board of Street and Water Commissioners, W. J. Knight, M. C. C., March 29, 1907."

Mr. VREDENBURGH: The first paper is a letter of Allan McDermott, dated November 5th, 1898. My criticism is that it has already been offered in evidence and is in print; and it would seem to me that it is not a matter to be again offered in evidence by the defendant and printed.

Mr. EDWARDS: Only as I would like a consecutive history of it.

Mr. VREDENBURGH: The next paper is entitled "Annual Report of the Committee of the Whole under New Water Supply." That to my mind is objectionable. What it is, I believe, is an annual report of the whole city's affairs by some member of the Board.

Mr. EDWARDS: Oh no.

Mr. VREDENBURGH: It discusses the police; all the various matters of Jersey City. And among others there is a statement with regard to the new water supply. Appearing in this way, it would induce the court, perhaps, or some one who does not know about the government of Jersey City, to suppose that there was an examination on this water supply by a special body appointed for that purpose, and that this was their action. Now, that is unfair it seems to me. That is not the fact, and it tends to prejudice, as I see it, the complainant.

And, in the same matter, they do not print the whole of what was said with regard to the water.

Mr. EDWARDS: Yes, we do.

Mr. VREDENBURGH: They print part of the report. It shows that the intent of the city was to purchase, as I see it; and that part is left out.

The COURT: It ought to all of it go in, of course, all that relates to water, if any of it goes in.

Mr. EDWARDS: Let me say what I suggested to Mr. Vredenburgh. "Now," I said, "if there is anything that you want to add to it, we will insert it wth a paragraph entitled 'Additional inserted by Mr. Vredenburgh.' "

The COURT: That can be corrected in that way.

Mr. VREDENBURGH: Ought it to be made an exhibit, what they pick out in that way and place before the court what they want? Garbled, it may be, or any way they please. Ought they to make that an exhibit?

The COURT: Does not the method suggested emphasize the fact that you want, namely that they have "garbled" it if you please to call it by that word. You insert what you want with a marginal note stating that this is your insertion. I cannot imagine anything that would indicate more conclusively the fact that they have "garbled" it, if they have "garbled" it. I used the term "garbled" because Mr. Vredenburgh used it. If you think it important, print what part you think important. It appears on the minutes as I understand. I cannot very well at this time say whether that is properly a part of the minutes or not. The better way, I think, is to print what each side desires, with such marginal indications as will show what the complainant desires and what the defendant desires.

Mr. VREDENBURGH: When they entitle it as they do here, which is not in the minutes? This: "Annual Report of the Committee of the Whole under New Water Supply." You will see, as your Honor goes on, that this statement of counsel of what it is tends to prejudice the complainant.

The COURT: If it is in the minutes I think it can be printed. I hope counsel will credit me with sufficient intelligence to discriminate in the end between what I think is proper and what is not. Sometimes it is a very good thing to have proceedings printed in a consecutive way. I know I often find it of very great use. It saves time and trouble. I do not see any objection to that course now.

Mr. VREDENBURGH: There is also this which I wish your Honor to pass upon. This annual report is dated December 13th, 1898. That was before the contract was signed, and does your Honor intend to admit the minutes of the Board of Works before the contract was signed?

The COURT: Well, I cannot pass on that question now.

Mr. VREDENBURGH: Well, suppose I put it in my objection. I object to the portion of this Defendant's Exhibit which contains extract from the Annual Report of the Board of Works, dated December 13th, 1898 (page 302).

(1). Because it is only a part of that annual report.

(2). Because the sentence "Annual Report of the Committee of the Whole under New Water Supply" is not copied from the minutes.

(3) Because the minutes are prior to the execution of the contract.

(4) Because not all of what is said with respect to the water is contained therein.

The COURT: That ought to go in. Everything that is said with regard to the water ought to go in. It needn't go in as your extract, but it ought to go in.

Mr. VREDENBURGH: I have completed that part of it and have it here.

The COURT: Undoubtedly you can put that in. It is not necessary to read it. Put in anything you want.

Mr. VREDENBURGH: Then, as to that, I understand I am to supply the other side with copies of those portions of what preceded that I think ought to be put in.

Mr. EDWARDS: I desire to state that, as to one of Mr. Vredenburgh's objections that it was before the contract was signed, this report was made after this Board had passed upon it.

Mr. VREDENBURGH: Now the next paper is a resolution with regard to the dam site, it is stated to be such and it seems to be such.

Now, then, occurs on page 11 of this exhibit this statement—Resolution by Board of Street and Water Commissioners to company to increase water works to seventy millions. Board of Finance refused to concur January 16th-January 9th resolution to purchase seventy millions supply not concurred in. Reply of Ferris as to cost of inspection. Now, those things are mere statements of counsel.

Mr. EDWARDS: If you want the resolutions in full you may have them.

Mr. VREDENBURGH: No, but these accounts should be in, that is the point of that. The next is April 17, official communication from the Engineer, I object, may it please your Honor, to their offering any evidence of official statements from the Minutes of the Engineer in charge of the Water Works, on the ground that his statements are not evidence in this case.

Now occurs, may it please your Honor, this—1901 in the minutes of this period, there are chiefly routine reports by Ferris on the progress of the work which he is watching closely.

Mr. EDWARDS: Strike out "watching closely."

Mr. VREDENBURGH: He speaks frequently of the dam, conduits and tunnels. The only report of importance is that of February 5, 1901, where he refers with particularity to the conduit on the first of August, 1900. The contractor filed in his office the following blue print showing—and then they go on to show that.

The COURT: Strike out any adjective characterizing the report.

Mr. EDWARDS: Yes, I will strike that out.

Mr. VREDENBURGH: In the minutes there are chiefly routine reports by Ferris.

The COURT: Well, strike out "chiefly routine." There are reports which counsel for the company think become necessary to print. Now if Mr. Vredenburgh wants to print any of them that gives him a chance to interject them.

Mr. VREDENBURGH: Yes, I will have that privilege. In 1902, may it please your Honor, the same that I have just read occurs, Mayor Fagan suggests a conference with the Board as to the water, etc. Nobody knows where that comes from, it don't come from the minutes.

Mr. EDWARDS: Yes, it comes from the minutes.

Mr. VREDENBURGH: Resolution that City will hold Company for delay beyond February 28th. Contracts agreed to, adopted, concurred in. Letter from Harrison to Ferris; letter from Ferris to Harrison; letter from Ferris that the Parsippany dyke question has been settled.

Now it occurs, may it please your Honor, on page marked 1, it starts off again on page 1, but it is on January 6, 1903, apparently. "Annual report new water works," and it commences with "early in the year" without capitals, as if it commenced in the middle of the sentence.

Mr. EDWARDS: Well, the typewriter wasn't very good, that is all.

Mr. VREDENBURGH: It continues in that way; an extract from some report, said to be a report, not from the minutes.

Mr. EDWARDS: It is in the minutes.

Mr. VREDENBURGH: Report of some one to the Board. Now, may it please your Honor, occurs a page of this character—same portion of the page, "Report by Ferris, C. E.: Good progress made, details given." Report by Ferris as to covering pipes in Hackensack meadows. Report from Ferris progress in detail. Then there is an extract—a few lines set out from the report refers to masonry conduit. Report from Ferris as to progress. "There is now every reason for inferring that with reasonable weather, etc., that the conduits will be ready for use within the contract period." Reports from Ferris, extracts from it.

Then follows what is called page 4, 1904, I believe, from the engineer in charge, Jersey City, February 29, a report and what is considered important there is underscored, not in the minutes but in this report.

Mr. EDWARDS: Let me strike that out.

Mr. VREDENBURGH: Here is some underscoring.

Mr. EDWARDS: Yes, I will strike that out.

Mr. VREDENBURGH: Here is a resolution to pay George E. McLoughlin, M. D.

Mr. EDWARDS: Read what the resolution says.

Mr. VREDENBURGH: That $100 be paid George E. McLoughlin for analysing samples of water taken from pipes, 1904; charge water accounts, new water works. It seems to me that such an entry as that is not evidence in this case.

The COURT: Well, do you object to it?

Mr. VREDENBURGH: I do.

The COURT: I suppose it is not proven that such an examination was made?

Mr. EDWARDS: No, it is simply that the City paid for it, and we have Mr. McLoughlin here.

The COURT: The City authorized the payment for work that has not been proven to be done.

Mr. VREDENBURGH: Now, may it please your Honor, these are all after January 5, 1905—these are all after the water was turned on, resolution requesting test.

Mr. EDWARDS: The water was turned on in May, 1904.

Mr. VREDENBURGH: These are after the water was turned on. Now, has your Honor determined that those minutes shall go in evidence; it does not seem to me that those are evidence in this case.

The COURT: Well, you can object to the introduction of them.

Mr. VREDENBURGH: I object to the introduction of those minutes; all proceedings of the Board of Street and Water Commissioners after May 24, 1904. Here are the resolutions after the suit was commenced; I object to those,—the minutes after the suit was commenced.

I object to all these reports by Mr. Ferris to the Board as being evidence in this case. The action of officials of the City in a suit between the City and third parties I consider as not evidence in the suit. The officials are changing and may say anything, and in that respect between a corporation or an individual that is not a public one, and a public corporation, I think the rule with regard to the evidence as between a public corporation and the defendant is different in that respect, and I object to it on that ground.

Mr. EDWARDS: We suggest that Mr. Ferris was the chief engineer and the party having this matter in charge for the City.

GEORGE E. McLAUGHLIN, heretofore sworn for the defendants, is recalled for further direct examination.

Q. You have already been sworn and testified in this case, haven't you?

A. Yes, sir.

Q. Did you at the request of the Water Company make from time to time, bacterial examinations of the water furnished by the Water Company to Jersey City?

A. Yes, sir.

Q. When did you begin to make those examinations?

A. I cannot give the exact date when I began to make such examinations, but it was from the time the water was turned on; I made them frequently, very frequently.

Q. Were the results of those examinations placed by you upon blanks prepared for that purpose?

A. They were.

Q. How often were those reports made?

A. During the first I should say five weeks, after the water was turned on, they were made on the average every other day and subsequent to that, they were made weekly.

Q. To whom did you give the reports generally?

A. They were sent to the Water Company—to Doctor Leal.

Q. And these reports made by you covering that period were on blanks which were prepared?

A. Yes, sir; those are the blanks.

Q. And are these the reports?

A. Yes, sir; those are the reports.

By Mr. VREDENBURGH: How many do you refer to?

Mr. EDWARDS: I will count them or give the dates if you choose—May 20, 1904, three samples from the Boonton Reservoir.

Mr. VREDENBURGH: Does it say from where it was taken in the reservoir?

By the WITNESS: They were taken from just in front of the dam.

Q. All three?

A. Yes, sir.

Q. State whether this contains anything besides samples used.

A. I have a table here that you can use if you like. Dr. Leal has copies of it.

By the COURT: Just hand a copy of that table to Mr. Vredenburgh and if there is any evidence.

Mr. EDWARDS: We will put the reports and the table both together.

Q. Have you made up a table of results from these reports as to the tap water?

A. I have.

Q. And they are made up from the reports themselves?

A. They are.

Q. And are they contained on these three blue sheets?

A. Yes.

Q. And they run to May 24th, 1904, down to December 23rd, 1906?

A. They do.

Q. Do they show the results in gross as given in detail in the reports?

A. They show a summary of the results.

Q. And in this table of results you have a heading of b. coli, what do you mean by that?

A. By b. coli, I mean the same as we have understood all through the trial.

Q. What is it?

A. The same classification as Mr. Whipple gave.

Q. Well, that's bacteria from what?

A. Animal intestines.

Q. From animals?

A. Yes, sir.

Q. Now, where you have the minus sign here on the table of results, what does that indicate?

A. It means it wasn't found—it was negative.

Q. But if you did find it?

A. It was a positive result—if it is found.

Mr. Edwards offers in evidence the three blue prints and same are marked as follows:

Table for 1904, D. 17, April 4th, 1907.
Table for 1905, D. 18, April 4th, 1907.
Table for 1906, D. 19, April 4th, 1907.

Q. Now, we have some reports here and I show you the accompanying report for May 24th, 1904, is that a detailed report of your examination of the water on that day?

A. It is.

Q. And is that made up in the same way for the other dates?

A. Yes, sir.

By Mr. EDWARDS: I offer this in evidence.

Same marked Exhibit D. 20.

Q. Are all these reports made from the same general plan?

A. They are, sir.

Q. And an explanation of one would practically explain all?

A. Yes, sir.

Q. I now show you report of January 2nd, 1906.

A. Yes, sir.

Q. Is that a sample?

A. Yes, sir.

Mr. EDWARDS: I ask that this be marked Exhibit D. 21, because it is a sample one.

Q. Now, where did you make these examinations, Doctor?

A. Which examination?

Q. January 22nd, 1906.

A. From the tap at Jersey City in the laboratory in Christ's Hospital.

Q. Where is Christ's Hospital situated?

A. 176 Palisade avenue, Jersey City.

Q. Where is the tap located that you took the water from?

A. In the laboratory.

Q. Now, when was the water drawn from that tap?

A. 3 P. M. 2nd of January, 1906.

Q. By whom?

A. By myself.

Q. Will you just describe how you took it, and how you made this examination? Tell what you did and how you did it and speak plainly so that the stenographer can hear it.

A. Cold water faucet in the laboratory was turned on and allowed to run twenty to thirty minutes, as I do in all my examinations.

Q. What was the object of that?

A. That was to obtain the water fresh from the main, and to run the waste of the residuum water out of the pipes by letting it run for a stated period of time. Then the temperature of the water was taken,—you want the result?

Q. What was the temperature that day?

A. That day it was 45-10 centigrade.

Q. Will you translate that into Fahrenheit for us?

A. Forty and one-tenth degrees.

Q. Now, then, what did you do with the sample you took from the faucet?

A. Sample was taken from the tap and allowed to run into a bottle—it was sterilized bottle with glass mushroom stopper, which was held at a distance about a foot below the tap, and the water was allowed to run into this bottle; the water was then plated, as we term it; that is, it was added to the culture media—a given amount of the culture media and incubated for two days at twenty degrees centigrade, when a count of the number of colonies appearing on the plate was made. I have brought sample of plate with me, because there has been so much discussion about plates (producing a circular glass article); such a plate as this is used. From that a count is made of the number of bacteria per cubic centimeter of water. The water is then further examined by being put into fermentation tubes containing a lactose bouillion with one tenth grain of neutral red per litre of bouillion. The amounts of water varying from one-hundredth cubic centimeter to ten cubic centimeters being used and four fermentation tubes being used with varying amounts of water.

Q. Have you fermentation tube with you.

A. Yes, sir; but unfortunately it is broken.

Q. Let us see it?

A. I am now holding in my hand a damaged so-called fermentation tube that was used in making examination of water. Unfortunately it has been broken.

Q. On your way out here?

A. Yes, sir. But in general I can give you an idea of it. It consists of a glass tube which is bent at a sharp angle—what would you call that angle? It is more than a right angle. It is an obtuse angle. That bend in the fermentation tube is approximately about one-third of the height of the closed arm. This is then placed—that glass foot is held in upright position and this closed arm is completely filled with the neutriant media used, enough being allowed to remain in the bulb to cause the media to remain completely filling the closed arm. Then, the gas collects in the closed arm of this fermentation tube and is measured in percentage of the total length of the tube. We have a measure by which we measure the height of the tube, and then take the percentage.

Q. Does the liquid rise?

A. As the gas collects in the gas arm, it forces the liquid down in the bulb.

Q. What is the object of that operation?

A. The object of that operation is to ascertain the percentage of gas in the fermentation tube and is to ascertain the presence of b. coli.

Q. How is b. coli indicated by that operation?

A. B. coli is indicated by this operation by producing gas in the closed arm of such tube, varying from thirty to seventy-five per cent. of gas. The gas has a general formula approximately two parts hydrogen and one part carbon dioxide and it changes the reaction in this neutriant solution.

Q. Which is colored?

A. Which was very faintly alkilined and is changed into acid, and it changes the color in the closed arm of the tube from red to yellow, so we have red color in the bulb and a yellow color in the closed arm of the tube. I might say that the lactose neutriant was used in these tubes by me for the reason that there are fewer fermentations of lactose than in glucose and furthermore the neutral red reaction gives us another test for b. coli.

Q. Now, will you tell us the object of plating. What did you discover from that?

A. The object of that is to ascertain in an approximate manner as closely as possible the number of bacteria in a given sample of water. This method, I might say, is not absolutely exact method because two men using the same water will vary somewhat in their account. Therefore, I used the term approximately correct as to the number of bacteria that are counted on such a plate and the number is recorded as so many cubic centimeter of water.

Q. Now, take the sample you have before you, will you count them on that plate for us?

A. That particular sample I happen to know about; we usually make our examinations with a magnifying glass; magnify about five times, which is recommended by the committee of water bacteriologists. There are some thirteen colonies on this plate I have in my hand.

Q. Will you tell us the purpose of these operations you go through, other than you have already told us?

A. Well, water containing dust, dirt and filth of any kind will contain as a rule, generally speaking, more bacteria than pure water; that's one of our objects in counting the number of bacteria. Water which does not contain b. coli in one cubic centimeter, judging from my work on this subject, more than fifty per cent. of the times of examination of this particular water of the Rockaway would indicate good wholesome water in my opinion.

Q. Go ahead.

A. That's the reason for examination of the water for b. coli.

Q. How many cubic centimeters are contained on that plate that you have exhibited; what is the area of that?

A. You mean the square cubic centimeters?

Q. Yes.

A. I should say, roughly speaking, sixty to sixty-two.

Q. And your plate is about three inches in diameter?

A. About four inches in diameter.

Q. Now, I want to get your reason, Doctor McLaughlin, why you go through these various processes. Why do you plate the water?

A. I have already stated; that is, to ascertain the number of bacteria.

Q. Why is that necessary; that is what I want to get at.

A. Well, I deem it necessary, as a bacteriologist.

Q. Why?

A. To ascertain in a general way the possibility of foreign matters in the water.

Q. Why is it necessary to plate bacteria in order to count them?

A. Because they cannot be counted with the naked eye. We plate them in the manner I described and they are extremely minute microscopic size, but after being allowed to grow in colonies, such as you see on this plate, where each one has formed a family around it, then they can be seen by the eye.

Q. And does each one of these colonies come from a single cell?

A. They are supposed to, but there may be times when it is possible for two cells to get together, but in a general way, as far as we know, we suppose each colony comes from one cell.

Q. Then when you count the colonies what guide is that as to the position of the water?

A. It is a guide as to the number of bacteria in the water.

Q. Then, the bacteria, after you have cultivated them into colonies—the number of colonies correspond practically to the number of cells in the water?

A. It does—the number of bacteria cells in the water.

Q. Now, after your fermentation is done, what is the next test to apply to it?

A. That practically finishes these particular samples.

Q. What's say?

A. I think that about completes the test.

Q. Now, taking this sheet before you of this particular sample of water, will you tell us what was the bacterial count?

A. One hundred and fifty bacteria per cubic centimeter.

> The COURT: Now, you are speaking about cubic centimeters. The plate only indicates square centimeters. How did you get the number of colonies contained in cubic centimeter of water from what you see in a square centimeter on the plate? What is the formula?

A In this way. We would say for example one cubic centimeter sample of water was taken and that cubic centimeter is put in this Petri dish; then the culture media is ready at hand at the proper temperature and that is poured into the dish. The dish is then moved from side to side and the water is thus mixed with the culture media and a count is made of the number of colonies developing on the entire area of the plate, if you count the entire plate, has not so much to do with it. But if you count half the plate then you will multiply it by two.

Q. You are careful to put in a cubic centimeter of water?

A. A stated amount of water; a carefully measured amount of water.

Q. Now, on the plates of this date how many different quantities did you have?

A. Do you mean on this particular day?

Q. Yes.

A. On this particular day one-tenth of a cubic centimeter was used.

Q. On this particular day how many samples of water did you plate?

A. Our endeavor is to obtain not more than two hundred colonies on any one plate, and we cannot always say when we receive water how many are contained in it. So, we make several plates and then pick out one that has colonies far enough apart on it so as not to interfere with one another and make our count from such a plate. We will say that we have a given water sent to a laboratory for examination. We will say, for example, it is our Jersey City tap water, which I know something about the number of colonies in it. I know the number of colonies in that water will vary within certain limits, but I cannot say exactly what the amount will be, but I, in order to obtain a plate,—A Petri dish which will show approximately not over two hundred colonies on such dish, I would take possibly three amounts of that water per plate. I would take one-tenth of a cubic centimeter, a quarter cubic centimeter and a half cubic centimeter and put them in three different dishes, with addition of culture media, such as this Petri dish in my hand. The bacteria are then counted after two days of incubation at twenty degrees centigrade, using the plate that has the distinct colonies on it. If there are very large numbers of bacteria in the sample of water the plate which contained one-half a cubic centimeter would have so many on it that we could not count them accurately and the plate having a quarter centimeter would still have too many on it while the plate only having one-fifth cubic centimeter of water might have two hundred or less, or might have one hundred, and that would be a very comfortable count and that's the plate we should use and if we count one hundred on it, we will multiply one hundred by ten and say that we have a thousand in one cubic centimeter.

Q. Do you find bacteria distributed in proportion to the amount of water you use?

A. As a rule if the water does not stand, the bacteria are fairly evenly distributed.

Q. Now, then on this particular day, how many samples of water did you put into the fermentation tube?

A. On this particular day I had some five different amounts of water in the fermentation tube.

Q. What were the fermentation? What were the amounts?

A. Amounts of water used in these five fermentation tubes were 1-100, 1-10, 1, 10, 100 cubic centimeters.

Q. Different proportions?

A. Yes, sir.

Q. Where did you get that water from?

A. That was direct from the tap and it was put in the culture media in the fermentation tube.

Q. And this process is to ascertain the b. coli?

A. Yes, sir.

Q. Now, then, on that day what was the color of the bulb of the fermentation tube?

A. In the 1-100 cubic centimeter of water the color of the fermentation tube was unchanged, namely, it was red. There was no gas in the 1-10 cubic centimeter of water in the fermentation tube. There was no change in both bulb and closed arm of tube and there was no gas. The reaction in both these cases being slightly alkaline. In the one cubic centimeter of water used in fermentation tube the color in both bulb of tube and closed arm remained unchanged and there was no gas.

Q. These colors are indicated by the letter R on your sheet?

A. They are.

Q. Now, go on.

A. The reaction of this sample was also negative, and there being no gas, we threw out the possibility of b. coli and recorded the absence of b. coli in these three amounts. In the ten cubic centimeters in use in the fermentation tube and in the one hundred cubic centimeters of water used in the fermentation tube we obtained a change in the color of the media in the clsoed arm.

Q. Did you expect that?

A. We expect that when we find b. coli, namely, a change to yellow.

Q. Do you generally expect to find that when you use as much as 10 or 100 cubic centimeters of water?

A. We generally expect to find that amount in water and for a time I used 100, but for some special reason it was entirely unnecessary.

Q. Never mind, proceed.

A. In the fermentation of 100 cubic centimeters of water we found production of gas in the closed arm, namely, forty-five per cent. in said arm. This gas was formed of two parts of hydrogen and one of carbon dioxide, the reaction was acid and we recorded the results as b. coli present.

Q. Why have you two plus there?

A. It shows the presence of b. coli.

Q. Presumptively?

A. This is the presumptive test. In three cases it was not present and in two cases where the plus is placed, it is recorded as positive.

Q. Why did you have a separate column under the head of reaction?

A. The reaction of the culture media of bouillion used in these particular cases is slightly alkaline and one of the indications I find of b. coli is the acid production in that.

Q. Well, are these last two columns always the same?

A. Yes, sir; it changes in reaction from alkaline to acid.

Q. Why do you use two plus instead of one?

A. One is reaction of the bouillion; the other is the presence or absence of the b. coli.

Q. Do you infer the presence or absence of b. coli from the reaction?

A. Not alone, but from the entire thing it is taken as a whole from the change from red to yellow in the closed arm; by the production of gas to a certain amount and the proportions in that gas—the ascertained proportion of hydrogen and carbon dioxide, and the change in the reaction from alkaline to acid.

Q. Do you ever have plus on the last column and minus on the reaction column?

A. Yes, sir; it is possible.

Q. And vice versa on the last column and plus on the reaction column?

A. Yes, sir; not finding b. coli.

Q. In other words, the column marked reaction is what you see and the last column is your inference?

A. It is our interpretation.

Q. Yes; it is your interpretation of the count of the colony?

A. Yes, sir.

Q. And not particularly of the reaction column?

A. Well, I would say it is our interpretation of all the columns.

Q. Take this particular sheet. What would you say as to the purity of the sample of water examined on that day, containing, as it did, 150 bacteria to the cubic centimeter?

A. I should say that it was a good wholesome sample of water.

Q. How did that compare with the water generally furnished in cities for drinking purposes?

Objected to.

A. Very fair to my knowledge.

Q. What have you to say—

Mr. VREDENBURGH: Well, your Honor, is that question overruled?

The COURT: Well, you can cross examine him as to that.

Q. Now, Mr. McLaughlin, what have you to say as to the examination of b. coli in this water, as to the quality of the water?

A. I should say it was a good water, and compared very favorably with water supplies from similar sources.

Q. You mean by that from running streams?

A. Running streams; yes, sir.

Q. And reservoirs?

A. And reservoirs.

Q. By that do you mean unfiltered water?

A. Exactly.

Q. Now the rest of these tables, under the various dates, have been made up, haven't they, in the same manner?

A. They have.

Q. And their results can be read from the tables?

A. From the tables; yes, sir.

Mr. EDWARDS: I offer now, may it please the Court, the original reports, covering the various dates mentioned in the tables, and I think they might be marked as one exhibit, and be marked Exhibit D. 21, and, of course, all of them are at Mr. Vredenburgh's disposal.

I would like to ask the Court now if you would like to have us print all these?

The COURT: I should think not.

Mr. EDWARDS: I should think if we took one,— or any one sample that Mr. Vredenburgh desired printed we would print.

The COURT: That would be the better plan.

Mr. EDWARDS: And we could print the tables in full. That would be simple.

The COURT: Yes.

Q. Now, Doctor, I see in your tables that you use agar for plating instead of gelatin; will you tell us why?

A. The reason is that I find less difficulty in counting my colonies and obtaining accurate counts, more evenly distributed counts on the agar than the gelatin. The gelatin has certain bacteria occuring which liquify it at times, within a comparatively short space of time, and so obscure, or tend to obscure true counts; and I further find that there is such a comparatively slight difference in the count on the agar or gelatin that I didn't deem that my results were changed by so doing; at least, materially.

Q. Then you have used both and have approximately the same results in each?

A. I used both in many cases, so that I could see or check, in other words, any great difference. I would say further on that subject that since the first of January I have been using both counts continuously and I have found—

Q. You mean contemporaneously,—together?

A. Yes, together, continuously and together, since the first of January contemporaneously.

Q. What has been the result?

A. The resullt has been rather interesting; at times the agar would be very much higher than the gelatin; at other times the gelatin would be somewhat higher than the agar. On the whole I should say from those results of this particular water examined the agar counts were higher than the gelatin.

Q. It has been testified in this case by Mr. Van Keuren the Chief Engineer of Jersey City, that it takes about sixteen minutes for the water to flow from the main delivery pipe—main six foot delivery pipe of the Jersey City Water Supply Company through the City service pipes to Christ Hospital; would you expect any difference in the character of the water from a bacteriological standpoint by reason of that flow?

Mr. VREDENBURGH I object. There is no such evidence in the view that counsel now states it. Mr. Van Keuren was present on the stand and he was asked how long it would take water to flow from the six foot main pipe—how long it would take water to flow through a pipe of a certain size and certain distance, and in the examination it turned out that he had not formed any idea upon that except that he had taken the size of a pipe and divided it up by the amount of water which would flow through that pipe, and in that way calculated the speed, and divided the number of feet by the speed, and no human being could possibly tell from which pipe it came or how long it would remain there if he let it run for a week. To ask the witness this question is to emphasize what was not testified to; and I object to it on that ground.

Mr. EDWARDS: Mr. Van Keuren testified it would take about sixteen minutes under ordinary conditions of draft for the water to get from the main service pipe of the Jersey City Water Supply Company through the city's pipes and to Christ Hospital. What I desire to show by this witness is that from a bacteriological standpoint the flow from sixteen minutes to half an hour through the city's pipe would not increase or diminish the bacteria found there.

The COURT: Is the witness competent to testify to that?

Mr. EDWARDS: I think he can. I can ask hm.

The COURT: I think that is a matter as to which Mr. Vredenburgh should have the right to cross examine. It would depend entirely upon this witness's experience; upon experiments made by him under similar conditions, would it not, whether he can answer the question or not? He may be an expert on the matter of bacteriology, but he may not be an expert on this. Undoubtedly, you can ask him as to what the effect of the water would be if it lay in an iron pipe or if it lay in a lead pipe.

Mr. EDWARDS: They are all iron pipes we have.

The COURT: I say, undoubtedly you can ask him as to the effect upon water of lying in pipes like that. But, as to this question that you ask, I think Mr. Vredenburgh should have the right to cross examine, if he wants to, at this time with reference to the witness's ability to answer such a question.

Q. Doctor, assuming that the water at Christ Hospital drawn by you came through the service pipes of Jersey City from the main supply six-foot pipe of the Jersey City Water Supply Company at about Carlton and Summit Avenues, and that the distance that it has flowed through the Jersey City pipes is about forty-five hundred feet through the service pipes; and assuming then that it would take water to run, under the pressure at that point, from sixteen to thirty minutes; and that the pipes were comparatively old pipes made of iron: what difference, in your judgment, would there be between the results found at the tap at Christ Hospital and the results which would have been found if you had drawn your water directly from the six-foot pipe coming to Jersey City from the reservoir?

The COURT: And that the pipes running from the street main into the hospital are iron or lead?

WITNESS: They are lead, I am told.

Mr. EDWARDS: Will you answer that question?

The COURT: Now, Mr. Vredenburgh can cross examine with respect to the ability of the witness to answer such a question; as to whether he has made experiments upon water running under those conditions.

Mr. EDWARDS: Or as to his knowledge of literature upon the subject?

The COURT: Well, yes. Whether iron, for instance, or whether lead, has such an effect upon the water that the bacteria would be likely to die.

Mr. EDWARDS: Of course your Honor will understand that they run through twenty-one miles of that same pipe.

Mr. VREDENBURGH: No. They don't run through twenty-one miles.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. Doctor, I would like to know what experiiments you have made with respect to the longevity of b. coli in iron pipes. What experiments have you made?

A. Experiments that would fit that question in this case very closely—

Q. (Interrupting) I didn't ask "that would fit the question in this case."

A. I am simply telling you that I am giving you experiments that—

Q. (Interrupting) I only want to know what experiments you have made to ascertain how long B. Coli will live in old iron pipes that are rusty.

A. We have made examinations of the water—

Q. (Interrupting) You, please.

A. I have made examinations of the water as it leaves the reservoir at Boonton and as the water is received at Jersey City. This work has continued from the time the water was turned on at Boonton, namely, the 23d or 24th of May 1904, up to the present time. I have in my hand a table of results, counts of bacteria and examinations for B. Coli, of the water as it leaves the reservoir and flows into this large iron pipe and as I received it in the tap at the Christ Hospital laboratory. The average count of bacteria in the water as it leaves the reservoir for a period covering two years and five months, was 636. After flowing through this pipe—Is it twenty miles?

Mr. EDWARDS: Some twenty miles.

Q. You don't know how long the pipe is?

A. I know approximately—There are 175 bacteria in the water at Jersey City.

By the COURT:—

Q. And the difference then would be how much?

A. In one case 636, and in the other 175. As regards B. Coli there were 44 per cent. B. Coli found in one c. c. in the sample at the reservoir intake at Boonton, and 11 1/10 per cent. at the tap in Jersey City in my laboratory. There is a reduction in that twenty miles. There is conceded to be, by I think all bacteriologists, a strong influence of the pipes in the reduction of the number of bacteria. The longer the distance that is the greater the journey through the pipe, the greater the decease in the numbers of bacteria. But here is a pipe less than a mile—

Mr. VREDENBURGH (Interrupting) One minute.

Mr. EDWARDS: Let him get through.

By Mr. VREDENBURGH:—

Q. You haven't answered my question.

A. Those are the results of the experiments in the iron pipe.

Q. I didn't ask you about bacteria. I asked you about B. Coli. If you will give what I ask, that will probably be all that is necessary.

A. I just gave B. Coli

Q. You say you have made examinations for two years of the B. Coli in water at the place where the Rockaway River enters Boonton Reservoir?

A. The place where the conduit to Jersey City leaves the dam; the intake of the conduit; the place where the water enters the conduit to go to Jersey City, in the Boonton Reservoir; in the gate-house, in other words, we will say.

Q. And how much less were the B. Coli in the water at the reservoir than at the gate-house? Have you made any experiments to ascertain that?

A. Did you say the gate-house or the tap?

Q. No. I didn't say the tap. I said the gate-house, and the reservoir in Jersey City.

A. The gate-house?

Q. Yes, sir

A. In Jersey City?

Q. No. The gate-house.

A. I don't understand your question.

(Question read by stenographer).

A. Which reservoir?

Q. I mean the reservoir in Jersey City.

A. Which gate-house?

Q. Do you ask me that?

A. Yes.

Q. You ask me which gate-house?

A. Yes.

Q. I mean the gate-house at Boonton reservoir.

A. I have made no experiments; none lately. No examinations of water from the gate-house in Jersey City,, or the reservoir in Jersey City.

Q. Then you cannot tell how many of those b. coli expired between the gate-house at the Boonton Reservoir and the reservoir in Jersey City?

A. I cannot.

Mr. EDWARDS: I object to that on this ground, that the water in the tap at Christ Hospital has never been through the reservoir in Jersey City.

The COURT: Then the cross-examination that question is irrelevent. That is so, if Mr. Edwards' statement is in accordance with the fact; if it is a fact that the water that reaches Christ Hospital does not go through the Jersey City reservoir. Then the cross-examination would seem to be irrelevant.

Q. Do you know where the main which takes the water from the Jersey City Water Supply pipes leaves that pipe?

A. I do not.

Q. Then you don't know how many of these b. coli expired between the point of the gate-house at the Boonton Reservoir and the point where the water leaves the Jersey City Water Supply main to go to the hospital?

A. I do not.

The COURT: One moment. If your statement, Mr. Edwards, is true with respect to the water coming into Christ Hospital, then isn't the testimony of the witness, the engineer, with respect to the length of time it takes to travel from the reservoir to the hospital—

Mr. EDWARDS: (Interrupting) Not from the reservoir. Jersey City has two services, a high service and a low service. The reservoir is about one hundred and twenty feet above sea-level; the water in our pipe comes in at a head of two hundred and twenty feet. Now a part of the city must be supplied with that head; and part runs into the reservoir to be supplied from the head of the reservoir. If we connected the main pipe with all the pipes in the lower portion of the city, there would be a snap at once. The result is that when we get very close to the reservoir there is a diversion of the water; and part of it flows into Jersey City's reservoirs and stays there and is from that distributed down town in Jersey City. The hill section, where they used to pump from this reservoir, now is connected directly with our main, and that is what is known as high service; and it is on that part of the water system that Christ Hospital gets its supply.

The COURT: What would be the use of the answer given by this expert based upon the examination of the water in comparison with the water at the tap? Would it be of any use. It might be useful to find out how water flowing through pipes is affected by those pipes, whether the pipe performs the functions of a filter and whether the smaller pipes and the more rusted pipes are better as a filter than the water pipes. But unless there have been some experiments in this direction, it seems to me that any answer that the witness might give, based upon only such knowledge as he has indicated to us so far, would be of no value.

(Mr. EDWARDS replies).

(Mr. VREDENBURGH reads from the testimony of Mr. VanKeuren on pages 20 and 21 of the transcript of March 29th, 1907).

Q. Doctor, the pipes of the Jersey City Water Supply Company's main are comparatively new pipes, do you know?
A. I know about the year they were put down, I think. In an imperfect way, of course.
Q. The various pipes leading from that main to Christ Hospital are old pipes, are they?
A. I don't know.
Q. Did you not testify that there was a very large amount of scaling in those pipes?
A. I said that accounted for a certain phenomena we saw, find certain findings by the possibility of scalding.
Q. Didn't you say that there had been a great deal in your former testimony?
A. I don't recollect.
Q. Didn't you say they had to have it cleaned out?
A. I said there was a blow-off at the hydrants because of sedimentation.
Q. Was that because of the scaling or not?
A. I cannot say as to that.
Q. Well, was it because of sedimentation?
A. I presume it was, yes sir.

Q. And in these pipes between the Jersey City Supply water main and Christ Hospital you are speaking about?

A. Yes, sir; that was on Palisade avenue.

Q. Have you made any experiments at all to tell how many of the bacteria were destroyed between the Jersey City Water Supply main and Christ Hospital?

A. I have not.

Q. Then the whole amount of the decrease which you just told us about might have occurred, so far as you know, between the Jersey City Water Supply main pipe and the tap at Christ Hospital?

A. Well, we always figure that the longer the distance the more reduction, that has been our experience.

By the COURT:—

Q. Does not the size of the pipes and their age and their direction—don't all those things have influence?

A. An old pipe may increase the number of bacteria possibly, the growths, etc., in it.

Q. Don't all those things enter into it?

A. Indeed they do.

Q. And here we find there seems to be at one end of the line one condition of things, and the other end of the line a different condition of things; now, unless the witness has made experiments with respect to those separate conditions I don't see how he is in position to give us an answer that will be of any value. If the witness has studied the question of the effect of flowage in pipes upon bacteria, he may give us the result of his study.

By Mr. EDWARDS:—

Q. Have you studied the question of the effect of the flow in pipes of bacteria as contained in literature on the subject?

A. Not from any special results, except some that I did give here, but in a general way I have studied the question.

Q. In connection with your occupation as a bacteriologist?

A. Yes, sir.

Q. Where does the great removal of bacteria take place in slow or in a rapid flow?

A. In a slow flow.

Q. Then in the rapid flow is there any decrease?

A. Yes, there is decrease in rapid flow as well.

Q. How do they compare between the rapid and slow flow?

A. I should say the slow flow was much greater.

Q. Well now—

A. Of course there are other conditions to be taken into consideration there as well.

Q. From your knowledge of the literature on the subject—

Mr. VREDENBURGH: I haven't finished with my examination yet.

Mr. EDWARDS: Oh, I thought you were through.

By Mr. VREDENBURGH:—

Q. I was going to ask him whether bacteria do not cling to or apparently cling to a morphus matter such as rust or what not in the water?

A. Yes, they would.

Q. And that is especially true with regard to B. Coli, is it not?

A. I should not say especially true with regard to coli.

Q. It is as much true with regard to that as any other?

A. Generally it might apply to that.

Q. These b. coli are covered with a slimy sticky casing?

A. Not more than any others.

Q. Most all of those are covered with a sort of slimy sticky substance?

A. I should not say so; they have an albuminous envelope.

Q. These little bacteria has an albuminous covering that is sticky or gellatinimus, perhaps is a better word—they stick fast to any non-organic morphus matter in the water, don't they?

A. It is not so much their sticking fast to anything I should not say that. They might be gathered in a filter, if they dropped through it, or something of that kind, as they were going through the filter bed be caught in the meshes but I should not say by passing along and sticking to something. I should say no.

By the COURT:—

Q. Take the case of a pipe having a small diameter—an iron pipe and jointed so that one part of the pipe would lie at an angle of 90 degrees from the other part, and the water going through the pipe would meet with the obstruction at the joint, suppose that obstruction was rust would not that catch the matter?

A. I hardly think such an obstruction would be rust.

Q. Don't the interior of iron pipes rust?

A. Yes, more or less, they scale off there, but in such condition it would have the full pressure of the water, and anything scaling off would be carried beyond it.

Q. Then you think that an irregular pipe, a pipe going first in one direction and then in another, wouldn't it be more likely to arrest these bacteria than a pipe going straight?

A. It would depend on the interior of the pipe altogether, otherwise I should say not; some might be precipitated to the bottom of the pipe temporarily, but the next flush of water would carry them all along again.

By Mr. VREDENBURGH:—

Q. The cleaner the pipe the less likely there would be to stoppage or obstructing of this bacteria?

A. Yes, generally speaking, certainly.

Q. And the more sediment there was—the more morphus matter, non-organic there was in the pipe the greater tendency it would have to destroy the bacteria?

A. Well, you are speaking of large mains?

Q. No, I am speaking of any main from an inch main up to six feet?

A. Well, I don't think I could answer that.

Q. Have you made any study of that?

A. Not specially, but in a small pipe you would not get very much sedimentation, it would be impossible it runs off.

Q. What study have you made of that?

A. Only from a general knowledge.

Q. You don't pretend to know any more about that than any other individual that has knowledge of pipes, do you?

A. Not any more than any other individual that has knowledge of pipes, no, sir.

Q. What study have you made of the organism which occur in pipes—have you made any study of that—any special study?

A. In a general way, yes.

Q. Well, what organisms are there which occur inside of the pipe, which destroy bacteria?

A. There are certain of the micro organisms not bacteria, growing in pipes that might act as a means to accumulate bacteria, and also to lessen the flow of water in that pipe, increasing, or at least lessening the circumference of the pipe.

Q. Don't some of them live on these bacteria?

A. Oh, yes.

Q. Well, what are they, have you made any study of that?

A. Yes, somewhat.

Q. What are the organisms which grow in pipes which eat or consume bacteria?

A. Well, certain of the protoza might.

Q. Well, you say might, what do you mean?

A. Would consume them.

Q. Do you know anything about it?

A. Yes.

Q Would they or wouldn't they?

A. They would consume bacteria.

Q. Do you know anything about those organisms in the pipes between the Jersey City main and Christ Hospital?

A. Only as I found them in the water as they came out of the tap.

Q. You have made no study of the pipes at all in that respect?

A. Only as the water comes through the pipes and into the tap.

Q. Do you know whether these organisms increase with the age of the pipe or not?

A. If they are there they tend to increase with the age of the pipe.

By the COURT:—

Q. Well, what have you to say with respect to the diameter of the pipe—of the influence of the size of the pipe upon the passage of bacteria through it?

A. Well, these organisms don't necessarily grow in every water, there are some waters that are specially—

Q. I am speaking now of the size of the pipe, has that any influence one way or the other?

A. I am under the impression that a large pipe will show growth just as readily as one smaller, but I don't think you will find the growth very extensive in the small intake pipes in a house; it is possible that pieces may come off and clog up, certain conditions are known that large pieces of growth have clogged up smaller pipes, but the growth is generally in the street mains I should say.

By Mr. EDWARDS:—

Q. Have you examined the water in the reservoir at Jersey City?

A. Yes, sir.

Q. And compared that with the bacteria at Boonton?

A. No, not at that time, Mr. Edwards.

Q. What say?

A. No, I have not.

Q. If these were old pipes would not that increase the bacteria?

A. It might under certain conditions possibly; it is a difficult question to answer.

The COURT: Does he know whether bacteria grow in old pipes?

Q. Do bacteria grow in old pipes?

A. What work has been done on that subject—

Q. Where the water is running?

A. What work has been done on that subject seems to show quite generally that there is a decrease in the number of bacteria that flow through pipes, the longer the pipe line the more decrease there is.

Q. Does that depend upon the distance of the flow and the time of the flow?

A. I should say so.

Q. Taking into consideration all your knowledge and experience on this question, would you say that there would be any difference in the bacteria to be ascertained, found at the tap in Jersey City, at Christ Hospital and the bacteria to be found at the point of delivery to Jersey City?

Objected to.

Q. As to this particular difference of 4,600 feet, or whatever it may be, between Christ Hospital and the tap, based upon your knowledge, what would you expect to find the bacterial count at those two points to be—would they differ?

Objected to.

By the COURT:—

Q. Do you feel yourself competent to answer that question, from any experiments you have made or any of your reading?

A. From the experiments that I cited a short time ago, that is, the decrease in the numbers of bacteria from the reservoir dam at Boonton to the tap in Jersey City, which is given as some twenty odd miles and the period of time during which these observations were made which consisted, as appears by my table here, of two years and five months, we found that in that distance there is a decrease in the number of bacteria of 73 per cent. that is in twenty odd miles. Now we could get an approximate idea by dividing that 73 by your 20.

Mr. VREDENBURGH: I ask that the answer be stricken out.

WITNESS: We would get a small decrease, possibly I should not say it would very materially affect the findings, that would give us a decrease of a little bit less than three and a fraction per cent.

Q. Well, they both have steel pipes?

Mr. VREDENBURGH: I object, they don't have steel pipes.

Q. Both have metal pipes, haven't they?
A. I don't know what the pipes are in Jersey City.

The COURT: I don't think it is worth while to pursue this testimony any further; I think you have exhausted his knowledge.

Mr. VREDENBURGH: I ask that that be stricken out.

The COURT: I really don't think that the witness has anything to base his three per cent. estimate upon, so far as I can see, but the rest of the answer can stand.

Mr. EDWARDS:—

Q. Now then, doctor, you say in your reports that you find in certain instances the b. coli; are your findings positive or presumptive?
A. They are presumptive findings.

Q. Will you tell us what you mean by that?

A. I mean by that that we have a certain number of indications that b. coli is present, but the recommendations of the Committee on Standard examinations of the American Public Health Association—

Q. That is a recognized standard, isn't it?

A. Yes, sir; that is a generally recognized standard.

Mr. VREDENBURGH:—

Q. Give me the date of that standard?

A. It is published in part 2, Volume 30 of the reports and papers of the American Public Health Association.

Q. What year?

A. For the year 1905.

Mr. EDWARDS:—

Q. And who, will you tell us, was the secretary of that body?

A. George C. Whipple.

Q. That is the George C. Whipple that we have here?

A. Yes, sir.

Q. Now, will you go on?

A. —required more tests that were made for positive findings; these recommendations are similar recommendations were made before 1905, I might say.

Q. Well, do these rules and recommendations prescribe methods of doing this work or making bacteriological examinations of water?

A. Are they what?

Q. Do they prescribe rules and methods?

A. They do, yes, sir.

Q. Have you followed them?

A. I have yes, with this exception, that I state I have not carried the positive test out in all my samples; we have followed a so-called presumptive test.

Q. Then you cannot say that in any of this water that you have found b. coli, can you?

A. Not positively in these examinations that I submit.

Q. Simply found presumption of b. coli?

A. Found presumption of it.

Q. Well then if you have made an error in that—I mean as to the positive tests —

The COURT: Well, I don't understand; this plate that has been exhibited indicates b. coli.

Mr. EDWARDS: No, it indicates bacteria.

Q. Now take that plate, doctor, for a minute; are there any b. coli in that plate?

A. No, I happen to know that there are not.

Q. Could you tell, in this examination, as to whether they were or not?

A. By looking at them?

Q. Yes.

A. No, hardly.

By the COURT:—

Q. Then there is no presumption at all that b. coli exists—

A. The ordinary water bacteria will grow and produce colonies that are harmless bacteria.

Mr. EDWARDS:—

Q. Those are harmless bacteria?

A. Yes.

Q. But they are not b. coli?

A. No, sir.

Q. Then when you say that you find—we will take the sample of January 2d, 1906, when you say you find 150 bacteria, can you say that there are any coli. in that?

A. Well will you let me see the report.

Mr. VREDENBURGH: I object.

Q. Take the 150 bacteria that you found, can you say that any of those were b. coli?

A. Inasmuch as we did not find any evidence of fermentation in one cubic centi-meter when put in the fermentative tubes I should say that none of them were.

Mr. VREDENBURGH: He didn't put any part of that particular substance in the water he took other water.

By Mr. VREDENBURGH:—

Q. You don't mean you took this particular gellatine place, did you, this gellatine that you grew the bacteria on?

A. Gellatine at one portion of the water and fermentative tube at the other.

Q. It wasn't the same water?

A. Yes, the same sample of water.

Q. That ends all that you did with that particular plate?

A. Yes, sir; on this particular plate. Mr. Whpple in the majority of his tests made a presumptive test If we don't find fermentation in our presumptive tests, in the amount of water stated we consider that there are no b. coli present; that is absolute. The negative findings shows there are no b. coli, if we don't obtain gas.

The COURT:—

Q. But you say you did obtain gas?

A. Where we obtained gas by the presumptive test b. coli may be present.

Q. Why didn't you go on and ascertain whether they were present?

A. I have a case where I obtained gas under these formulas, and the other reactions present. I have said b. coli was present; in doing so I have undoubtedly in a number of times called them present when they were not present, but we are giving the Water Company the worst end of it in that matter. It is a quick test taking but two days time, and the report can be forwarded quite promptly on that.

Mr. EDWARDS:—

Q. Supposing you wanted to be absolutely certain as to whether first there was b. coli and secondly as to whether there was the typhoid coli what would you do?

A. We would plate out in this same manner from the fermentative tubes, which give the indications of b. coli from gas etc., small amounts, and examine from suspicious colonies cultures on a number of different media, to ascertain if b. coli were present, and these different media must have certain reactions take place to prove the presence of b. coli.

Q. If you had found presumptive B. coli in suspicious quantities would you have done that?

A. If I had found it continuously in the small quantities I would have done it.

Q. Why didn't you do it?

A. I did it frequently as it was.

Q. What was the result?

A. Several times I isolated it, and several times where I had presumptive tests positive I did not find b. coli.

Q. Did you at any time find the typhoid germs in any of your isolations?

A. I did not, I wish I had.

Q. Did you look for it?

A. I didn't make any special examination for it, no.

Q. Why do you wish you had?

A. Well, it has been found so seldom that I would be glad to have my name among those that claim to find it.

Q. Then it is a very rare thing?

A. Exceedingly rare.

Mr. VREDENBURGH:—

Q. If you didn't look for it of course you will never find it. I don't understand the witness to swear that he examined this water for typhoid bacillus. Does he swear he examined this water to find typhoid bacillus at any time?

A. I didn't examine it specially for typhoid bacillus.

Mr. EDWARDS:—

Q. Why not?

A. Because it is such a hopeless task.

Q. And the b. coli, did you find that very often when you examined for it?

A. I should have to refer to my tables; I can give you the results from my tables.

The COURT:—

Q. The tables show?

A. Yes, sir.

Q. And as I understand, the doctor, says that as far as b. coli are concerned his tables are really indicative of more b. coli than probably exists?

A. That is true, that has been shown by a number of other workers, and is generally acknowledged to be true.

Mr. EDWARDS:—

Q. What do the works lay down the rule to be as to the finding of b. coli, in what proportion of water must it be found to be objectionable?

Objected to.

Admitted.

A. Different observers have different standards that they work under, I would say, in answering that, these standards are somewhat flexible Mr. Whipple has already given his standard but a more or less commonly accepted standard is that potable water for City's use and drinking purposes should not contain b. coli in one c. c. samples, over fifty per cent. of the samples examined, that is where the water is examined regularly.

Q. Take your tables, and tell us what was the percentage in the various proportions of water that you examined for the different years, 1904, in one centimeter?

A. 1904 b. coli in one centi-meter present 7 per cent. of the time; 1905, b. coli in one cubic centimeter present seven per cent. of the time. 1906 b. coli in one cubic centi-meter present eight per cent. of the time.

Q. What do you deduce from that?

A. I deduce from that, that the water is a good water.

Q. Now then will you please compare—you have read Mr. Whipple's testimony, haven't you?

A. Yes.

Q. Carefully?

A. Well, as carefully as I could.

Q. Will you compare the methods followed by your presumptive test with the methods followed by Mr. Whipple and his assistants Mr. Barton and Mr. Meyer in making their tests as disclosed by the testimony?

A. I should say that my presumptive test was somewhat finer than Mr. Whipple's.

Q. In what respect?

A. For the reason that I used, in the first place, a lactose bouillion, we find fewer fermentating organisms in lactose than we do in glucose that is, other than b. coli, so that we might not get fermentation in the lactose bouillion in one cubic centi-meter or given sample, where we might get it in one cubic centimeter in that same sample in the glucose Furthermore we have another reaction that he does not have, and that is in the change of neutral red to yellow. Other than these two I should say that the two methods were approximately the same.

Q. Do the standard methods require further procedure to ascertain definitely if the b. coli are present?

A. They do.

Q. Well now, do you consider that Mr. Whipple is justified in condemning a water supply upon the data furnished by the methods used by him?

A. I do not.

Q. And why not?

A. That is as far as his presumptive tests go.

Mr. VREDENBURGH: I suppose I will be allowed permission to examine along the same line with my witnesses.

The COURT: In form I suppose the question is objectionable, but it is a short way of getting at it. I will allow Mr. Whipple to criticise Dr. McLaughlin just as I will allow Dr. McLaughlin to criticise Mr. Whipple.

A. As far as my presumptive test go, in considering his presumptive test he would not be justified in condemning the water.

Q. Why not?

A. Because he has not absolutely and positively found b. coli.

Q. Have you seen any other tests safe presumptive tests made by him in this case?

A. I think there were a few given that spoke of the test being carried further, and made positive; I am under that impression; a few.

Q. Were those by Mr. Whipple or by Mr. Meyer?

A. I believe they were by Mr. Meyer

Mr. VREDENBURGH: Well, that is hardly fair.

The COURT: I will overrule the last question and answer.

Mr. VREDENBURGH: I wish to repeat, so as to make it as strong as I can, we saw the fecal matter go into this water; now that was the best test after all; that is what we insist on.

Mr. EDWARDS: Where?

Mr. VREDENBURGH: Right in this water.

Mr. EDWARDS: Where?

Mr. VREDENBURGH: A dozen witnesses testified that they saw the fecal matter go in, and we had the exhibit in Court, two exhibits taken from the water.

The COURT: Well the last question was decidedly objectionable, it calls for the recollection of this witness as to what other witnesses have testified to.

Q. Now then Mr. McLoughlin, have you read the testimony of Mr. Constable?

A. I have.

Q What have you to say about that as to the methods employed.

A. I made a note on a portion of Mr. Constable's testimony. Mr. Constable testified that he held the bottle for bacterial samples so that the water entering the bottle flowed over his hands before entering the same.

Q. What is the objection to that?

Mr. VREDENBURGH: What did you read from?

WITNESS: I read from the printed testimony.

Mr. VREDENBURGH: Well, that is a mistake.

Mr. EDWARDS: What should the testimony be?

Mr. VREDENBURGH: Just the opposite.

WITNESS: One man testified to the opposite, but this man testified to this.

Q. Did you hear his testimony?

A. Yes, sir; heard it on the stand and saw it later in the notes.

Q. If the hand came in contact with the water before it went into the bottle what effect would that have upon the accuracy of the examination?

A. It is very likely that the bacteria on the hands would be washed into the bottle, not only the ordinary bacteria of dirt, but b. coli; b. coli being found on the hands, in a series of experiments that were made with the hands of school children, of some ten per cent. of the hands examined; this would naturally change his result.

Q. What effect would that have upon the accuracy of the test?

Mr. VREDENBURGH: Which test?

Mr. EDWARDS: Bacteria test.

A. It would influence both, invalidate both.

Q. The coli and bacteria both?

A. It would be apt to invalidate both; yes.

By Mr. VREDENBURGH:

Q. If there was b. coli on his hand it would invalidate it?

A. Yes, and nobody proved that he didn't have.

Mr. EDWARDS:

Q. Now how do you ice in connection with your water samples?

A. Our samples are carried in a valise the size of the one that I have with me, I should say it is about approximately eight inches wide and nine inches high and about 16 inches long; this valise is lined with zinc, which is made water tight; in other words, which has a cover of zinc which fits fairly closely on the top; out of each corner of this zinc tank which fits in the valise are wire nettings arranged in a circle, which hold the containers, which in turn hold the bottles in which the samples are taken; I might say that my method of taking the sample has been the use of this brass cylinder which I hold in my hand, which is approximately six or seven inches long and two and a half inches in diameter. This brass cylinder contains the bottle in which the water sample is taken. The bottle consists of a four ounce mushroon stopper bottle and a gauze is placed over the neck of the bottle and stopped; this is introduced into this brass cylinder and sterilized with dry heat, and such bottles are kept on hand for taking bacteriological sample of water. The use of the ice is to keep the sample cold until it reaches the laboratory until the examination is started.

Q. Why do you want to keep it cool?

A. Because the bacteria increase in numbers and increase quite rapidly as the water warms up; the recommendations of the bacterial committee are that the temperature of the water sample shall be kept within certain degrees until it reaches the laboratory.

Q. What have you to say as to Mr. Whipple's methods relative to the use of ice?

Objected to.

Q. You have heard the testimony of Mr. Whipple, you have read the testimony of Mr. Whipple?

A. This was the method, I should say, of his assistants.

Q. I mean of his assistants?

A. Yes, rather than Mr. Whipple himself; they made certain statements as to the samples taken first and iced later; they made statements, one man, that the sample had not increased in temperature more than three degrees from the time it was taken until it reached the laboratory, and they further, to the best of my knowledge and from my reading of the case, did not regularly take the temperature of the water when the sample was taken or when it reached the laboratory, and the recommendations of the committee on public health, are that the water shall be kept at a temperature approximately between fifty and sixty—not higher than sixty.

Q. Fahrenheit?

A. Fahrenheit; preferably not higher than ten degrees centigrade; it is much cooler than the usual summer weather, so that the water is cooled down during transit.

Mr. VREDENBURGH:

Q. You are now testifying about water taken from the river?

A. Yes, sir.

Q. Water taken from the Rockaway river to Mr. Whipple's laboratory and there examined?

A. Yes, sir.

Mr. EDWARDS:

Q. Are you not also testifying to methods pursued of taking water at the tap at the Pennsylvania station?

A. I haven't testified to that as yet.

Q. What would you say as to the methods pursued in that regard?

A. Mr. T. W. Constable testified; took sample for bacteriological analysis from the Pennsylvania Railroad, Jersey City, after letting the water run for one minute; I claim that he could not get a proper sample in so short a time.

Q. What criticism have you to make of that?

A. Because the water has been standing in the pipes and the pipes are warm; there should be at least 15, possibly 20 to 30 minutes, to get a fair sample of the tap water.

Q. How did Mr. Whipple use ice; what criticism have you to make as to the use Mr. Whipple made of ice in carrying his sample?

Objected to unless they fix the particular sample they are talking about.

Q. Every one of them that he used ice with.

The COURT: I understand the question to be now directed to this witness's criticism of the manner in which the water is taken from the Pennsylvania Railroad tap.

Mr. EDWARDS: And also from the Boonton—

The COURT: Well, we will take one at a time.

Q. The Pennsylvania tap, what have you to say as to the way that was taken?

A. I just testified to the Pennsylvania tap.

Q. What have you to say as to any criticism of the methods in which the water was carried in ice from Boonton to Mr. Whipple's laboratory?

A. The testimony that has been given on the taking of the Boonton samples has been that the bottle was taken, a tin foil top was over the stopper of the bottle, this tin foil was taken off and put in the pocket—

Mr. VREDENBURGH: I object to this.

WITNESS: If he did it at this one place he would likely do it at others.

By the COURT:

Q. Go on and state what criticism you have to make upon that method?

A. He was lax in his methods inasmuch as he would put his tin foil in his pocket, take his sample and, as one of them testified, holding his hand in such a manner that the water would flow over it in reaching the bottle, and then put the tin foil around the neck again, from his pocket, in which it may have collected dirt and germs by the hundreds, and walked up to the railroad station,—maybe fishing for a time before, and then got his ice, and put his sample on ice; his sample, during that time, has been some time without being iced and during the summer weather he would get a fair increase.

Mr. EDWARDS:—

Q. How did he put the ice in contact with the sample?

A. As I recollect it wasn't in as close contact with the samples as by our methods. His samples could not be, in my opinion, kept as cool as proper, in his method.

Mr. VREDENBURGH: Do you claim that the water in those bottles by reason of their having either too much ice or too little ice would have less or more coli in at the time they were taken out than when they were examined for coli. Which do you claim?

Mr. EDWARDS: I claim that your methods would increase both, as we understand it.

Mr. VREDENBURGH:—

Q. What does the doctor say as to that?

A. Say it might increase both.

Q. You say it might increase the number of coli—you mean they would propagate in there?

A. They might; the chances are they might.

Mr. EDWARDS:—

Q. I show you Exhibit D. 17, 18 and 19, and ask you what they show as to the average number of bacteria per cubic centimeter on the examination of the different years?

A. The bacteria per cubic centimeter in the tap water at Jersey City—the average number, I should say, in the tap at Jersey City for the year 1904 was 451.

Q. For 1905?

A. For 1905 the same water, average number of bacteria per c. c., 268. For 1906, the same water, average uumber of bacteria per c. c., 94.

Q. What does this decrease in the number of bacteria indicate from year to year?

Objected to.

Question withdrawn.

Q. Now then, will you also tell us the b. coli on one one-hundredths of a centimeter for each of those years, what percentage is found?

Mr. VREDENBURGH: Where?

Mr. EDWARDS: The tap water at Jersey City—Christ Hospital.

A. For the year 1904, b. coli was not found in any of the one one-hudredth cubic centimeter of water examined, that is the single one one-hundred.

Q. You mean there was no presumption of it?

A. It was positively not there.

Q. Now for the year 1904, as to the one-tenth, take that,—what did you find of a centimeter?

A. b. coli was entirely absent.

Q. Every examination?

A. Every examination.

Q. Now we will take 1905, what did you find as to the coli in one one-hundredth of a centimeter?

A. It was absent.

Q. Always?

A. Always?

Q. And as to one-tenth of a centimeter?

A. It was absent.

Q. Always?

A. Yes.

Q. Now take the year 1906 as to b. coli, in one one-hundredth of a centimeter?

A. It was absent.

Q. And in one-tenth of a centimeter?

A. It was absent.

Q. At all times?

A. At all times.

Q. Now you have given us as to the percentage of times that it appeared in one cubic centimeter in each of those years?

Mr. VREDENBURGH: What year?

Mr. EDWARDS: 1904.

A. In 1904 it appeared in one cubic centimeter, the Jersey City tap water in seven per cent. of the samples examined.

Q. In 1905?

A. In 1905, it appeared, the same water, in the same amount in seven per cent. of the samples.

Q. In 1906?

A. Same water, same amount in 1906, appeared in eight per cent. of the samples.

Q. And in 1904, we wll take, what proporton of ten centimeters of water did it appear?

A. It appeared in 18 per cent.

Q. In 1905?

A. 57 per cent.

Q. 1906?

A. 61 per cent.

Q. That was a presumption?

A. That was a presumption.

Q. Are you familiar with Mr. Whipple's report to the Commission on additional water supply for the City of Newark?

A. More or less generally, yes, I am with certain portions of it.

Q. Are you familiar with the bacteriological portion of it?

A. Familiar with the portion of it in which he states a summary of his bacteriologcal analysis.

Q. What was his summary and how did it compare with your own results on the Rockaway river?

Objected to.

WITNESS: I have it in published form here.

Q. Did Dr. Whipple lay down in this report a standard?

Objected to.

Q. Do any of your analysis for the two years and upwards show any indication from a bacteriological standpoint, that there is or is not any direct flow of the Rockaway river to the reservoir out-let through the reservoir?

Objected to.

Q. Doctor, have you made a comparative examination of the bacteria found at different times at the main dam on the Rockaway river, near the outlet to Jersey City, with the count of bacteria entering the reservoir from the river at the slack water?

Mr. VREDENBURGH: I would like to have those points definitely fixed, near the dam means nothing; was it inside of the dam or outside?

The COURT: Well, the witness can state.

Q. I ask the general question if he made that investigation?

The COURT: You can state in the first place in answer to that question, at what point near the dam you refer to, and at what point in slack water you refer to.

A. We have made examinations of the water of the Rockaway river just before it enters the resevvoir; that is, where the water is still running water, before it comes to the slack water; we have made examinations of the water as it leaves the Boonton reservoir by taking samples from the gate house as it enters the conduit.

The COURT:—

Q. Now go on and answer the question.

Question repeated.

A. I have made an examination at the points in which I have stated, yes.

Mr. EDWARDS:—

Q. And what has been the result of that examination?

A. The results of those examinations show no connection between the two points; that is, there is no similarity in the examinations. If the water of the river ran down and across to the reservoir we would get water of practically the same content.

Objected to.

The COURT: This witness is competent to testify as to the bacteria found at each point. Now as to whether the water flows directly and rapidly between those two points, or whether the water reached the dam by a very circuitous route, of course it does reach it ultimately, but it is for the Court to determine what the fair inference is.

Mr. VREDENBURGH: Then that portion of his testimony is to be stricken out.

Mr. EDWARDS:—

Q. Now have you made a table of those results?
A. I have.
Q. For 1904, 1905 and 1906?
A. Yes, sir.
Q. Made up from your various detailed reports?
A. Yes.

Mr. VREDENBURGH: I object to that table.

Q. Now then, do these reports that have been offered, giving the tap water also give the reports of your bacteriological investigation at the dam and at the point where slack water and the current of the river join?
A. They do.
Q. Given in those reports?
A. Yes, sir.

Mr. VREDENBURGH: Let us understand about these papers.

The COURT: I understand that these records are offered in evidence for all purposes.

Q. Is this table the result of the bacteria examination made from these tabled reports?
A. Yes.

Mr. VREDENBURGH: What I want is that all our records go in the same as yours —that mine go in as well as yours.

Mr. EDWARDS: We say we will produce everybody that we have used in making these examinations.

Mr. VREDENBURGH: I prefer that they be produced first before you put in any evidence this way.

Mr. EDWARDS: I would like to have this table marked for identification D. 22.

AFTER RECESS.

DR. GEORGE E. McLAUGHLIN resumes the stand:—

FURTHER DIRECT EXAMINATION by Mr. Edwards:—

Q. I was examining you about the table, Doctor, D. 22 for identification. In the first column here is given, is there not, the date of the examination?
A. It is.
Q. And in the next column the water itself is given?
A. Rockaway river water at the entrance to the Boonton Reservoir.

Q. And in the next set of columns?

A. Boonton Reservoir water at the gate-house of conduit.

Q. And still the next column?

A. Jersey City water as delivered from the tap.

Q. When you speak of the tap, where do you refer to?

A. The tap at Christ Hospital.

Q. And have you given us here the number of bacteria that you found in the Rockaway river water at the entrance to the Boonton Reservoir for each day?

A. I have.

Q. And the average for all of these dates?

A. I have.

Q. And is that per cubic centimeter?

A. That is per cubic centimeter.

Mr. VREDENBURGH: You are not going into that now, are you? You can't have that spread on. That is a question of where you took the water from. He doesn't know anything about that. We were required to prove that first, because that is very important.

The COURT: You see, that lies at the foundation of the whole statement.

Q. Does this table show the everage?

A. It does.

Q. The average at the Boonton Reservoir?

A. Yes.

Q. The average at Jersey City, and the average at the tap?

A. It does.

Q. As found by you? Provided, of course, the water came from the places it was claimed to come from?

A. Yes.

Mr. EDWARDS: I understand your Honor does not want me to give these figures, then.

The COURT: Well, I can't let it in in the face of objection.

Mr. VREDENBURGH: We would be perfectly willing, as I said before, if ours were let in on the same basis.

Mr. EDWARDS: What do I understand you want us to do?

Mr. VREDENBURGH: We have put in a number of analyses by Mr. Whipple. Some of them the boy that took them failed to appear, and we didn't examine him at the time. Therefore these particular analyses, about which I don't remember now, are not technically in.

Mr. EDWARDS: They have been presented?

Mr. VREDENBURGH: They are in here, in Mr. Whipple's tables, all made up. But it happens that we have not connected these.

Mr. EDWARDS: Well, we do not think it is wise to ask you to connect yours further, and we think it will save time if we are not called upon to connect ours.

Mr. VREDENBURGH: All right. Then, on that admission, we will not require it.

Mr. EDWARDS: As to those that are in.

Mr. VREDENBURGH: They are in our tables. They may not be technically admitted by the Court, but they are made up with our tables.

Q. Now, then, Doctor, I see on the side here certain abbreviations, "C. M," &c., giving names of people. Are those the people that furnished the water to you?
A. They are, yes.

Table offered in evidence by Mr. Edwards, and marked "Exhibit D. 22."

Mr. EDWARDS: Of course, the accompanying sheets are already in.

Mr. VREDENBURGH: That statement which you now offer is taken entirely from the sheets that have been offered in evidence?

Mr. EDWARDS: Yes, sir.

Q. Now, then, will you please tell us the number of days in 1904, beginning June 13th, that you made the examination?
A. Of the Rockaway river?
Q. Yes.
A. Five.
Q. And in 1905, how many?
A. Eleven.
Q. That is, one each month except August?
A. Except August.
Q. And in 1906?
A. Eleven in 1906.

Q. You were away each year on your vacation during August, were you not?

A. Yes, sir.

Q. Now, then, what was the average in the Rockaway river of bacteria per cubic centimeter, as found by you at the place of its entry into the Boonton reservoir?

A. That was, taking in the running water of the Rockaway river as it entered the reservoir. 25,035 was the average count.

Mr. VREDENBURGH: 1904, was that?

WITNESS: No; the whole perod from time the water was turned on until 1906.

Q. Was that variable in the period?

A. Yes, that varied considerably in that period.

Q. From what was the lowest?

A. The lowest during that period was 600 bacteria per c. c.

The COURT: In what month?

WITNESS: That was on February 9th, 1905.

Q. And the lightest?

A. The lightest was 130,000 on September 8th, 1904.

By Mr. VREDENBURGH:—

Q. Wait. Where was that 130,000?

A. They are both in the same place.

Q. Was that at the gate-house?

A. No. In the Rockaway river; the running water just as it enters the reservoir, before it has become slack water .

Q. That is the one of September, 1904, is it?

A. Yes.

By Mr. EDWARDS:—

Q. Now, what was the average found at the gate-house?

A. 636.

Q. As against how many above?

A. 25,035.

Q. Now, in the tap in Jersey City, what did you find as to the average number of bacteria?

A. 175.

Q. That is per cubic centimeter?

A. Per cubic centimeter.

Q. Now, Doctor, what do you have to say from your examination as to the effect of the reservoir upon the bacteria in the water?

Mr. VREDENBURGH: The question is objected to We have just as much judgment about that as this witness has.

The COURT: I think that question is proper.

Mr. EDWARDS: I will withdraw that question for the present, anyhow.

Q. Have you done much experimental work with the typhoid bacilli, Doctor?

A. I have done a fair amount.

Q. How do they multiply?

A. They multiply by fission. That is, one becomes two. They divide.

Mr. VREDENBURGH: Can I interrupt? There seems to be an error. The original report of the Doctor made the number of bacteria at the Rockaway river 120 on September 8th, 1904, and at the gate-house 130,000, and down at the hospital 475. Now, the witness's statement was contrary to the report that he offered in evidence.

WITNESS: There has evidently been a mistake in the transposition, in the sampling or something.

The COURT: Before the witness ventures any statement let him look at the table.

Table is shown to witness.

WITNESS: It is evidently a transposition, in my opinion, of the samples that were taken in Boonton by the sampler; because the Rockaway river sample was given as 120, which figures we have never obtained; it would be entirely too low for our examinations that we have made there. Whereas, the Boonton reservoir water from the gate-house was given as 130,000, which figures we have never come anywhere near; it is a matter of hundreds, as a rule. I have entered that here on my report as it was given to me, but I feel justified in saying that that was a transposition of samples.

By Mr. VREDENBURGH:—

Q. That is your explanation? You say the samples were mixed up?

A. That is my explanation of that.

By the COURT:—

Q. Let me see, now. You say that in no samples taken at any point was there ever as many as 130,000. How do you explain that. You have got to explain it by something more than transposition. That is my question.

A. From our analyses of the samples taken at the gate-house of the conduit, we have never approximated any such figure. There has never been an approximation of 120 in the river water at Boonton. But if we transpose them, then they naturally fit into their respective grooves, being the one Rockaway river water and the other the gate-house water. I base that on the examinations for two and three-quarter years.

Q. Do you mean to say there could be a difference of 130,000 at the inflow at the reservoir, and only six hundred and some odd at the tap?

Mr. EDWARDS: 435 at the tap.

Q. Do you mean to say that there have been in your experience variations as great as that?

A. There have been very marked variations.

Q. What are the variations in other cases? We might as well have that down on the record.

Mr. EDWARDS: Well, the nearest approach to that is 85,000 in the river as it enters the reservoir, and 140 as the water leaves at the gate-house. Here is 65,000 in the river; 350 at the gate-house. 63,000 at the river; 550 at the gate-house. 30,000 in the river; 80 at the gate-house. 52,000 in the river; 1,050 in the gate-house.

The COURT: That difference is simply enormous.

Mr. EDWARDS: If you will follow it down the table, you will see it is a little greater in proportion. That was six days after a heavy rain.

The COURT: Well, as a matter of curiosity, what is the minimum at the point of inflow? At slack water?

Mr. EDWARDS: The minnimun is down as low as 600 in February 9th, 1905.

The COURT: And at that time, how much was it at the gate-house?

Mr. EDWARDS: At that time it was a little bit more at the gate house, 1,400.

Mr. VREDENBURGH: Double as much at the gate-house.

Mr. EDWARDS: In Jersey City at that time it was only 100, one of the lowest counts. It only shows that the water at the upper end of the reservoir doesn't reach the gate-house for some time.

Mr. VREDENBURGH: I want to call your Honor's attention to this: that when he says there was 130,000 at the entrance of the reservoir and then says there is 475 at the gate-house, they have no relation to each other whatever, because they are taken within an hour of each other. So that you cannot tell whether this 130,000 was not shown in the gate-house the next day or the day after.

Mr. EDWARDS: Well, the highest ever at the gate-house was 5,400, and the next highest was 1,050. So you see the 130,000 really has relation in comparison to the upper river.

The COURT: What month was the 5,400?

Mr. EDWARDS: The 5,400 was in the month of January, the very highest average; but the next highest is in June, 1,050.

The COURT: That is very singular, isn't it, that such a thng should occur in January?

Mr. EDWARDS: When we had the 1,050 in the reservoir that was 52,000 in the river.

The COURT: I say, isn't it very singular that the maximum at the reservoir should have been in a month less subject to floods than almost any other?

Mr. EDWARDS: The point about that is that the 5,400 was the day of a heavy rain.

The COURT: The rain couldn't stir up things in the reservoir.

Mr. VREDENBURGH: What authority have you for saying that it was a rain rather than a snow?

Mr. EDWARDS: Only what he says. "H. R." means "heavy rainfall." And "H. F." means a "heavy rainfall on frozen ground."

Mr. VREDENBURGH: You have something on those to show it?

Mr. EDWARDS: Certainly.

By the COURT:—

Q. Let me ask you this question. Suppose snow falls. Would you enter that as rainfall?
A. Hardly, unless it would melt afterwards.

By Mr. VREDENBURGH:—

Q. Is there any snow indicated on there anywhere?

A. I couldn't say whether any snow is indicated there. We take these records from the man who brings these samples down. Occasionally he indicates snow. If he indicates snow, we don't count it; unless there has been a melting snow, then we so state. We don't put it as rain.

By the COURT:—

Q. You don't put it as rain, no matter how heavy the storm may be?

A. We do not.

By Mr. EDWARDS:—

Q. Now, I will go back to the point where Mr. Vredenburgh interrupted me (not improperly, I mean). Have you done experimental work with typhoid bacilli?

A. I have.

Q. How do they multiply?

By the COURT:—

Q. First of all, have you ever seen one?

A. I have.

Q. I think the evidence of Mr. Whipple was that he had never seen one.

Mr. VREDENBURGH: Oh, no. That was another witness.

The COURT: He said that they could not be distinguished from others, and therefore he could not say with any positiveness.

By Mr. EDWARDS:—

Q. Have you ever seen them?
A. I have.
Q. Can they be seen with the naked eye?
A. Not a single bacillus. Only a growth of them can be seen.
Q. And can they be distinguished from other bacteria?
A. They can.
Q. By the eye?
A. By the eye.
Q. How?
A. By culture tests. Putting them through different culture tests.

By the COURT:—

Q. When you say "eye," you also include, of course, the microscope?
A. We do include the microscope. They must be bacilli.
Q. What I want to know is, whether you understand counsel to include the microscope?
A. Well, when he asked me if they can be seen by the eye: if we have a culture of them. For example, a culture of these on this plate (indicating) would be typhoid bacilli; they can be seen by the eye.

By Mr. EDWARDS:—

Q. But you cannot tell whether they are typhoid or not by the eye?
A. We cannot.

By the COURT:—

Q. Suppose you put them under the microscope, haven't the typhoid bacilli such a characteristic form that you could distinguish them from other bacilli?
A. We cannot.

By Mr. EDWARDS:—

Q. How do you distinguish them?

A. By different culture tests. Their growth on different kinds of media, and their reaction by such growth.

Q. Is that a question of recognition?

By the COURT:—

Q. Then, let me see. You never have seen them. What you have done is this: You have found by subjecting what you have seen to certain tests that they give evidence of being typhoid germs. That is all?

A. We have to see them under the tests. One of the necessities is that it be a bacillus as opposed to being a corcus or a round growth.

The COURT: I don't see how anybody can say that they have seen that whose form they cannot distinguish from other forms

By Mr. EDWARDS:—

Q. When you put them into a culture, how do you find that they are typhoid bacillus?

A. What is your question?

Q. What kind of a culture do you put them in?

A. We put them through different cultures; quite a lengthy process.

Q. What is the effect of that procedure?

Mr. VREDENBURGH :You haven't started whit them yet. How do you start with them?

A. We take a case of typhoid fever, which we want to identify as typhoid. Our later way has been the separation direct, or the isolation direct, from the blood, of the typhoid germ. And we proceed with drawing a certain amount of blood from that patient; adding that blood to a sterilized ox bile; incubating it for twelve or fourteen hours; and then plating that growth in the ox bile and blood on a specially prepared media; in other words, endo fuchsine agar. We may get thereby, if it is typhoid, we may get some b. coli growing; but b. coli on this particular medium produces a reddish ring around the colony while the typhoid does not. And, furthermore, the edge of the typhoid colony is very thin and transparent, whereas, the coli is quite well marked and defined. Then that patient's blood, if it is diluted with a one part of blood and twenty of water, and this bacillus added to it and observed under the microscope, it will agglutinate the bacillus. In other words, it will cause the bacillus to clump and stop its motion. We recognize that as a positive test.

Q. And that show typhoid?

A. Yes, sir. We furthermore isolate it from the spleen of individuals dead of typhoid fever, and get the subsequent reactions.

By the WITNESS: If I get this glutination of a patient suffering with typhoid fever we know that that individual is elaborating; or, in other words, to put it clearer, he has elaborated antitoxin which determines the life and action of the bacillus.

Q. Is there and bacilli that causes agglutination excepting typhoid germs?

A. There is not. There is only one case in which I know where reaction has been carried out—where bacilli has been given to a human being. We naturally cannot carry it out to a final test because nobody seems willing to submit to it. There is a case which happened abroad in which a scrub woman ate a culture of typhoid and contracted it very seriously and died.

Q. When you plate this typhoid bacilli, are all the surrounding bacilli typhoid, too?

A. Very frequently; yes.

Q. How can you tell that?

A. By the peculiar reaction that it has.

Q. How do you get pure culture of typhoid?

A. We isolate it from the spleen of the individual suffering with typhoid fever.

Q. Then after you have pure culture is the bacilli from that typhoid?

A. Yes, sir.

Q. And then you put them to this test, or can you do so?

A. You can.

Q. And if they are typhoid what will be the result?

A. They give characteristic reaction.

Q. Do they agglutinate with the blood of typhoid patients?

A. They do.

Q. What is the effect of agglutination of the blood of typhoid patients?

A. Well, we use the blood outside of the patient's body.

Q. How do they multiply, Doctor?

A. By division.

Q. Are there any animals affected with this disease?

A. They don't seem to have it. A mouse has a kind of typhoid form. Typhoid is purely a human disease.

Mr. VREDENBURGH: One question I should like to ask there. If you can't see this division, how can you tell it?

A. Just the same way as we see these spots on the plate. There are more than one. If there was only one you couldn't see it, but you have to produce a colony in order to see them, just the same as you can see one hundred people better than you can see one.

Q. Are they all sorts of round or different forms?

A. Different forms of bacteria; yes, sir.

RE-DIRECT:—

Q. You don't know yet. After you get typhoid bacilli multiplies into colony which you can see?

A. If it should be different—a colony of some other kind of bacilli, you can't tell it; no, sir.

Q. By its peculiar form; these colonies don't have peculiar forms?

A. No, sir; it is from reaction.

Q. What is the shape of typhoid bacilli?

A. Rod shape bacilli.

Q. Then, it is not all sorts and kinds of shapes, as Mr. Vredenburgh said?

A. No, sir.

Q. How do you see them multiply?

A. By division.

Q. Do they multiply in water?

A. They do not, to the best of my knowledge; that is, not the water of nature.

Q. Well, I mean natural water?

A. They do not.

Q. Do they form spors?

A. No, sir.

Q. Do they ever appear in excreta of animals other than human animals?

A. Not that we have been able to find.

Q. What period do they appear in the excreta of typhoid patients?

A. About the second week, when the ulceration takes place; about eight or ten days.

Q. Do you in your profession as a bacteriologist have occasion to examine blood frequently of typhoid patients?

A. I do.

Q. Or people suspected of having typhoid?

A. I do.

Q. How often in a year?

A. Oh, I cannot tell; very frequently.

Q. Monthly?

A. It is more frequently than that.

Q. For what purpose do you examine the blood?

A. For diagnostic purposes. Typhoid fever is a difficult disease to diagnose. It assumes different forms so that it is practically possible by bacterial examination to diagnose it as such disease sooner than by waiting for certain symptoms to develop.

Q. Do you do that yourself or for other doctors?

A. For the doctors of Hudson County.

Q. Is there anyone else in Hudson County who makes a specialty of that?

A. Not that I know of.

Q. Now, in what excretions do the typhoid germs appear?

A. They appear in the urine and feces principally.

Q. What?

A. In the urine and feces.

Mr. VREDENBURGH:—

Q. Do they appear in the spital?

A. They might appear there.

Q. Do they appear through the skin ooze through the sweat pores?

A. I have never known them to.

FURTHER DIRECT:—

Q. Is water a favorable or unfavorable environment for these germs?

A. It is an unfavorable environment.
Q. Why is that, Doctor?
A. Well, they are out of their natural element.
Q. How long will they live in water?
A. What kind of water do you mean?
Q. I mean in the ordinary river water we have.
A. That would depend upon the water.
Q. What?
A. That would depend upon what water.
Q. Well, the natural water of the Rockaway river, say.
A. I should say in the water of the Rockaway river, as I know it in my work (interrupted).

Mr. VREDENBURGH: Objected to because this witness is not qualified to testify.

Objection overruled.

By the WITNESS: I should say in the waters of the Rockaway river, as I know it in my work, typhoid bacilli life would be fairly well eliminated in the waters of the Rockaway river in ten days at the outside.

Objected to.

Q. What kind of waters would they live longest in?
A. In sterilized water, because they have no antagonistic action of other bacilli.
Q. What is the danger of other bacilli to these germs?
A. It is the antagonism existing between it and the water and soil bacilli; they are especially antagonistic.
Q. In what respects are they antagonistic?
A. They kill them off, or they die off.

Q. Have you made any experiments as to the effect of excessive cold on typhoid germs?

A. Excessive cold in water containing typhoid germs and frozen water quite a number are eliminated. There have been a number of experiments in that line.

Q. Are you familiar with those experiments?

A. Yes, sir.

Q. What is the temperature that will kill typhoid fever germs?

A. Sixty degrees centigrade for ten minutes, I should say.

Q. In Fahrenheit?

A. About one hundred and forty.

Q. What about cold?

A. Freezing water eliminates them to a certain extent; it reduces the number by 99 and a fraction per cent. There is one small fraction, a trifling percentage, which seem to exist for some time.

Q. Will they live in ice?

A. This small percentage, practically one per cent., will live in ice for quite some time.

Q. What do you mean by quite some time?

A. A matter of weeks, I should say.

Q. Or a few months?

A. Yes, I should say so.

Q. Now, Doctor, are you familiar with the experiments of Sedgeweck and Winslow on this subject?

A. Yes, I think so.

Q. What are they?

A. They found practically, as I said a moment ago, that 99 and 8-10 or 9-10 per cent. of typhoid bacilli die in frozen water, in a matter of sometimes under two weeks, as I recall it.

Q. Is that true of all bacilli or only typhoid bacilli?

A. I think that will be true of most bacilli life, providing the ice freezes from the top down and no fresh water comes over the top of the ice and is frozen with it. The ice as it freezes seems to exert a squeezing out of all but a fraction of bacilli in the ice, but if you have fresh water overflowing the ice it wll be dangerous; otherwise the water seems to purify itself as it freezes.

Q. Are you familiar with the experiments of Huntemiller?

A. He did work on the antagonism of protozoa.

Q. What was the result?

A. He found that water containing protozoa it would attack typhoid bacilli, as he observed.

Q. What is the difference between protozoa bacillus?

A. Bacillus is bacteria while protozoa is a higher form of life.

Q. Do you mean that there are more cells?

A. It is more highly organized; protozoa is one cell and bacillus is another, but protozoa is a higher type and is considerably larger.

Q. What you call bacilli—is it animal or vegetable?

A. More vegetable.

Q. And what is protozoa?

A. I wouldn't like to call it of the animal kingdom.

Q. But doesn't protozoa belong to the animal kingdom?

A. Well, I suppose it does somewhat.

Q. What is the dividing line between vegetable life and animal life?

A. It would come pretty close to that idea in considering the dividing line between vegetable and animal life.

Q. Have you found protozoa in the Rockaway river?

A. I have found it in the reservoir; I have not found them in the river.

Q. Frequently?

A. Oh, yes; in several examinations of it.

Q. Does protozoa appear on your reports at all?

A. No, I don't think it does; we only put down those things that are apt to cause smells or bad tastes.

Q. Are you familiar with the investigations of Russell N. Fuller?

A. On the subject of typhoid?

Q. Yes.

A. I am.

Q. What were they?

A. Russell N. Fuller conducted his investigations to ascertain the life of typhoid bacillus when subjected to the influence of other water organisms or a series of organisms growing with them.

Q. Out of what water supply was that investigation made?

A. I think there were several examinations; one at the Chicago River, another at the Chicago drainage canal and the third in the Illinois River.

Q. What was the result of those investigations?

Objected to.

Q. Is that part of the learning upon that subject?

A. Yes, sir; I have a report here.

Mr. VREDENBURGH: I object to that because that was in connection with some suit out there.

WITNESS: It does not say anything in the report about any suit.

Mr. VREDENBURGH: Wasn't that a report in a suit?

WITNESS: Not that I am aware of, sir.

FURTHER DIRECT:—

Q. Let us see the report.

A. Here it is (producing paper).

Q. Are you familiar with the investigations of Frost on the subject?

A. Yes, sir.

Q. What were those investigations?

A. Frost conducted a series of investigations somewhat different from those of Russell and the others, in which he grew typhoid bacteria in sacks, composed of agar and celloidin and parchment, and suspended these sacks in a solution containing soil bacteria and water bacteria. The result of these investigations was a large diminution of the typhoid bacteria, amounting to the killing in time in most cases of typhoid bacteria and a great reduction in them within a period of two weeks.

Q. As the result of what?

A. As the result of the growth of the two types of bacteria together; the soil bacteria in the outward media and the typhoid in this inner sack, and he endeavored by the means to produce conditions analogous to those as in nature.

Q. How did he produce those conditions?

A. He produced it as I said, by growing typhoid bacilli in this sack and suspending in a solution of the other bacteria; in one case soil bacteria and in the other water bacteria.

The COURT: The idea was to find out which was the strongest?

Mr. EDWARDS: To ascertain the survival of the fittest.

Q. Which did he find was the survivor?

A. Where the water bacteria or soil bacteria were allowed to grow in their outward media and were given a chance to incubate and grow for two days prior to the time the typhoid in the sack was put in the media, the typhoid succumbed; but, however, where the typhoid was given a chance to grow first he found results pointing in the opposite direction.

Q. What special varities did he find inimical to the typhoid?

A. The bacillus flourescens liquefaciens; the bacillus proteous vulgaris; bacillus vulgatus, bacillus putida.

Q. Are those organisms found in the Rockaway River above the reservoir?

A. I have found three of them in the Rockaway River.

Q. What do you mean by that—three times or three specimens?

A. Three of those varieties.

Q. Have you isolated them?

A. I have.

Q. Now, doctor, what are the diseases carried by water?

A. Typhoid fever, cholera, dysentery.

Q. And the chief one that you look out for particularly in places of water supply in this part of the country is what?

A. Typhoid fever.

Q. What is its cause?

A. Its cause is ingestion of typhoid bacillus into the human body.

Q. Is that the principal means by which it is conveyed?

A. It is conveyed by water, milk and food of different kinds.

Q. Oysters?

A. Yes, sir; oysters and some plants.

Q. Vegetables?

A. Yes, sir.

Q. Flies?

A. Yes, sir; flies will convey it; they act as an intermediate body, conveying it from typhoid dejecta of typhoid patients.

Q. From fecal matter?

A .Yes, sir; they fly into out-houses, or fly on to typhoid dejecta and will carry it into a house and deposit it in the fly feces or from its feet.

Q. Have you conducted such experiments as that?

A. Not personally; that is generally accepted.

Q. At what time of the year is typhoid most prevalent?

A. In the fall of the year, as a rule.

Q. What is that?

A. Well, there are a number of reasons for it; the fact that a large number of people are returning from vacation and they have been in the country districts where they have been drinking infected water supplies from wells, I think is one of the principal reasons.

Q. And you think most of the typhoid in cities comes from the use of persons on vacation using wells in the country?

A. I think so, yes, sir.

Q. And it also comes from milk?

A. Yes, sir; we know of milk epidemics.

Q. Was there one prevalent last fall?

A. You mean in New York?

Q. Yes.

A. Yes, sir; it was prevalent.

Q. And generally?

A. Yes, sir; prevalent here last fall as well.

Q. Have you looked up the statistics?

A. Yes, sir; I have.

Q. In what cities was there an increase last fall above the normal?

A. Last fall seemd to be quite an exception; last year they had an increase in typhoid fever in many of our cities. There was Cleveland, as I recollect it, had some two and a half times as many cases last fall as it had the fall prior; that is to say, two and a half times as many cases in 1906 as it had in 1905. Cincinnati had something over twice as many. Atlanta, Georgia, has some three times as many.

Q. How about Newark?

A. Newark had a decided increase last fall.

Q. How about Scranton, Pennsylvania?

A. There was a very sharp increase there; and Pittsburg had an increase; Pittsburg ran along for some time, not only in the fall, but winter, too.

Q. How about New York City?

A. That ran fairly close up to the first of the year, as far as my figures go. Since then, there has been some increase.

Q. How about Buffalo?

A. Well, I don't know about that.

Q. Where there is infection of water supplies upon what does the infection of a patient depend?

A. It would depend principally upon getting the infection quickly from the person ill with typhoid fever into the system of the person infected. It depends upon the time of the infection and the time of the person drinking the infected water; I mean the difference between the time.

Q. It is a question of the quickness of access to the germs?

A. Yes, sir; as a rule it is.

Q. Would it not depend also upon the condition of a man's system?

A. Yes, sir; somewhat; no doubt a person may be in perfect condition and take in those germs without contracting typhoid fever. I have no doubt that is frequently done, and yet if he is run down he will take it, and that is so with much disease.

Q. Have you made a study of typhoid rates as connected with water supplies?

A. Yes, sir.

Q. What is considered by sanitarians as the best index of the quality of a public water supply?

Objected to.

By The COURT:—

Q. Have you studied upon that subject?

A. Yes, sir.

Objection overruled.

A. A low typhoid fever rate.

Q. Typhoid fever rate or death rate?

A. A low typhoid fever rate.

Q. What death rate in one hundred thousand of population would indicate a suspicious water supply?

Mr. VREDENBURGH: You mean from typhoid fever?

Mr. EDWARDS: Yes, sir; typhoid fever; I mean the death rate from typhoid fever in every one hundred thousand inhabitants, what rate would indicate a suspicious water supply.

Mr. VREDENBURGH: Do you include in that typhoid pneumonia and other forms of typhoid? We have had testimony in regard to that at Jersey City.

FURTHER DIRECT:—

Q. Is there any such disease as typhoid pneumonia doctor?

A. Pure and simple, I should say no.

Q. Now, doctor, answer my question.

A. I should say that a 30 per cent. death rate in one hundred thousand inhabitants—if the figures should go higher than that the water would become suspicious. I would prefer to have the death rate at 20.

Q. 20 what?

A. 20 per cent. per one hundred thousand per year. If it becomes over 30 it is suspicious of an infected water supply.

Q. What should be the average death rate from typhoid fever per one hundred thousand inhabitants; doctor, assuming one hundred cases of typhoid fever what would be the average death in these cases?

A. I should say about ten per cent.

Q. That is in the present study of the medical art?

A. Yes, sir.

Q. In your judgment doctor, could any epidemic of typhoid fever ever come to Jersey City from affected water supply as long as the city has the large reservoir at Boonton, as a settling and sedimentary basin?

Objected to.

Q. In your testimony as a bacteriologist, physician and sanitarian would it be possible for a typhoid fever epidemic to become prevalent in Jersey City from using Rockaway water supply as now constituted so long as the city maintains large settling basin at Boonton?

Objected to and withdrawn.

Q. Did you ever know or is there any record of any case where typhoid epidemic has originated in any city having as large a settling basin or reservoir as the one at Boonton, constructed by the Jersey City Water Supply Company?

Objected to.

By the COURT: If the doctor has made a study upon that subject he may answer the question, but if Mr. Vredenburgh wishes to he may cross examine him first.

By the COURT: Have you ever studied it?

A. I have in a general way your honor.

By the COURT: You may cross examine him if you want to.

CROSS EXAMINATION by Mr. Vredenburgh:—

Q. Have you studied the epidemic of typhoid at Detroit?

A. No, I haven't.

Q. Well typhoid germs came right through from Lake St. Clair didn't they?

A. I don't know.

Q. Well, that is one of the well known epidemics, Mr. Harrison spoke about it.

A. I don't know about it.

Q. What lakes have you studied?

Mr. EDWARDS: I didn't ask anything about lakes.

The COURT: Well large bodies of water, artificial or natural. You spoke about Scranton you said there had been quite an increase of typhoid fever there.

A. Yes, sir.

Q. Don't you know there is a large reservoir there through which these typhoid germs passed?

A. Yes, I know that but I know that one of their reservoirs was cut out and when they cut that out and took their supply from a single reservoir there was an increase of typhoid fever, which may have been a coincidence.

Q. Which reservoir was cut out?

A. Number 7.

Q. How large was that?

A. I could not give the exact capacity of it. I endeavored to find out but did not succeed.

Q. Did the typhoid germs go through their reservoir?

A. Well alongside their other reservoir, they drew from there, were railroad tracks very close to it, etc. and it was easy I should say for the reservoir itself to be polluted.

Q. You don't know the size of it?

A. No, sir.

Q. Didn't the germs grow and multiply in the lake?

A. I have no knowledge of that.

Q. Didn't the epidemic continue for over six weeks, and wasn't there thousands and millions of those germs in the lake?

A. There was some thousand odd cases; I think 1,100.

Q. Were not the germs multiplied in that lake in order to create epidemic, the number of deaths and the continuous fever rate I mean in the City of Scranton?

A. There may have been continued infection from what may have been washed in; from contamination near it.

Q. Do you mean to infer that this use of the water from the train was contaminated by sick person?

A. It might be.

Q. That wasn't the theory was it?

A. I don't think that case has been sifted down at Scranton yet. We had one paper on it which was more or less preliminary.

Q. The distance through which that water passed in an enclosed pipe was about twenty miles, wasn't it?

A. I am not sure about that.

Q. From the big reservoir to the City of Sranton was about twenty miles through four foot lane, wasn't it?

A. I don't know that.

Q. What case is that that you have in mind that the reservoir would prevent typhoid germs passing through it to the City using the water?

Objected to.

By the VICE CHANCELLOR: Have you made a study of the affect of large bodies of still water on the destruction of typhoid germs?

Mr. VREDENBURGH: You may cross examine as to what study has been on that subject.

FURTHER CROSS:—

Q. You heard what the Vice Chancellor said? What special study have you made of that problem?

A. Well, I have noticed through my hearing and observation of cases something in regard to it. I think conditions at Washington D. C. would correspond with that more or less. They cut out one of their reservoirs and the typhoid rate immediately began to rise.

Q. What is the size of the Washington reservoir through which the water passed?

A. I don't know.

Q. When was it built?

A. I don't know, but the epidemic in Washngton occured about the same time as the epidemic occured above Washington.

Q. At Mount Savage?

A. Yes, sir.

Q. You are now giving us what you found out by your study in reference to the Mount Savage epidemic and the epidemic in Washington?

A. Yes, sir.

Q. Well, Mount Savage is about 100 miles up the river above the City of Washington is it not?

A. I should say it was about that.

Q. And the town itself of Mount Savage is some distance from the river—I mean the place where the typhoid fever occured.

A. Yes, sir.

Q. And had to pass from that town to the river through a small tributary, didn't it?

A. The river has a very fast flow from that point and it could only be a few hours before it got to Washington.

Q. I am speaking of the tributary?

A. That has a very fast flow also.

Q. What is the length of it?

A. I couldn't give you that.

Q. What is the name of it?

A. I know that the water going through this small tributary down to the reservoir at Washington would only be a matter of hours.

Q. But when it did get into the reservoir it passed through that reservoir and made a lot of people in Washington sick?

A. Well they had cut out one of their reservoirs at that time and as soon as that reservoir was cut out they began to get increase.

By the COURT: And the lesson you draw from that is that the larger the reservoir or the greater their number, the less the danger?

A. The less danger, yes, sir. But these questions are really more for engineers than in my line, but in a general way in regard to these matters I have some general knowledge.

Q. What relation has the water supply of a city to children's diseases, scarlet fever diphtheria, membraneous croup, measles and diarrhoea?

A. It has none that I am aware of.

Q. Do not all these diseases arise from sewer gas?

A. No.

Q. Well, there was such a theory once entertained?

A. Well, it probably was by some men, but has been discarded since.

Q. What is the present scientific knowledge on the subject?

A. The present scientific knowledge on the subject is that these diseases being contracted by breathing sewer gas—that is undoubtedly incorrect, inasmuch as there must be an infection and sewer gas does not contain an infection.

Q. Is there any specific germ of diarrhoea?

A. Yes, sir; there is one that I know of.

By the COURT:

Q. What is sewer gas mostly?

A. It would be pretty hard I think, your Honor, to have a chemist even answer that question; it is a very complex thing. Most people call a simple odor from a sewer, sewer gas.

Q. Has anybody ever analized it?

A. I suppose so, but what little I have seen of it—I suppose a marsh gas, sulphuretted hydrogen.

FURTHER DIRECT:—

Q. What is this specific germ of diarrhoea?

A. Baccillus shiga.

Q. Is that a diarrhoea or dysentery?

A. Dysentery.

Q Do you know of any specific germ of diarrhoea itself?

A. I cannot say that I do.

Q. What have you to say as to a specific germ of dysentery?

A. This bacillus shiga that I speak of is a specific germ of dysentery.

By Mr. VREDENBURGH:—

Q. Is there any difference between dysentery and diarrhoea?

A. One is bloody diarrhoea; dysentery is more or less bloody diarrhoea.

By Mr. EDWARDS:—

Q. What have you to say as to anthrax and tape worm being generated by baccillus?

A. Tape worm is not generated by baccillus.

Q. Do we have any anthrax in this part of the country?

A. It is very exceptional.

Q. What does that come from?

A. It comes from the animals, slaughter houses mostly is where the infection takes place.

Q. Is it a disease conveyed by water?

A. I do not know of any cases; I do not think they could be found any on the records.

Q. What is the learning on that subject?

A. The learning on that subject is to that effect.

By Mr. VREDENBURGH:—

Q. To what effect?

A. That that is not conveyed by water; if it was it would be very exceptional and I doubt if you could find a case that was conveyed by water. I never heard of one.

By Mr. EDWARDS:—

Q. Does the presence of fecal matter in the waters of a river at certain points necessarily indicate the presence of such fecal matter in the waters of the same river at a point below?

A. Not necessarily.

Q. Why not?

A. Certain changes may have taken place between the two points.

Q. What changes?

Mr. VREDENBURGH: Has the doctor made any study of that, or is he telling us what we all know.

WITNESS: There are various chemical changes and mechanical, too—decomposition.

Q. Now Doctor, because the ground water is polluted at one point does it necessarily continue to be polluted at some other point where it enters a river?

A. I should say not?

Q. For the same reason?

A. For the same reason intermediate changes may take place.

By Mr. VREDENBURGH:—

Q. I was going to ask the doctor how deep a well must be that will not be infected by typhoid germs.

A. Well, that would be a pretty hard question to answer. There are certain precautions that should be observed in buildng wells. Our main precaution is to keep the upper layers of the wall around the well, that is the upper part of the well, well walled off so that any surface drainage can't get in; the lower drainage we don't care much about.

Q. Admitting that the wall may be of loose stone, how deep will these germs be sent to the water—50 feet or 40 feet, or haven't you made any study of that at all?

A. Yes, sir; I have from works of others. I should say that if the well was walled off for a distance of six feet down, that you would be quite safe from typhoid.

Q. What would that depend upon?

A. Of course somewhat on the condition of the soil you had to deal with. If you had conditions as exist in England, it might be different.

By Mr. EDWARDS:—

Q. Then it is proper to have the bottom of the wall open, it is not—or the cesspool?

A. I should say yes.

Q. Now is polluted water which percolates through the soil necessarily polluted when it reaches a river?

A. It is not.

Q. Why not?

A. Because many of the bacteria may be filtered out or destroyed in the interval.

Q. Would you expect them to be so filtered out and destroyed?

A. I should say yes, to a large extent.

Q. Is polluted water flowing over the surface of the ground necessarily polluted when it reaches a river?

A. No, it is not.

Q. And why not?

A. Because as it flows over the surface a large amount of it will enter the ground and you would have to take into consideration also the fact of the length of time it would flow and how large a body it was,etc. Also the condition of the ground through which it flowed.

Q. Are you familiar with the various methods that are employed for the testing of closets in connection with water supplies, or the insertion of color, etc.?

A. Couldn't help but be after listening to this case; I am.

Q. You have also had experience, I suppose, with those matters in connection with the Board of Health, have you not?

A. Yes, sir.

Q. Well, because color placed in a privy vault appears in an adjoining river or brook is it necessarily a fact that the water carrying the color is contaminated by the contents of the privy?

Objected to.

Q. Did you ever make any experimnets along this line?

A. Yes, I have.

Q. Tell us what they are; have you the reports here?

A. Yes, sir; I believe so.

Q. Who did you make them for?

A. I made them in connection with my water examinations made for Dr. Leal.

Q. What was the object of making these reports?

A. The object was to have some decided knowledge on this very question that you have asked.

Q. Well, now, then, will you please explain what those experiments were in detail?

A. Experiments showing filteration effect upon the typhoid bacillus and solution of urinine.

Q. When?

A. I will give you all that in just a moment.

Q. Go ahead.

A. A glass percolating jar, 28 cubic centimeters long and 12 cubic centimeters diameter at the top, filled with about 2,000 cubic centimeters of garden top soil and ashes in equal part; fillings are arranged somewhat in layers, the lowest being ashes, then ashes and soil equal parts, then soil, then ashes and soil and equal parts, and then soil again; the area of the surface soil in this jar was 113 square centimeters; a definite amount of a fresh typhoid bacillus culture was applied to the surface soil of the jar and then a solution of urinine was allowed to flow on the surface soil, the amount being used would equal about two inches of rain fall; that would be a very heavy rain fall.

By Mr. VREDENBURGH:

Q. When was this?

A. Just a moment; I have the date; the 1st of January, 1907; the report was made the 1st of January, 1907; the work was done the latter part of December, 1906, the last two days in December.

Q. Go ahead.

A. Number of cubic centimeters of about 1 to 15 thousand; urinine solution used 600; number of cubic centimeters of the urinine solution that filtered through, 250; number of minutes taken to apply the urinine solution, 30; number of minutes taken by urinine solution to filter through, 45; number of B. typhoid applied to the surface contents of the jar, 19,000; number of B. typhoid that filtered through the contents of the jar; 750; per cent. of B. typhoid retained by the filtering, 96; per cent. of B. typhoid that filtered through, 4. The first hundred cubic centimeters of urinine solution came through the filter colorless, this seems to have been due to the ashes acting as bleacher. The remainder had the urinine color, and the date, 1st January, 1907.

Q. What is the depth of the filter?

A. 28 centi-meters.

Q. What was the depth of the filter?

A. About 12 inches.

Q. Would you expect, under these conditions to get as much of a purifying effect as you would in case of nature?

A. No, hardly, because you would be apt to get more soil to filter through, in nature.

Q. Why not?

A. We only had one foot of soil in this particular experiment, and nature would expect a longer amount of soil or greater amount.

Q. What conclusion do you draw from that experiment made by you as to whether color placed in a privy vault and appearing in an adjoining river or brook would carry in the color the contamination of the vault?

A. You can draw the conclusion from this,—inasmuch as only four per cent. of the applied bacteria filtered through this one foot of soil.

Q. And only through one foot of soil?

A. Only through one foot of soil that is it; yes, sir.

Q. If you had increased the depth of the soil—the depth of the filter, what would you have expected as to the percentage of bacteria that would have filtered through?

A. I should expect they would be further decreased.

Q. Did you make other experiments at the same time as to the effect of filtration through soil and ashes?

A. I did.

Q. Where was that made—

Q. (A paper is shown the Doctor and he is asked), Is that a detailed count of this experiment with the figures and results as obtained?

A. It is.

Mr. EDWARDS: We offer that in evidence.

Marked Exhibit D. 24.

Q. Was this experiment conducted entirely by you?

A. It was, entirely.

Q. Did you make any other experiments at that time as to the effect of different materials upon typhoid germs?

A. I did.

Q. What was that experiment; please give the detail of it?

A. Experiment showing the effect of different materials acting as filter upon the typhoid bacillus.

Q. Just explain what you did and how you made the experiments?

A. Three glass tubes thirty centimeters long and five and six-tenths centimeters wide were filled with materials as shown below and then sterilized under 15 pound pressure in an antoclave. Typhoid bacilli were applied to the surface of the contents of each tube, and then sufficient sterile water to equal two inches of rainfall was added.

Q. Why did you add the sterilized water?

A. Because we did not want to get any other bacteria; we were dealing wholly with the typhoid bacilli and we did not want anything else in the water, so that our results would be in typhoid and nothing else; materials used as filters topsoil—garden top soil and ashes equal parts, and the figures that I gave now would be in that order.

Q. Give the figures, what happened?

A. The top soil from garden time taken applied water to run through, half a minute. Number of cubic centimeter of water that filtered through, 40. Number of minutes taken to filter previous amount, 12. Number of B. typhi applied to surface of contents of tube 402162. Number of B. typhi that filtered through contents of tube 256720. Percentage of B. typhi retained 36. Per cent of B. typhi that passed through 64. That was the garden soil alone. Then in the tube soil and ashes that is garden soil and ashes; applied water began to run through in three-quarters of a minute. Number of cubic centimeter of water that filtered through 10. Number of minutes taken to filter previous given amount 15. Number of B. typhi applied to surface contents on each tube 402162. Same amount as the other. number of B. typhi that filtered through contents of tube 45,520. Number of B. typhi retained 88. Per cent. of B. typhi passed through 12. And in the ashes: Time taken applied water to run through, two minutes. Number of cubic centimeters of water that filtered through 8. Number of minutes taken to filter previous given amount, 17. Number of B. typhi applied to surface contents of tube, 406,162. Number of B. typhi that filtered through contents of tube, 6,240. Per cent of B. typhi retained, 98. Per cent. of B. typhi that passed through, 2.

Q. What were the depth of your filter?

A. Thirty centimeters.

Q. How many in inches?

A. That is a little over a foot; I think that would make it about a foot.

Q. What conclusion do you draw from these experiments?

A. I draw from these experiments that the plain top soil of the garden retained, as a filter, some of the typhoid bacilli, namely, 36 per cent. The top soil and ashes—garden soil and ashes, retained 88 per. cent. of the typhoid bacilli. That the ashes retained 98 per cent., showing that ashes are a better filter medium than the garden soil alone.

Q. Then the ashes proved the best filtering material?

A. Yes, sir.

By the COURT:

Q. Were these very fine coal ashes?

A. These were the ordinary ashes that would come from burning in every day stoves.

Q. You mean it would take the big clinkers as well as the fine dust?

A. Just as they came, dug out from the ash heap.

Mr. VREDENBURGH:

Q. Were they sifted or not?

A. No, just as they came from the stove, some big pieces among them.

Mr. EDWARDS:

Q. Did you get as good result as you would expect in the state of nature?

A. Well, we would usually expect more of a filter material in nature than a foot; so that in nature we would you expect to get better result than shown in this laboratory experiment.

Q. This is only through one foot of filter?
A. Yes, sir.
Q. Where did you get your typhoid bacillus?
A. From the culture that I had.
Q. How many of them did you put in?
A. 402,612.
Q. A good dose?
A. Yes, sir.

Mr. EDWARDS: Now we offer that in evidence.

Mr. VREDENBURGH: I object to it.

The COURT: I think it is competent.

Marked Exhibit D. 25.

Q. Now then I ask you this question, because color when placed in a privy vault appears in an adjoining river or brook, is it necessarily a fact that the water carrying the color is contaminated by the contents of the privy?
A. It is not.
Q. Now then, Doctor, you are acquainted with the waters of the Rockaway river above and below the Towns of Dover, Rockaway and Boonton?
A. In a more or less general way.
Q. Are the waters of the Rockaway river polluted to a greater or less extent below the Town of Dover, Rockaway and Boonton?
A. Polluted to a greater extent below.
Q. That is to say, after passing the Town they become more polluted than when they enter the Town?
A. They are more polluted below Boonton than they are above Dover.
Q. Are the waters of every stream flowing through a populated water shed and passed through towns necessarily polluted?

Objected to.

Overruled.

Q. Do not the towns and streets in a water shed necessarily pollute to some degree the river flowing through the water shed?

Objected to.

Overruled.

Q. Then, Doctor, in your opinion would the building of sewers with disposal works in the various towns of the Rockaway water shed, to wit, Dover, Rockaway and Boonton, prevent the pollution or infection of the waters of the Rockaway river?

Objected to.

Overruled.

Q. Doctor, in your opinion, would the building of sewers with disposal works in the various towns of the Rockaway water shed be advisable for the purpose of preventing pollution or infection of the waters of the Rockaway river?

Objected to.

A. I think that is somewhat more of an engineering problem.

Q. In your opinion as a bacteriologist and sanitarian, where does the bulk of the pollution that you find in the Rockaway river, at the head of the reservoir where it enters the reservoir come from?

Objected to.

Q. Have you visited the Rockaway water shed?

A. I have.

Q. Been up the river?
A. Yes, sir.
Q. Examined its banks?
A. I have.
Q. And the town?
A. Yes, sir.
Q. And the various streams entering it?
A. A certain number of them.
Q. And the character of the country?
A. Generally, yes.
Q. Now then, with a view to looking into this question of pollution?
A. Yes, as regards the water examination.
Q. You have been up there a number of times?
A. I have, yes.
Q. Covering a period of how long a time?
A. Well, from the time the dam was first begun.
Q. A period of three or four years then?
A. Until about two years ago; I haven't been up there in the last two years.
Q. In your opinion where does the bulk of the pollution of the Rockaway river, that you find in the river as it enters the reservoir, come from?

Objected to.

Mr. VREDENBURGH: May I be permitted to ask him some questions about that?

The COURT: If you want to, certainly.

Mr. VREDENBURGH:

Q. When did you go two years ago—what day in the year?
A. I can't tell you?
Q. Did you go to Hibernia?
A. No.

Q. Did you go to Mt. Tabor?

A. My visits—

Q. Did you go to Mt. Tabor?

A. My visits along the water shed have been more along the main river.

Q. Did you go to Mt. Tabor?

A. No, sir.

Q. Did you go to the mines at Hibernia?

A. No, sir.

Q. Did you go to the mines at Wharton?

A. No, sir.

Q. Did you go to the hotel in Boonton?

A. I did, yes.

Q. Did you know that to be sewered at that time into the Rockaway river?

A. I didn't know that it sewered into the river; I knew there was a Brook Street drain there which we looked at.

Q. You didn't know it sewered in the river?

A. Not into the river, no, sir; that was the canal as I recollect it that drained into.

Q. Did you examine the Cooper-Lord works?

A. I have never been in their works, no, sir.

Q. Do you know how many men were there?

A. No, I don't remember; I was told at the time; I did know at the time.

Q. Two years ago their water closets emptied into the river?

A. I believe they did, I am not sure of that; that matter wasn't in my hands.

Q. Did you examine the mill known as the Lyondale Silk Works?

A. Yes, sir.

Q. How many men were working there?

A. Those figures I cannot give you at the present time; that is Dr. Leal's work.

Q. Two years ago did the water closets from the Lyondale Silk Mill enter the Rockaway river?

A. I should say they did; I believe their closets entered into the raceway there, as I recollect it.

Q. Now the Singleton Silk Mill at Dover, do you know where the fecal matter from that mill went?

A. I don't recall.

Q. Do you know how many men were working there?

A. I do not know.

Q. The Boonton Iron Works, do you know how many men worked there two years ago?

A. No, sir.

Q. Do you know whether the sewage from those men went into the river there?

A. I cannot say.

Q. The Swiss Kniting Mill, did you go to that in Dover?

A. No.

Q. Do you know whether the sewage from that mill entered the Rockaway river?

A. Cannot say.

Q. You don't know how many men worked there?

A. I do not.

Q. Did you examine the slaughter house known as Davis' slaughter house?

A. I believe we were there, yes.

Q. Where is Davis' slaughter house?

A. I don't recollect any more; I recollect being there and that is all.

Q. Is it Dover or Hibernia?

A. I think that was Dover.

Q. Davis abattoir?

A. The slaughter house, I didn't know the name; I thought you were speaking of Dover.

Q. You went to some slaughter house in Dover?

A. Yes.

Mr. VREDENBURGH: Now I object to this witness.

The COURT: I don't think this witness is competent to give his opinion upon the whole case; I think he is competent to state what he saw when he was there.

Q. In water sheds of the general character of the Rockaway, with the pollution of that character, human and animal, where does the bulk of the pollution come from?

Objected to.

Overruled.

Q. Would it be possible, in your judgment, to prevent pollution of the water in the Rockaway water shed save by the animal depopulation of the water shed; I mean by animal, human and otherwise, or any other water shed?

Objected to.

Overruled.

Q. Would it ,in your judgment, be safe from what you know of the examination of the waters of the Rockaway water shed to deliver water therefrom at any given point below the town of Dover and above the Boonton reservoir, and send it to consumers without purification?

Objected to.

Q. Would it be safe, in your opinion, Doctor, to deliver water from the Rockaway river at any point below the town of Dover and above the headwaters of the Boonton reservoir, that is from the plain river, and send it to the consumer without purification?

A. It would not be possible; it would be dangerous.

Q. Would this be true of any river draining a populated water shed?

Objected to.

Ajounred until Friday, April 5, 1907, at the same time and place.

IN CHANCERY OF NEW JERSEY.

Between

THE MAYOR AND ALDERMEN OF JERSEY CITY,

Complainants,

and

THE JERSEY CITY WATER SUPPLY COMPANY,

Defendants.

Before His Honor, Vice-Chancellor Stevens.

Mr. James B. Vredenburgh and Mr. George L. Record appearing for the complainants.

Mr. William H. Corbin and Mr. William D. Edwards appearing for the defendants.

Transcript of short hand report of the evidence given upon the trial of the above stated cause, on Friday, April fifth, nineteen hundred and seven, at the Chancery Chambers, Newark, New Jersey.

GEORGE E. McLAUGHLIN recalled.

FURTHER DIRECT EXAMINATION by Mr. Edwards:

Q. Now then, Doctor, from your knowledge of the conditions existing in the Rockaway water shed, and from your own analysis, is the water as delivered to Jersey City, safe and potable?

Objected to on the ground that the witness does not know anything about it.

Q. Is the water delivered to Jersey City safe and potable?

Mr. VREDENBURGH: I object to the question based on his knowledge of the water shed.

The COURT: As I understand the question it is whether the water at the point of delivery is now, in the estimation of this witness, wholesome.

A. It is.

Q. How does it compare, Doctor, with the water supplies of other cities?

Objected to.

Q. Are you acquainted with the literature on the question of the water supplies of other cities?

Mr. VREDENBURGH: I object; it cannot make any difference in this case whether he did or not.

Objection sustained.

Q. How do you explain your statement, Doctor, that the water, as delivered to Jersey City from the Rockaway is safe and potable, while below Dover or Boonton and above the reservoir it is unsafe?

A. I explain it by the influence of the reservoir on the water delivered into it; the reservoir acting as a purifying agent; large sedimentation basin.

Q. What are the principal methods of purification of water in practical use?

A. Sedimentation—

Mr. VREDENBURGH: I object; I don't understand he is an expert on sedimentation.

The COURT: Well, you can cross examine him on that and find out whether he is.

A. Sedimentation and filtration—

By Mr. VREDENBURGH:

Q. One moment; I will ask you about sedimentation; what effects sedimentation in reservoirs?

A. Gravity, the same as it effects sedimentation anywhere else.

Q. Does the wind?

A. Effect it how?

Q. Well, you understood what I meant when I asked you a moment ago, and you said gravitation; I mean the same thing as I said the first time.

A. Wind may act against sedimentation somewhat, for a certain depth of water.

Q. Well, how much, do you know?

A. I should say over fifteen to seventeen feet the wind would not have any effect.

Q. What experiments have you made with the wind to find out how far it goes down in the water?

A. Made experiments in the Boonton reservoir.

Q. You have?

A. I have.

Q. When did you make that experiment?

A. I think it was 1903.

Q. 1903?

A. Or 1904 possibly.

Q. Who was with you?

A. One of the engineers of the Water Company.

Q. Which one?

A. I believe it was Mr. Merriman; I am not clear on that.

Q. Have you the memorandum of your experiments?

A. I have, yes.

Q. The original notes?

A. The original notes.

Q. Where are they?

A. I believe they are in my office.

Q. They are not here?

A. I don't think so.

Q. What were those experiments as to how deep the wind affected the water in the Boonton reservoir?

A. Those were experiments made by taking samples of water in the reservoir at different depths, ascertaining the—

Q. Well now, wait. What size samples did you take?

A. Took the usual four ounce sample.

Q. I didn't say usual; what samples did you take?

A. Four ounce size; I said the usual four ounce sample.

Q. Is it usual in determining the effect of wind on water to take a four ounce sample?

A. Yes, sir.

Q. Who else did you ever hear of, who, for the purpose of ascertaining the effect of wind upon a reservoir ,took a four ounce sample?

A. I believe Mr. Whipple has done the same thing.

Q. In order to ascertain the wind?

A. Yes.

Q. You think he has?

A. Yes.

Q. When was it that Mr. Whipple—

The COURT: No, he cannot testify to that.

Q. Who took the four ounce sample?

A. The engineer of the Water Company, Mr. Merriman.

Q. Did you see him?

A. I didn't see him, no, sir.

Q. After he got the four ounce sample from the water what did he do with it?

A. He did exactly the same as had been done with other samples of the water.

Q. Please tell me what he did with it?

A. He put the sample in the usual brass container which I showed you yesterday; put it in the satchel for the collection of water samples, with ice in such satchel, and sent it to my laboratory.

Q. Sent it to your laboratory?

A. Yes, sir.

Q. You suppose he did that; you know nothing about that, except so far as he told you?

A. That is all.

Q. What experiments did you then make with the sample?

A. The counts of the number of bacteria were made in such samples.

Q. How did that tell you what effect the wind had on it?

A. That told me that the—on windy days we would compare the counts with days when there was a calm, and in tnat manner we could ascertain the difference.

Q. Well, how deep were these samples taken from?

A. They were taken at various depths, one being taken—

Q. My question is—

A. Just a minute and I will try to tell you.

Q. What I desire is that you answer the question and don't answer something else.

A. I am endeavoring to. I say the samples were taken at various depths—

Q. When you say various depths—

A. I haven't finished; just give me a little chance and I will try to answer you. One sample being taken just below the surface at about one foot depth; another sample being taken about ten feet and another twenty-five; occasionally a sample was taken at a depth of fifty feet.

Q. When you took it at one foot in which direction was the wind blowing then?

A. Cannot recollect; we would make it according to whether there was a high wind; if we happened to get a day with a high wind we would take it on that day, but the direction of the wind I cannot tell you off-hand.

Q. What do you mean by high wind; what does your record show was the highest wind at which you took the sample at a foot deep?

A. By a high wind I mean wind blowing at the velocity of a moderate gale.

Q. At which one of the experiments was the highest wind, when you took the water from a foot in depth?

Mr. EDWARDS: Is this an examination to qualify at all?

Mr. VREDENBURGH: This witness is about to testify to this Court with regard to the effect of wind on this water in the reservoir.

The COURT: Well, the question of whether he made his experiments in the most perfect way is rather a question which goes to the accuracy of the result of the witness's work and to his competency to testify. Some experts are more careless than others, and some more careful than others, but the mere fact that an expert is careless, or perhaps has not taken the highest number of precautions does not exclude him from testifying, but, as I say, you will probably want to cross examine on this same subject again with respect to the accuracy of his work, and so I don't see any particular objection to your going on with that subject now.

Mr. EDWARDS: We withdraw the objection.

Q. At which one of the experiments was the highest wind, when you took the water from a foot in depth?

A. The highest wind blowing?

Q. Yes, on what day?

A. I cannot tell you off hand that, Mr. Vredenburgh.

Q. Well, it was some time in the year 1903?

A. Yes, sir.

Q. What time of the year was it?

A. In the fall.

Q. What month?

A. Well, the work extended over some two months at odd periods.

Q. In that month what was the highest wind that blew, that you have a record of, on the waters of the Boonton reservoir?

A. I believe it was in October.

Q. What time in October?

A. I cannot tell you that.

Q. How many samples did you take that day?

A. There were three samples taken.

Q. Three samples taken on the day of the highest wind?

A. Yes, sir.

Q. What was the speed of the wind that day?

A. The speed of the wind that day was, as I say, a moderate gale, about thirty-five or forty miles an hour, possibly.

Q. Which direction?

A. I cannot recollect that.

Q. What was the temperature of the water that day?

A. I cannot tell you that off-hand.

Q. What is the temperature of the water when it is of the highest specific gravity?

A. The temperature is cold.

Q. What is the temperature—what degree of fahrenheit represents the greatest weight of the water, that is the highest specific gravity?

> It was suggested that 39 degree would be the highest specific gravity, and that freezing point would be 32.

Q. If the water of the river was more than 39, and the temperature of the reservoir was 39, what would be the effect of the river water on the reservoir water, as to sedimentation?

A. The river water would tend to float.

Q. To do what?

A. The river water would tend to float on top of the colder water, the warmer water would be the higher.

Q. Well, if the opposite was so—suppose the water of the river was colder than 39, and the temperature of the lake was 39, what would be the effect on the sedimentation of the river water meeting the reservoir water?

A. It would tend to drop lower than the reservoir water.

Q. What effect would that have on sedimentation?

A. Well, if it stood there a sufficient length of time the effect on sedimentation would be exactly the same, that is, it would sedimate just the same as the other water standng in the river.

Q. What was the temperature of the river water on this day when you made experiments in the high wind?

A. I could give you what it was about that time.

Q. No, that day, I don't care about that time, that very minute I want to know, if you can give it; did you have any thermometer to measure?

A. Of the river water?

Q. Yes.

A. No, the river water was not given that day.

Q. What was the temperature of the surface of the reservoir that day?

A. I cannot give you that exactly.

Q. Was it the same as it was a foot down?

A. Approximately I should say it was.

Q. Was it the same as it was two feet deep?

A. Very nearly, yes.

Q. How about ten feet?

A. Then it would begin to get a little colder.

Q. Which would be colder?

A. Ten feet down.

Q. Ten feet down it would be colder than the surface?

A. Yes, sir.

Q. Would not that depend on whether the sun shone or not?

A. No, that would be independent of the sun.

Q. What would be the effect of the sun, if sun was shining that day brghtly on the reservoir?

A. Tends to warm it up.

Q. Do you know whether it was shining that day?

A. It was.

Q. How do you know, you weren't there?

A. To the best of my knowledge and recollection there was a note that we had in most of our samples as to cloudiness, etc., on that day it was an ordinary cloudy day, that is, there were clouds and sun shining with it.

Q. What effect do you think the shining of the sun that day had on this experiment that you made upon the number of bacteria one foot below the surface?

A. Had a detrimental effect I should say.

Q. As to sedimentation I am talking about?

A. Because sun light kills off bacteria for a certain depth.

Q. So that experiment would not give you any information at all upon sedimentation?

A. That particular tube sample would not count so much as it would almost any time, that would depend more on the lower samples.

Q. You only took three samples?

A. Yes, sir.

Q. One was one foot below?

A. Yes, sir.

Q. How was the second one?

A. About ten feet.

Q. Why do you say about, don't you know?

A. Didn't measure it in inches exactly, took the rule and called it ten feet when the measure drops,—about that depth, I should say about ten feet.

Q. How did you get water out of ten feet depth do you know?

A. Yes, we have a special apparatus.

Q. Did he have that special apparatus at that time?

A. Yes, sir.

Q. How do you know?

A. It was in his possesson, he told me he used it.

Q. What was the third one?

A. Over 25 feet, between 25 and 30 feet.

Q. Now the records of this experiment you have at your office and haven't brought here?

A. I have, yes.

Mr. VREDENBURGH: I object to the testimony.

The COURT: The witness can testify from memorandum in his possession if he wants to refer to it, but he is not obliged to so testify.

Q. One other question; what study did you make in 1903 of the currents of the reservoir?

A. I made none.

Q. How near the spillway was the surface of the water in 1903?

A. I cannot tell you offhand.

Q. Was it running over the spillway at all?

A. I cannot tell you without consulting my reports; the reports on the examination of the water in the reservoir always gave the height of the water at the dam.

Mr. VREDENBURGH: I object to his testimony, may it please your Honor, from anything he has learned from those experiments.

Q. I will ask you another question. At what speed does the river water enter this reservoir?

A. I don't know, sir.

Q. In what volume does the river water enter this reservoir?

A. That is a question that is left to the engineers.

Q. In what volume did the stream enter this reservoir at the time these samples were taken, upon which you form your judgment?

A. I cannot tell you without consulting the engineering notes.

FURTHER DIRECT:—

Q. You took these samples a number of times, did you not?

A. I did, or they were taken for me.

Q. Now, was that after the reservoir was completed—after the water began to run over the spillway?

A. It was.

Q. Then it would be in 1904 and not in 1903?

A. It may have been; I wasn't quite sure of the date.

Q. Now then go back to my original question. Will you tell us what are the principal methods of purification of water in practical use?

A. Sedimentation and filtration.

Q. What is the—which system is used in the Rockaway supply?

A. Sedimentation.

Q. What is the chief agency in this method of purification?

A. Gravity especially.

Q. Now, will you describe the process, and what it accomplishes—process of sedimentation and what it accomplishes?

A. Sedimentation is influenced in many ways, the rapidity of it, etc., a water carrying an amount of mud or silt will more rapidly sedify—that is from a bacteriological standpoint, than a water which does not, the silt or clay or mud acting as a mechanical means in carrying down the bacteria with it more rapidly than water that does not carry them; however, there is always a certain large effect on sedimentation in any standing body of water. It is so in the laboratory, where we have a tube of water containing bacteria, and it is so in nature. The effect of gravity, as I say, is, in my opinion, the principal agent, and then we have a sinking to the bottom of these different organisms effected by that means; and, furthermore, we have diminution in numbers due to antagonistic actions, one to the other, and to the antagonistic actions of higher organisms such as I testified to yesterday, namely the protozoa. It is a well recognized fact, and I think it is acknowledged by all water experts, that sedimentation has this great purifying effect; it is made use of in many of the filtration systems, namely, having first the sedimentation reservoir before the water is put through the filters themselves, to get the effect of sedimentation in that reservoir and without taxing the filter to the limit. It is a well acknowledged point generally.

Q. Has this system of sedimentation been known for many years?

A. I should say it has.

Q. Can you tell us how the results, from a bacteriological standpoint of water subject to sedimentation compares with water filtered?

A. I have made a chart of our Rockaway water and compared it to— that is, the Rockaway water in the river before sedimentation, and the Rockaway water from the tap in Jersey City, and compared that to the—

Q. That is already in evidence.

A. No, it is not.

Q. Let us see that chart.

A. And compared it to the Merrimac river and the Lawrence filter beds, comparing our water in Jersey City to the filtered water from the Lawrence filtration plant.

Q. What is the Lawrence filtration plant, what does that supply?

A. That supplies Lawrence, Massachusetts.

Q. Why did you pick that?

A. I picked that because it is a well known plant, and because I had complete records of its workings.

Q. And is this the chart?

A. That is the chart.

Q. And this is for 1904 and 1906?

A. 1904 for Lawrence, because that was the last available report of their work that I had last Fall, when this chart was prepared for the case, and 1906 for our water.

Q. Well now, we will take the upper chart first.

Mr. VREDENBURGH: I object to the chart and I object to the comparison. He takes the year 1906 that has the smallest amount of bacteria—

Mr. EDWARDS: No, we take 1904.

Mr. VREDENBURGH: —and compares it with some filtered bed of 1904, some one particular one of which we know nothing; that filter bed may at that time have been out of order, and there may have been a thousand things connected with it that makes that one a poor showing.

Q. Why did you choose 1904?

A. I took it because it was the last available report.

The COURT: If they do not succeed in proving this report by competent evidence then this evidence that the doctor is now giving will go for nothing.

Mr. VREDENBURGH: What I desire is that the same rule be applied to us as to them, with regard to this.

The COURT: If they want to put in official reports or reports which purport on their face to be official you will have the same privilege. I desire that to be understood.

Mr. CORBIN:

Q. From whence did you get your data with reference to the Lawrence filter plant?

A. Massachusetts State Board of Health, published reports.

Q. Is that book which is before you the book which you refer to?

A. It is.

Q. Are you familiar with that book?

A. Yes, in a general way.

Q. Is it published yearly?

A. It is published yearly.

Q. By whom?

A. By the Massachusetts State Board of Health; it is an official document.

Q. It is an official document?

A. Yes, sir.

Mr. VREDENBURGH:

Q. Have you ever examined the plant yourself?

A. I have not.

Q. You have never been there?

A. I have not.

Mr. EDWARDS: We offer the book in evidence.

The COURT: If Mr. Vredenburgh has no objection to the offer, and if you are willing to consent that he shall also offer official reports of the same general character I will let it go in.

Mr. EDWARDS: Certainly.

FURTHER DIRECT:

Q. Why did you choose the year 1904?

A. It was the last available report in my command.

Q. How does that report compare with the former years?

A. I should say that the years just preceding compared very closely. The next report was 1905, and I just received it a few weeks ago.

Mr. EDWARDS: I offer this exhibit as made up from these two reports.

Marked Exhibit D. 26.

Q. Now, Doctor, will you just for the purpose of the record, compare the results obtained by filtration at Lawrence, and sedimentation at Boonton?

A. The examination of the Merrimac river water before it flows upon the Lawrence filter, 1904, gave an average count for the year of 8,600 bacteria per cubic centimeter, b. coli present in 1 c. c. of water 100 per cent of the samples; the effluent of the Lawrence City filter, average number of bacteria per c. c. for the year, 37. Per cent. removed, that is per cent.

removed bacteria, 99 and 5-10 per cent. samples containing b. coli in 1 c. c., 8. The figure 8,600 is the count of the raw river water.

By the COURT:

Q. If you remove 99 and 5-10 per cent. of the b. coli—

A. No, that is all bacteria.

Q. Well, if you removed that per cent. of all the bacteria, then you would have five-tenths of one per cent. left?

Mr. EDWARDS: The last column shows if your Honor please, the percentage of the samples that show presumptively b. coli, that is to say, eight samples out of the hundred; and your Honor will remember that the Jersey City samples at the Christ Hospital showed seven samples out of the hundred, as I remember it.

A. Rockaway river water as it enters Boonton reservoir, average number of bacteria per c. c. for 1906 and 1904, b. coli present in 1 c. c. of the water, 100 per cent. Rockaway river water at Jersey City, that is in the taps, average number of bacteria per c. c. for the year, 100. Per cent. removed efficiency 99 and 5-10 per cent; samples containing b. coli in 1 c. c., 8 and 4-10. The Lawrence typhoid death rate per hundred thousand in 1904, is 15. Jersey City's typhoid death rate per hundred thousand in 1906 is 20 and 1-10.

Mr. EDWARDS:

Q. And that included the milk epidemic?

A. Included the entire death loss for the year.

Q. Included what has been charged to the milk?

A. Yes, sir.

By the COURT:

Q. If my conclusion is correct this would seem to show that the Merrimac river, just before it flows into the filter, or through the filter was a very much purer stream than the Rockaway just before it enters the reservoir, wouldn't it?

A. Well, I should say, just judging from this examination alone, that they compared fairly closely. The 8,000 and the 19,000 bacteria would be the only criterion we should have to judge the results on, and those two figures I don't attach great weight to, the difference in the two, because when bacteria gets up to those numbers in water it might easily go from 8,000 to 19,000 very rapidly.

Mr. EDWARDS:

Q. And those are both low figures for that period, for a running stream?

A. Well, a running stream which is draining a populated area, I should say those are average figures.

By the COURT:

Q. Well, the flow in the Merrimac seems to be much steadier with respect to bacteria than the flow in the Rockaway river?

A. I don't think it has the quick run off that the Rockaway river has?

Mr. EDWARDS:

Q. Were you, in November last, notified by the Health Board officers of Newark that milk was being delivered in Jersey City by the same parties to whose milk an outbreak of typhoid fever in Newark had been traced?

Objected to.

Q. I will put the question in a different way. In November last did you receive any notification from Mr. Chandler, the Health Officer of Newark?

A. I did.

Q. Relative to the typhoid outbreak there?

A. I did.

Q. And what was that notification, was it verbal or written?

Objected to.

The COURT: The question is whether the notification was verbal or written?

WITNESS: It was verbal.

Q. And what was that communication?

Objected to.

Mr. EDWARDS: They seemed to throw doubt, in the cross examination of Mr. Chandler, as to whether he had notified Dr. McLaughlin or not as to this outbreak of typhoid in Newark and in Jersey City, and they were working it up in Newark, and they traced it in Newark to the Borden Company's milk, which was no reflection whatever on the Borden Company itself, and that then Mr. Chandler had notified Dr. McLaughlin, who was of our Health Board at that time, that the same milk was coming to Jersey City, and it was shut off at both places afterwards and the typhoid stopped.

The COURT: Well, for the purpose, I suppose, of identifying the particular communication you may state what it was.

Q. What was the communication that Mr. Chandler made to you?

The COURT: It won't have any effect to prove that there was an epidemic due to that cause, but it will be merely an identification, as I understand it, of the notice, that is all. I will receive it for that purpose.

Q. (Question read.)

A. Mr. Chandler notified me that a particular supply of Borden's milk, that is, a supply coming from a particular locality they had been investigating and found to be suspicious. They later reported that their investigation had proved their suspicions to be true.

Mr. VREDENBURGH: Objected to.

The COURT: Strike out the latter part of that answer.

Q. That certain milk had been suspicious?
A. Yes, sir.
Q. What locality was that?
A. That was the milk supplied from Oxford.
Q. What State?
A. New York State.
Q. Did you make investigation as to whether that milk was supplied also to Jersey City?
A. I did.
Q. Did you have a number of typhoid cases in Jersey City in November last?
A. We did, yes.
Q. How were they brought to your attention?
A. I was naturally watching the typhoid in Jersey City, because I have been interested in it for some time, as a former member of our Board of Health.

Q. Were you called upon to make bacteriological examinations in cases?

A. Frequently.

Q. Did you make investigations as to whether that milk from Oxford could be traced to these typhoid patients in Jersey City?

A. Not personally, no. I believe some investigation was made; it was not made by me.

Q. Was that milk supply stopped, as you understand it?

Objected to.

Objection sustained.

Q. Did you make any investigation as to whether that milk came to Jersey City or not?

A. Yes, I did.

Q. Did you find that it did?

A. The manager told me that it did.

Q. Now did you make out a list of the existing cases of typhoid taken from the official books of the Board of Health of Jersey City, and send the same to the Board of Health of Newark?

A. I did.

CROSS EXAMINATION by Mr. Vredenburgh:

Q. Doctor, you were first employed by the Jersey City Water Supply Co. at what date?

A. Why it was the time that the Jersey City Water Supply became interested in the work, having taken it over from Mr. Flynn's company; I cannot give you the exact date.

Q. On that day you were employed by the Jersey City Water Supply Co. and have you been in their employ ever since?

A. To the best of my knowledge, yes; I have done regular work for them since.

Q. These tables that you produced, D. 17, show the results of analysis commencing May 24, 1904. That is also, I understand it, the day on which the water from the Rockaway supply first came to supply any portion of Jersey City with water?

A. I understand it so; yes, sir.

Q. On that day you made an analysis of the water of Jersey City at the tap at Christ Hospital. Did you make any analysis of the water before that date, of the Jersey City Water Supply Co.?

A. I did, yes.

Q. Where did you make those analysis?

A. Those analysis were made at different places; they were made in Jersey City.

Q. Were the analysis made in your laboratory in Jersey City?

A. The aualysis were made in my laboratory at Jersey City.

Q. And the samples for those analysis were taken from where?

A. Taken from different points; taken from the tap in my laboratory at Jersey City, and also taken out at Boonton.

Q. When you say tap in Jersey City, you mean the tap at the Christ Hospital?

A. I do, yes, sir.

Q. There was no water from the Rockaway river passing through that tap prior to May 24, 1904, was there?

A. There was not, but the water was examined there that we were getting in Jersey City.

Q. That was not the Rockaway river at that time?

A. No, but analysis was made of the water at that time, that was made of our supply at that time; that had been examined for some time past as well.

Q. I didn't ask you that; I ask you whether you made any analysis of the Rockaway water prior to May 24, 1904?

A. I just stated that we made analysis of it, samples being taken out at Boonton and vicinity.

Q. None at the tap?

A. It wasn't at the tap prior to that date; the tap water I stated was examined, but that was not the Rockaway water.

Q. Then you were in the employ of the Jersey City Water Company prior to May 24, 1904?

A. I was.

Q. The result of those analysis, have you given them here, in any of your evidence?

A. I have not.

Q. After May 24, 1904, you analysed the water taken from this tap at the Jersey City Hospital, and the results of those analyses you have shown in the papers which have been offered in evidence here, have you?

A. I have, yes, sir.

Q. Have you shown all of your analysis made of the Boonton water?

A. I have, yes, from those dates.

Q. And all the analysis that you made of the Rockaway water is shown on some of the original exhibits that you offered here?

A. They are, yes.

Q. Now the sample from which you made the analysis of the water at Christ Hospital was taken from the tap by you, when?

A. At the time of making the analysis.

Q. Did you take the water on May 24th. The first day shown on these exhibits, did you take the water from the tap that day?

A. Yes, sir.

Q. It says here, "Sample taken by J. E.," does that mean you?

A. That is my man in the laboratory.

Q. Then did you take it that day?

A. Not personally, no.

Q. Well, now, I want to know which of those samples from the Christ Hospital you took personally?

A. When you came to the initials "McL." you will know that I took them personally.

Q. Then you took no samples yourself between May 24 and September 8th of the year 1904?

A. I did not for a time. The reason was we were taking a sample from the lower City to show water which had passed through our reservoir, as well as a sample from the heights to show water which had not passed through the reservoir, so to simplify matters the one individual took both samples; however, it was taken not three feet from me in my laboratory where I was working. That is the laboratory sample. The down town sample, of course, was collected from the lower city.

Q. Well, I notice that there are no samples from June 27th to September 8th, of the year 1904; how did that occur?

A. I believe I was away at that time.

Q. And no samples during that time were taken by anybody?

A. Not by myself or anybody in my employ.

Q. And you made no analyses of the water from June 27th, 1904, to September 8, 1904?

A. I made none personally; I believe some were made, but they were by others than myself.

Q. I notice that in 1905 you made no analysis from July 3rd, to September 7th, or none are shown on your paper here; did you make any analysis?

A. I did not.

Q. So far as you know no analysis were made in any way connected with you?

A. I am not positive as to that; I believe some were made during the times I was away; made at Little Falls laboratory; Doctor Leal, I believe, had them made.

Q. I am talking about the tap in Jersey City; were there any made of the tap in Jersey City, any analysis of the water between July 3rd and September 7, 1905?

A. I believe there was; I cannot answer positively; Doctor Leal could tell you.

Q. Well, the results are not shown on any of those papers?

A. No; they were not made by me or in my laboratory.

Q. Well, now, it appears by Exhibit D. 18 that all the samples taken during the year 1905 were taken by you; is that true?

A. That is true if they are marked so.

Q. In the year 1906 it appears that the samples were taken from July 3rd to September 18th, by J. E. That is who?

A. That is a man in my laboratory.

Q. Were you present when they were taken?

A. I wasn't.

Q. Where were you then?

A. I was away at the time.

Q. Out of the country?

A. Out of the country.

Q. Now, Doctor, when you were present the water from the tap, before you commenced to analyze it, was allowed to run for from twenty-five to thirty minutes, and then the samples were taken which you proposed to analyse?

A. Was allowed to run that time or over that time, at least those are the minimum figures, I should say.

Q. The samples that you took were in two vessels, one containing how much?

A. Which samples?

Q. The samples which you took every day from the tap were taken in two vessels?

A. No, sir; they were not.

Q. How were they taken?

A. Taken in one vessel.

Q. What was the size of that vessel?

A. The usual four ounce bottle that we had been using all along, such as I showed you yesterday.

Q. Four ounce bottle?

A. Yes, sir.

Q. And that was taken full?

A. That was taken full, yes, or approximately so.

Q. From that sample you took a cubic centimeter of water and plated it for the purpose of ascertaining how many bacteria there were in a cubic centimeter, is that correct?

A. We did that, or virtually that; either took a cubic centimeter or a fraction of it.

Q. Your object was to ascertain how many bacteria there were in a cubic centimeter of water?

A. It was; yes, sir.

Q. That you ascertained by plating them and counting them, as I understand.

A. Yes, sir.

Q. When you had performed that operation the plate and the counts on the plate were no longer dealt with by you?

A. We were usually through, unless for some reason we were following up the examination further; as a rule we finished it.

Q. That finished that experiment?

A. As a rule.

Q. That told you how many bacteria there were in a cubic centimeter of water, and when you had ascertained that, what you thought was a fair specimen of that water; a fair cubic centimeter of that water; that exhausted that research?

A. It did; yes, sir.

Q. Then you took another part from this same bottle of water—you took it in five quantities, one-tenth of a cubic centimeter, one cubic centimeter, ten cubic centimeters and one hundred cubic centimeters; is that so?

A. At times was taken as much as a hundred cubic centimeter, and at other times the hundred cubic centimeter was dropped for the reason that we felt it was not giving us accurate information; that was cut down then to ten cubic centimeters.

Q. The smallest quantity you took was one-tenth of a cubic centimeter?

A. Was one one-hundredth of a cubic centimeter. You will find the reports go from one one-hundredth to ten, at times they go to a hundred.

Q. But the smallest quantity you took was one one-hundredths of a cubic centimeter of water?

A. It was.

Q. Now those four quantites taken from this bottle you experimented with, in order to ascertain whether it contained b. coli or not?

A. I did.

Q. When you counted the bacteria on the plate you could not tell how many b. coli there were in this cubic centimeter of water which was shown on the plate, could you?

A. Not in the plate that we made, on account of the numbers of bacteria in the water, but we used frequently another plate with a special media on.

Q. But that plate you used?

A. We frequently plated for the count of the number of bacteria in the water; we could not tell offhand.

Q. Could you tell the different species of bacteria that were on that plate with any certainty?

A. To a fair extent, yes; there are some that we can pick out fairly readily.

Q. Some that you could?

A. Some that we can, yes.

Q. Could you pick out the typhoid bacteria on that plate?

A. The ones we can pick out are mostly harmless water bacteria.

Q. What do you mean by harmless ones?

A. Ones that naturally live in water, that are in their natural habitat.

Q. Can you pick out any of the different kinds of b. coli on that plate?

A. Not on that particular plate, no, sir, not with certainty.

By the COURT:

Q. Is there any recognized proportion between the bacteria contained in water and the b. coli?

A. I would not know quite how to answer your question. We have another method in which a number of my reports will show, whereby we used a plate —a culture jelly on a plate consisting of lactose litmus agar. The b. coli ferments the lactose and produces an acid which changes the litmus, which is blue, to red.

Q. That I understand, but is there not many bacteriologists—is there any recognized proportion between the amount of b. coli found in a given number of bacteria? In other words, would the b. coli and bacteria increase and be diminished proportionally?

A. I should say not.

FURTHER CROSS:

Q. Then having found the number of bacteria, your remaining experiments with the water is to find out whether it contains b. coli or not?

A. It is.

By the COURT:

Q. I would like to know if there is no proportion between bacteria and b. coli, and if bacteria are found in every stream or lake; what is the importance of finding out the number of bacteria as distinguished from the number of b. coli?

A. The number of bacteria, to a great extent, indicates the amount of foreign matter in the water; to a great extent, I say, because many of them are soil bacteria that may be washed in by a rain fall. Very pure well water, good artesian well water, or ordinary well water that is kept in a proper condition with regard to its surroundings, will contain small numbers of bacteria, especially if it is kept in the dark.

Q. If they are not b. coli they are entirely innocuous?

A. If they are not, the water bacteria are innocuous.

Q. That being so, when a research of this sort is conducted, what is the significance of finding out whether there are bacteria in the water, merely bacteria?

A. The true value of the counts of bacteria in the water, in my opinion, is best made use of in filtered water, to ascertain the value of the working processes of such filter, but counting the numbers of ordinary bacteria in the water, the count is open to a good deal of elasticity one way or the other, and it is simply a fairly close index, to the best of our present knowledge to-day, of the general freedom of that water from surface drainage or from washing from the soil, etc.

FURTHER CROSS:

Q. Is there such a bacteria as a hay bacteria?

A. There is; yes, sir.

Q. And then if the name indicates anything it comes from hay?

A. Frequently comes from grain and grass.

Q. And that may be in the rivers in very large quantities at certain times of the year?

A. It usually is.

Q. In winter time as well as summer?

A. Yes, sir.

Q. And that is foreign to water and dies quickly.

A. Well, it may live quite some time; it is usually quite a hardy organism.

Q. I was going on to ask you with regard to these experiments to ascertain why b. coli—I will stop there one minute, because the Court asked you whether b. coli is an noxious bacteria?

> The COURT: No, I didn't mean that; b. coli that contains noxious bacteria, that is to say, as I understand it, where you find b. coli you may find noxious bacteria present, but when you simply find bacteria why it indicates nothing.

Q. Now, the whole experiment then is to find out whether there is any b. coli in the water, and if so in what amount of water the b. coli is?

A. Yes, sir.

Q. Now, when you say there is b. coli in one one-hundredth of a cubic centimeter of water, do you mean that there is only one b. coli in that, or that there are one or more—there is at least one and maybe more?

A. Maybe more, exactly.

Q. Now, in order to ascertain whether there are any b. coli in you use this tube, double ended which you have produced, and you say that there is b. coli in the water if you find a certain amount of gas in the long end of the tube?

A. And other findings in connection with it.

Q. Well, that is one?

A. Yes, sir.

Q. Gas in the tube?

A. Yes, sir.

Q. Now if the gas is less than twenty per cent. of the amount of gas in the end of the tube, then you say there is no b. coli present?

A. We have so regarded it.

Q. If there is more than seventy-five per cent. then you say there is no b. coli present?

A. We are inclined to so regard it; frequently though we make other tests, if conditions seem to warrant it; in that regard I would say that in the use of the lactose litmus agar plate, if we found red colonies there we will plate them out further, and frequently, if a tube is suspicious, that is if it would give gas over seventy-five per cent., or if it would give gas under twenty per cent., and give the yellow red contrast reaction in our litmus bouillion, we would frequently plate it to ascertain the presence or absence of the colon bacillus following out the complete test. As a rule that is true.

By the COURT:

Q. Do I understand that the color indicates the presence of b. coli as contra-distinguished from other bacteria—that the other bacteria give one color and the b. coli give another?

A. We employ, at least I have been employing in this method of mine, for the investigation of the colon bacillus, a lactose bouillion; this lactose bouillion in contra-distinction to a glucose bouillion ferments, in my opinion, fewer organisms will ferment in this solution than in the glucose, the b. coli growing in this solution which contains a small percentage of analine dye, neutral red, and is colored a bright red, rose red color, the colon bacillus will change the red to a yellow color in the closed arm of the tube. In the open arm where the air has access to it, it remains red.

Q. B. coli will and all other bacteria won't?

A. There is a few of the other bacteria that may change it, but b. coli will positively. We will some times get a tube that shows a gas production and red in both sides of the tube and not find b. coli.

FURTHER CROSS:

Q. If you find no gas at all then the color is of no importance, is it?

A. No, sir; we want gas.

Q. If you don't have gas why you say there is no coli present?

A. Yes, sir.

Q. You may have yellow or red in either arms of the tube, but you would not say there was any coli present because the color happened to be there?

A. I have never seen it otherwise.

By the COURT:

Q. How can you help having gas when there are bacteria there?

A. All bacteria are not fermentative bacteria.

FURTHER CROSS:

Q. Which is the most important, in your estimation, the gas or the color?

A. The gas is most important.

Q. That is what you rely on?

A. Not alone.

Q. But that is your main reliance—the gas?

A. No, sir; we rely on the completed test.

Q. A great many bacteriologists treat the color of very little importance?

A. I don't think so; not in my opinion.

Q. Well, Mr. Whipple does?

A. Mr. Whipple is one, maybe; I didn't hear him so testify.

Q. You spoke of his work being one of the best on that point?

A. Not to my knowledge. Mr. Whipple's work is good no doubt.

Q. How many must you have in order to produce any gas?

A. We suppose one will do it.

Q. Why do you suppose one will do it; have you ever tried one?

A. That is the tendency of the bacillus.

Q. The natural tendency is that if ten b. coli will produce enough gas that you can discern it, one b. coli will also produce enough gas to discern it?

A. Well, if one is put in they grow, they increase in numerous numbers and that produces gas, but starting from one I should say they could produce the usual gas.

Q. Would one typhoid bacillus produce sufficient gas in this long arm of the tube to make twenty per cent.?

A. I should say typhoid bacillus would not produce any gas.

Q. Well, the coli bacillus, would one coli bacillus produce sufficient gas to make the twenty per cent. which you require in the long arm of the tube?

A. One b. coli would produce more than twenty per cent. of the gas, because it would grow and increase; it does not remain as one in this fermentative tube. You understand the fermentative tube gives opportunity under the best conditions for bacteria in it to increase in number.

By the COURT:

Q. The process is fermentation—is the destructive process as I understand it, wherever gas is produced you destroy, you don't create?

A. You destroy what is being acted upon, but the bacteria are increasing in numerous numbers.

Q. If it is all in one tube and all being acted upon by this ferment I should think the effect would be destruction and not growth?

A. There finally is great destruction in the bacteria, but in the early stages of the growth the bacteria have a food that is very nutritious for them.

Q. But Mr. Vredenburgh claims that a bacteria put in this tube, one bacteria put in this tube—isn't there a tendency towards destruction the moment you put these different things in the tube?

A. There is a tendency to increase in the colon bacillus; he is given every possible means whereby he may increase; many of the ordinary water bacteria are killed because this tube, after inocculation with the water is put in an incubator at blood heat.

Q. I cannot understand that the process of growth and destruction can be going on at the same time when subjected to the same conditions?

A. It is destruction of the media.

Q. For instance, you put sulphuric acid in a vessel containing living organisms and there the process would be destruction?

A. That would be a germicide.

Q. Now you put in a solution of something, anything that will create gas, oxygen, hydrogen or anything else, why the process there, I take it, is one of destruction and not of growth; I cannot quite understand what is going to destroy animal or vegetable life in a tube, how you can expect growth?

A. Well, we have a media here that is nutritious for the colon bacillus especially; it has been found so, by experiment; and it grows in this media and splits up the sugar into its component parts. The same thing takes place in nature generally, where there is animal matter, for example, to be removed. If an animal dies in the field it is the bacteria that finally dispose of it, by splitting it up into its original elements, but the bacteria increase enormously on this same putrifying meat, and gradually dissolve the meat into its original component parts; they are finally killed themselves by their own action, but for some time they continue to increase and split up into the component parts the body on which they may be working there and produce gas.

Mr. EDWARDS:

Q. In consuming meat they make the gas and that in turn kills them?

A. Yes, the toxine they throw out.

Q. I supposed you put some fluid in for the purpose of producing the gas; what you do is to put your substance in for the purpose of producing growth, and then the gas is the incidental of final result of the growth?

A. Yes, sir.

FURTHER CROSS:

Q. How many coli is it necessary to produce twenty per cent. of gas in the long arm of the tube?

A. One colon bacillus will grow and create others, and produce any amount of gas within the figures given.

Q. How much growth must there be—have you ever experimented to find out how much growth there must be from one bacillus to create the gas?

A. I never have, but one will surely produce gas.

Q. Well, you say one will do it, will one colon bacillus always grow, or what do you know about that?

A. I should say it usually would.

Q. Well, why, what ground have you for saying such a thing?

A. Because it is put in the best possible environment for it; it is put into a media which is especially well prepared for its particular growth, and which is not adapted, under the circumstances of the incubation and heat, for the growth of other media; that is generally recognized by bacteriological workers, that is no disputed point.

Q. Is it not a disputed point that every colon bacillus will grow under all circumstances of age and condition?

A. There may be some attenuated organisms that don't grow; it is possible to have some.

Q. How many kinds of colon bacillus are there?

A. Two special varieties.

Q. Well, there are more than two; they are not all alike, are they?

A. They are all alike except these same two.

Q. All the same size?

A. There is a variance in size; there is also a variance in size of the typhoid bacillus.

Q. I asked you whether colon bacillus varied in size?

A. Yes, sir, they do.

Q. Vary in shape?

A. If they vary in size they must necessarily vary in shape.

Q. I ask you whether they do?

A. Some would, yes, sir.

Q. They vary in length, don't they?

A. Yes, sir.

Q. They vary in width?

A. Slightly, yes, sir.

Q. How do you know?

A. I seen them.

Q. You have seen colon bacillus vary in width?

A. Yes, sir.

Q. How thick are they—what is the width of an ordinary—

The COURT: It is not worth while to go into that.

Q. Is it not decided whether colon bacillus don't differ in accordance with the animal from which it comes?

A. I think it is decided; we cannot make a distinction between them, that is, a colon bacillus may come from a sheep or may come from a human being; I cannot differentiate between them, and nobody can that I am aware of.

Q. Do you say that the difference in size and shape is not caused by the fact that they come from a different animal?

A. I cannot say that, I say I cannot distinguish between them.

Q. You cannot tell us whether it is not so or not?

A. We cannot. In bacteriology this is generally conceded to be the case.

Q. What is their habitat, do you say?

A. Some inhabit human beings.

Q. Do you say the habitat of a typhoid bacillus is a human being, too?

A. It is at times.

Q. Well, in a very different sense from the human intestines being a habitat for a coli bacillus?

A. It is in a pathological sense.

Q. Very different. The colon bacillus can occupy the host without any danger to the host, cannot it?

A. No, sir, not always, it may produce considerable trouble.

Q. It may but—

A. In appendicitis, for example, the colon bacillus is frequently the cause of the trouble.

Q. Don't it occupy the host ordinarily with safety to the host?

A. Yes, sir.

Q. Does the typhoid bacillus occupy or be in the host without danger to the host, if the host is a human being?

A. We know of some cases following typhoid fever in which the patient continued to carry the typhoid germ without special danger to the patient; otherwise it is dangerous.

Q. Well, in the sense that it is destructive to the host, do you say that the habitat of the typhoid bacillus is the human intestines?

A. I cannot so call it in our present understanding.

Q. Well, do you say that the colon bacilli multiply by fission?

A. Yes, sir.

Q. Where do they divide, in the center or toward the head?

A. I should say approximately the center.

Q. You never have seen, I understood you to say, a typhoid bacillus?

A. See them frequently.

Q. I understood you to say in answer to the court you never had seen one?

A. I don't recollect saying so.

The COURT: No, on the other hand, he said he had.

Q. But he never had seen, as I understood it, an individual typhoid bacillus?

A. Yes, sir; I have.

Q. What was the size of the typhoid bacillus that you saw, did you measure it?

A. They are generally recognized standards of size.

Q. Did you measure it?

A. No, sir; I didn't, they vary in size.

Q. Then you don't know the size of them?

A. I do generally.

Q. You said you did know the shape of that one that you saw?

A. I have seen millions of them when we looked at them under the microscopic field, I suppose in every field we would see thousands of them.

Q. Are they separated from each other so that you can see?

A. Yes, sir; they swim around like little eels.

Q. With short tails, or with—

A. They have flagalla.

Q. What is that?

A. It is virtually as you might put it, a tail, which may be placed on either end of the bacillus; it is virtually a tail.

Q. It has not fins or feeted structure like that to swim in?

A. It is a process by which the bacillus manages to move around.

Q. You said that they multiplied also by fission.

A. Yes, sir.

Q. What is a spore?

A. A spore might be termed the egg stage of a bacillus. In other words, it is a condition which may at a later period, develope into a bacillus.

Q. Isn't it already impregnated?

A. It is ready to develope at any time.

Q. Well now are they of different sizes, these spores?

A. Yes, sir.

Q. Could you detect by any microscopical instrument the spore of a typhoid bacilli?

A. It is generally conceded that it produces no spores.

Q. That wasn't quite the question. If it did could you see it?

A. I fancy I could.

Q. Can you form any judgment as to the size or as to the possibility of your discerning whether this typhoid bacillus does not in addition to fission also reproduce itself by means of what might be called spores?

A. Nobody has ever found that to be the case, although it has been investigated, and we take it for granted now in bacteriology that it does not produce spores.

Q. Well, you said that under circumstances that seems to be destructive to the typhoid bacillus such as freezing, that two per cent. or some other very small per cent. for some reason which you cannot account for, survived, didn't you?

A. I said there was a fraction of a per cent. which survived.

Q. Can you account for those surviving?

A. I suppose they may be especially hardier individuals than the others, just as you might take one hundred men in a battle and one man survive.

Q. That is your theory?

A. That is the generally accepted theory.

Q. May it not be because of the fact that the spores live?

A. It might possibly be, we have never been able to demonstrate it.

Q. Isn't it the rule that spores are more tenacious of life than the individual?

A. Undoubtedly.

Q. They may survive for years, may they not,—spores?

A. Yes, sir.

Q. When the individual would not live days?

A. Yes, sir.

Q. And spores may survive under circumstances of extreme cold or extreme heat when the parents would not survive at anywhere near that temperature?

A. That is possible.

Q. Now to go back to the b. coli. You said there were only two varieties that you recognized; is that the general opinion of bacteriologists, or have they named a great many b. coli?

A. I think that is the general opinion of bacteriologists.

Q. Are there not a great many names for groups of bacteria?

A. There are groups, yes, sir; allied groups.

Q. So similar to b. coli that they cannot be distinguished?

A. Yes, sir; morphologically, but you asked me about b. coli.

Q. Well, why do you say these groups that cannot be distinguished from b. coli are b. coli?

A. They can be distinguished if they are carried through cultures far enough.

Q. Do those other groups, when they are put in the tube, produce some gas in the tube?

A. Many of them might, yes, sir.

Q. Are those from the human intestines or not?

A. Many of them from the human intestines, yes, sir; most all of them.

Q. Not all?

A. I should say practically all of them are, yes, sir.

Mr. EDWARDS:

Q. From the human intestines?

A. They may be.

Mr. VREDENBURGH:

Q. Well, what are they?

A. Well, the groups that are allied from b. coli are from human intestines.

Q. All of them?

A. Yes, sir.

Q. Do they all produce gas?

A. Most of them do.

Q. And all produce color?

A. You mean in this solution that I used?

Q. Yes.

A. No, they don't all change.

By the COURT:

Q. If that be so what is the significance of the term b. coli; how are they distinguished from others just like them?

A. Differentiated by different culture media, but b. coli are by far the more prevalent, very greater numbers. There are many forms in the intestines, many forms of bacteria that aid digestion etc, but the b. coli are the largely predominate type, and we take the b. coli through its larger numbers than the others as the special one for indicating sewage contamination by excreta from warm blooded animals.

Q. But b. coli are not, necessarily, as I understand it, injurious?

A. No, sir.

Q. Now you say that there are groups which are also found in the human feces which are very similar to b. coli?

A. Yes, sir.

Q. Of course their presence would indicate fecal matter, under those circumstances?

A. Yes, sir.

Q. How do they differ, what are the characteristic differences between these allied groups and the b. coli?

A. Well, we are getting into rather a fine question. if your Honor please.

Q. I understand that the supposed significance of finding whether there are or are not b. coli lies in the fact that where you find them you assume the presence of fecal matter. Now why should not you assume the presence of fecal matter from these allied groups, and how do the allied groups differ from the b. coli?

A. You could assume fecal matter from most of the allied groups or all of them, but we have, in the study of bacteria, b. coli as the extreme type at one side, another type which resembles it as a second group, and a third type is the typhoid bacillus which is quite distinct in its characteristics, but the shading from one to the other is somewhat gradual with the two that I have mentioned at each end. In fact many observers are inclined and many men are working at the present day to endeavor to change b. coli into typhoid bacillus. They haven't succeeded; but there is another group of bacteria, one standing at one side as the b. coli and at the other side typhoid bacillus, the group or as they are termed, intermediate bacilli lie between them.

Q. Leave out the typhoid group altogether as being distinguished. Now what are the characteristic differences between the b. coli and those other groups you speak of?

A. The characteristic differences are different cultural reactions in our culture media in the laboratory they differ materially in their reactions to different media.

Q. But if their presence is indicative of the presence of fecal matter why attempt to differentiate?

A. I don't attempt to differentiate, and I haven't stated that I do.

Q. Why do bacteriologists generally, why don't they have one class containing perhaps many different species, why don't they have one class which is indicative of the presence of fecal matter in the water, why take out some that are indicative of the presence of fecal matter and leave them off by themselves and not report them or notice them, and then take up the b. coli as a class by themselves?

A. I wasn't speaking so much of water bacteriology when I was speaking of these groups, as general bacteriology. In general bacteriology we want to know all about each one that we can, but I think largely the water men, and I think Mr. Whipple also in his presumptive tests would include these others which would be included in my presumptive test as well. The water man does not attempt to do that as a regular procedure, not unless he is on some special line of investigation maybe of his own, does he go into these findings such as we have stated here as a rule.

FURTHER CROSS:

Q. How many groups are there in number, as you say, that are allied to the b. coli?

A. I should say there were some three groups.

Q. And those three groups in the tube produce gas?

A. They will produce more or less gas; two of them at least will produce gas, more or less.

Q. And the third one won't?

A. The third one causes none, it is an entirely different bacterium, namely the typhoid.

Q. Does it produce gas, the third one in the tube?

A. It doesn't.

Q. The second one produces gas to what extent?

A. Varying extents according to the different bacillus you might deal with.

Q. It may produce less than twenty per cent?

A. Yes, sir.

Q. Or may produce more than 75 per cent?

A. As a rule it might produce less, more than it would produce more.

Q. Well, do they inhabit, do these three groups inhabit the same water?

A. I am speaking more specially of the human intestines; they might possibly be in water, these others, very likely, because they are discharged with fecal matter and are found at times in water.

Q. Can you tell when you take a sample which of these groups will be in the greater number the first, second or the third?

A. The b. coli will be in the greater number.

Q. Will they all three be in the same water?

A. Yes, we might have three.

Q. Then they are injurious to each other?

A. I would not say that positively, or I would not negative it.

Q. Do you know anything about that?

A. There has been quite some work on that question, and it is open to opinions both ways I think.

Q. You don't know whether the one group which shows no gas but which comes from a human being might destroy the colon bacillus in that water, every one of them?

A. I don't think it is likely they would.

Q. Well, you don't know anything about that?

A. I say there are opinions on both sides of that question.

Q. So that the water which you put in this tube and shows no gas may be filled with this third group of bacilli which come from the human intestines?

A. No, sir.

Q. So far as you know?

A. No, sir; that could hardly be so, because it would be so exceptional that I don't think any record is made of it; water that contains fecal matter will contain more b. coli than other bacteria.

Q. It is also possible to have in that sample of water the group which causes gas but don't cause color, is it not?

A. It might be; it would be very exceptional though.

Q. When you say that, doctor, what basis have you for saying that it would be exceptional?

A. Because they are so seldom found.

Q. It is only guess on your part?

A. No, because they are so seldom found.

Q. Well, if you don't look for them how will you find them?

A. Many observers in special lines of work of their own have looked for them continuously.

Q. Have you ever looked for them in this water at the tap in Jersey City?

A. We have looked for other sewage organisms.

Q. Have you looked for either one of these groups?

A. Yes, sir; we have.

Q. When?

A. At different times, I cannot tell you when.

Q. Have you any record of them anywhere?

A. I don't think any special record was kept of that.

Q. How many times did you look?

A. Oh, frequently, I suppose on an average several times a year.

Q. What did you go through to find out whether there were any of these other to groups in?

A. There was one special group that we would examine for, from the litmus agar plates which also produces red colonies on the plate, similar to the colon bacillus, we would endeaveor frequently to separate this bacillus, which is an indication of old sewage pollution, and have isolated it at times.

Q. What is the life of the colon bacillus?

A. It is a hardy organism. Where do you mean, in water?

Q. No, I mean its length of life; I don't mean in water, I mean anywhere, what is its length of life?

A. I cannot answer the question in that way.

Q. You don't know how long it will live?

A. Not anywhere.

Q. It might live some places a year?

A. It might possibly, yes, sir.

Q. And in other places?

A. But a few hours.

Q. But its length of life is at least a year you think?

A. I think it might live a year, that is continue to reproduce itself.

Q. At what age does it commence to multiply?

A. Almost immediately that it has grown, they are not like human beings, but almost immediately they commence to multiply; spaces of time in that regard are very very infinitesimal.

By the COURT:

Q. I think there was some evidence to show that it did not increase in standing water?

A. We were not speaking of that, as I understood it, we were just speaking of generalities. You didn't mention about water.

FURTHER CROSS:

Q. No, I didn't mention water, but I wanted to first get its life, as far as this witness knew it, in its most favorable circumstances, and I wanted to know what he knew.

A. I have had cultures of it in my laboratory for several years.

Q. Do you know how long a colon bacillus will live without dividing?

A. If it doesn't divide—doesn't have an opportunity to grow its life history I should say would not be long.

Q. What do you mean by long?

A. Of course you would have to specify live where and under what conditions.

Q. Under the most favorable conditions?

A. Under favorable conditions it would multiply immediately, as it multiplies it disappears.

By the COURT:

Q. Now how long will those individuals live under the most favorable conditions, we will say the culture in a laboratory, before they sub-divide?

A. I don't think that has ever been estimated, I don't see how it could be.

FURTHER CROSS:

Q. Now in water, ordinary pure filtered water how long will they live?

A. Ordinary pure filtered water they may live for a matter of weeks.

Q. Ten weeks?

A. It depends on whether the water is sterile or not, and whatever bacteria there might be in the water.

Q. In ordinary pure brook water how long will they live?

A. I think their life history in ordinary pure brook water would not be long; I should say a matter of a few weeks at the most.

Q. Will they multiply in ordinary brook water?

A. I should say no.

By the COURT:

Q. Then your theory is that a single bacillus will, without sub-dividing, live in brook water for a few weeks, that is your idea?

A. That is our idea, yes, sir; or if they multiply it is not to an appreciable extent.

Q. In other words, they don't multiply with anything like the rapidity in water that they do under culture, and that they live a great deal longer?

A. Oh, they would live very long in culture, but in culture they have good food and go on and multiply quickly.

Q. I am talking about the individuals?

A. Yes.

Q. Now your theory is that the individual in water will live a long time but won't multiply, and in culture it will live a very short time and then be subjected to sub-division, now that is your theory?

A. Generally speaking, yes, sir; that is true.

FURTHER CROSS:

Q. Now I suppose if there is sufficient sewage what might be called sewage matter in the running brook it will have a tendency to prolong their life, because it furnishes them the food on which to live, is that so?

A. It would furnish more colon bacillus, the more sewage of course the more colon bacillus you would have in that water.

By the COURT:

Q. Do they live with each other to any extent?

A. I should say no.

Q. Then the question is whether there is anything in your opinion, in fecal matter which would serve the same purpose as your culture, your gellatine, or whatever it may be; do you think there is?

A. Under natural conditions in water.

Q. Pour them into a cesspool?

A. I should say they would live there for quite sometime.

Q. And not only live but grow?

A. They might possibly, the influence of soil surrounding, etc., and the drainage of the cesspool.

Q. Favorable conditions, do you think they would multiply in a cesspool?

A. I think they would gradually die off.

Q. Would they multiply before they died off?

A. Might multiply at first for a time.

FURTHER CROSS:

Q. That depends entirely upon the amount of sewage in the water, doesn't it?

A. To a very great extent.

Q. If there is just sufficient sewage in the water to be best adapted for them they will multiply there indefinitely, will they not?

A. I don't know as they will multiply there indefinitely, but the fresh sewage of course will add more bacteria to it. The Court was speaking of the cesspool.

Q. There is a point in the amount of sewage which becomes, instead of favorable for them, becomes deadly to them, does it not?

A. In sewage you will always find large numbers of b. coli even in strong sewage.

Q. The stronger the sewage is after it reaches a certain point in amount the more injurious it is to them. In other words, sewage up to a certain point is favorable to their multiplication, but afterwards it becomes injurious to their multiplication?

A. Favorable to their life I should put it.

Q. Do you know where that point is?

A. I do not. I don't really know that there is such a point.

Q. You never made a study of that subject, have you, particularly?

A. I don't know that that subject has been specially worked out. Sewage contains always large numbers of colon bacilli.

Q. You haven't made any examination personally?

A. No, sir.

Q. Whatever you know about that is whatever you read about it?

A. General knowledge of the subject.

Q. Now you said in answer to a question of his Honor, you said they would not live on each other. Won't they live on the carcass, on the refuse of each other?

A. I hardly think so, they produce a certain amount of toxine which in time might kill them off, and would kill them off under favorable conditions.

Q. Haven't they at Scranton to your knowledge, scraped the pipe which leads from the reservoir to the City of Scranton because the typhoid bacilli would multiply in the pipe?

A. No, sir; not to my knowledge.

Q. The typhoid bacillus differs not only in the facts already stated, but also differs in the fact that it won't give gas in the tube that you have mentioned?

A. That is correct.

Q. It won't create the color which you have mentioned?

A. That is correct.

Q. Why do you then reason that the typhoid bacillus is not characteristic at all with the colon bacillus?

A. I don't so reason.

Q. Don't reason that?

A. I don't.

Q. Then why have you a right to suppose that if you find colon bacillus in the water that there is danger that there will be typhoid in the water?

The COURT: Well, I think we understand that.

(Question withdrawn).

Q. The fecal matter from animals with sickness such as diarrhoea is dangerous to the human race also, isn't it?

A. I don't know of any such case.

Q. Have you studied that subject at all?

A. I think the fecal matter from any animal is undesirable Mr. Vredenburgh.

Q. Well, may be dangerous?

A. I don't know. If you will cite a case of any disease in an animal I might be able to tell you.

Q. Why undesirable?

A. Why any fecal matter is undesirable.

Q. Why?

A. Because we don't care to drink knowingly fecal matter.

Q. Why not?

A. It is not exactly esthetic.

Q. Isn't it one reason because there is danger?

A. Because there might be human fecal matter with it which might contain specific germs, but as far as the animal goes we don't know of a specific germ that has been carried by water and an individual infected.

Q. Bacteria from tuburculosis is said to come from animals, is it not?

A. Yes, sir.

Q. Isn't it dangerous to drink the milk of cows with tuburculosis?

A. Yes, sir; but we were speaking of water.

Q. Wouldn't it reasonably follow that it would be dangerous to drink the water in which was mingled the excreta from diseased cattle?

A. As compared to the milk it would be a negligible quantity. It has never been shown that water was a carrier of tuburculosis; the milk is quite different.

Q. Has it been shown that the dysentery or the diarrhoea which is so prevailent in cities may not come from animals suffering from some disease of that kind?

A. It has never been shown that it does come from animals.

Q. Your tests were presumptive tests, I understood you to say, entirely?

A. Yes, sir; those on the reports are presumptive tests.

Q. Now I notice that in many cases in which you have gas you have made a negative test, sometimes, it appears by these exhibits that you put in evidence, you will have thirty five per cent. of gas and yet you will give a negative result, and I understand the reason you do that is because the color is not there.

A. The color is not there, and then in those cases we would plate out on to a lactose agar plate and find no red colonies, and we would then throw out the possibility of the colon bacillus being present. Those are not very many cases.

Q. Under the same circumstances, Mr. Whipple at any rate would say that the coli was present?

A. I don't know, he might. Of course he would take in other considerations. He would take other matters into consideration, before he would call it so from the gas alone.

Q. Your test then is a stricter test for coli bacillus than that of Mr. Whipple's?

A. A trifle stricter I should say, yes.

Q. Well, if you have a stricter test would you apply the same rule as the test with reference to water?

A. About the production of gas,—what is the rule referred to?

Q. It don't make any difference what his rule is. Would you apply, if you have a stricter test, apply the same rule?

A. If you will state his rule.

Mr. VREDENBURGH: The general question, may it please your Honor is this,—if you have a stricter test would you apply the same rule or a different rule.

The COURT: Rule as to what?

Mr. VREDENBURGH: Would you apply the same rule in the interpretation of the results.

The COURT: What rule. I think you will have to state the rule. If the witness says he can understand your question, that is one thing.

WITNESS: I am not sure that I understand it perfectly.

Mr. VREDENBURGH: He stated his rule of interpretation, and he has now stated that his tests are more strict, not so liberal as some one else's. Now I say if your tests are more strict ought your rule to be more strict or not.

WITNESS: I think I grasp the idea.

The COURT: All right. I don't understand the question.

Mr. VREDENBURGH: Then I will withdraw the question.

Q. Now, Doctor McLaughlin, I understood that you introduced in evidence yesterday tests which you made at the reservoir, where the Rockaway river entered the reservoir, I would like to see those exhibits now?

A. They also appear on the chart.

Q. Well, I want to see the exhibits. Will you please find in this bundle of exhibits that is now passed up to you by Doctor Leal the report that you made upon the water at the Boonton reservoir in September, 1906; you said that the typhoid bacillus, if taken in with water would produce typhoid fever in the person drinking the water under certain circumstances?

A. Not necessarily, it might.

Q. How many of these bacilli is it necessary to drink in order that the disease may be created?

A. We cannot positively say. Of course the more you drink the more likely you would be to get the disease; you might take a few and might pass them through without contracting the disease; the larger the dose of typhoid bacillus you would take naturally the larger the chances of contracting disease; further than that I don't think I can say.

Q. Is there any reason for not believing that if under certain circumstances, the most favorable to creating the disease, one single typhoid bacillus is taken in it will produce the disease?

A. It might so produce under such circumstances.

Q. Now, how soon after that bacillus is taken into the stomach will the disease show itself?

A. It is usually expected to be about two weeks time, for the period of incubation, as we call it, during the time the disease is developing.

Q. About two weeks?

A. Yes, sir.

Q. And if the result is fatal how soon will it be fatal in the most rapid cases?

A. Within a matter of a few days.

Q. The patient may die in a few days or may die in a few weeks?

A. Yes, sir.

By the COURT:

Q. Do you mean from the expiration of two weeks or—

A. From the time the symptoms develope.

FURTHER CROSS:

Q. The germ is taken into the system and in about two weeks the patient will show he has the disease, and within from three days to a certain number of weeks, if it is to be fatal, he will die?

A. Three days would be a very short time.

Q. What is the average period?

A. I should say the average period of death was during the third week of the disease, the end of the third week, possibly.

Q. Now, doctor, will you show me the September report?

A. (Same produced).

Q. You now produce the original report for September?

A. Yes, sir.

Q. Was there any other report of the water taken from the river, where it enters the reservoir, except this report for the month of September, 1906?

A. Not that I examined.

Q. Did you analyse any water from that same place except this one that you reported during that month?

A. No, sir.

Q. Looking at this report, doctor, I see that in one one-hundredths, in the sample containing only one one-hundredth of water you found b. coli present?

A. That is correct.

Q. Of course, doctor, that was the smallest amount of water you examined?

A. Yes, sir.

Q. You don't know at all how many b. coli was present in that water?

A. Let me see the report again, please?

Q. (Same handed to witness).

A. There was at least one we would say.

Q. And there might have been a thousand?

A. There might have been more than one.

Q. Well, might have been a thousand?

A. Might have been more than one, I wouldn't like to specify any special figures.

Q. Where would you limit—there might be a great many?

A. I wouldn't like to put a limit on.

Q. Well, in one-tenth of a cubic centimeter of water taken from that same source you also found b. coli present?

A. Yes, sir.

Q. And in one cubic centimeter of water you also found it?

A. Yes, sir.

Q. And in also ten cubic centimeter you also found it present?

A. I did, yes, sir.

Q. Then on that day, the water that was passing from the river into the reservoir was filled with coli bacillus, in the smallest amount of water that you could measure?

Mr. EDWARDS: I object to the word "filled" that is not what he said.

A. I could measure a smaller amount, of course, that is the smallest amount taken.

The COURT: In the smallest amount taken he found the coli bacillus.

WITNESS: Yes, sir.

Q. Now when did you make your next examination of the waters at that same place?

A. The following month, to the best of my knowledge.

Q. October?

A. Yes, sir.

Q. Will you show me that report?

A. That is 1906, isn't it?

Q. Yes.

A. (Handing same to counsel).

Q. I am asking you with regard to the next report after September, 1906, about which you have just been testifying, and now that you hand the report to me I find it is dated the tenth day of October, 1906, that is correct, is it?

A. Yes, sir, that is the day the report was made.

Q. But the day the sample was taken was the 8th of October, 1906?

A. Yes, sir.

Q. Now on that day in one-tenth of a cubic centimeter of water did you find b. coli?

A. You are still speaking of the Rockaway water?

Q. In the water of the Rockaway river as it enters the reservoir I am speaking about?

A. I did.

Q. Did you take a sample of any smaller amount than that one-tenth of a cubic centimeter that day?

A. Yes, sir.

Q. What?

A. One one-hundredth.

Q. Did you find b. coli in one one-hundredth?

A. I did.

Q. Did you take any sample smaller than one one-hundredth?

A. No, sir.

Q. Then you found b. coli in one one-hundredth, and also found it in one-tenth of a cubic centimeter?

A. Yes, sir.

Q. Did you find it in any one cubic centimeter?

A. I did.

Q. Did you find it in ten cubic centimeters?

A. I did.

Q. Did you find it in one hundred cubic centimeters?

A. I did not examine it.

Q. It wasn't necessary?

A. No, sir.

Q. Well, did you analyse a sample of that water from the same place between those dates?

A. I don't quite grasp your idea.

Q. Did you analyse the water which was passing from the Rockaway river samples taken from where the Rockaway river enters the reservoir, between the 18th day of September, 1906, and the 8th day of October, 1906?

A. If the report is not here I did not. I am under the impression I did not. It will show on the monthly average may I see it? That will tell us.

Q. Is this the monthly average to which you refer?

A. Yes, sir; September 18th and October 8th; there was none between of the Rockaway water.

By the COURT:

Q. Can you distinguish in your laboratory any difference between b. coli of animals and b. coli of human beings?

A. No, sir; there is no difference.

FURTHER CROSS:

Q. Doctor, have you any fact which you can give us, which would show whether the water of the Rockaway river, as it entered the Boonton reservoir differed as to the number of b. coli it contained between the 18th of September and the 6th of Ooctober?

A. Those are the dates of my report?

Q. Yes.

A. I haven't any facts.

Q. Then so far as you know, from the 18th of September to the 8th of October the water of the Rockaway river contained colon bacillus in every one one-hundredth of a cubic centimeter of water?

A. I am under the impression that in September the water was very low in the river there, and later was higher, but I have no—nothing that I could tell.

Q. Now in October the death rate from typhoid fever in Jersey City increased from five to twelve, did it not?

A. October 5th to November 12th, that is correct.

Q. Well, it ran in that year as follows: None in June, do you see June?

A. Yes, sir; and none in April.

Q. Three in July.

A. Yes.

Q. Two in August, three in September, five in October, twelve in November and nine in December?

A. Three in January and one in February.

Q. Now won't you just answer me what I ask you.

A. I just wanted to give it to you up-to-date.

Q. Well, never mind. In November there were 12, you said, and in December 9. When after October the sixth did you analyse the water of the Rockaway river as it entered the reservoir at Boonton?

A. Your blue prints there of the monthly averages will show that.

Q. Doctor, on the 19th one one-hundredth of the water taken from the sample contained no colon bacillus, did it?

A. That is correct.

Q. Doctor, the report of September 22d, 1906, of the analysis of the water at the gate house showed no b. coli when analysed in quantities of one-hundredth of a cubic centimeter, did it?

A. That is for the 18th of September, 1906?

Q. Yes.

A. No. b. coli in one one-hundredth cubic centimeter at the gate house.

Q. Was there any b. coli in one-tenth of a cubic centimeter?

A. There wasn't at the same place.

Q. Was there any in one cubic centimeter?

A. There was.

Q. Now, doctor, in a cubic centimeter of water taken from this same source, as appears by that report in addition to the bacteria, there were microscopic organisms?

A. That is so in all waters.

Q. I didn't ask you that.

A. Yes, sir; there were.

Q. And the amount of those at the river were 177?

A. Yes, sir; 177.

Q. And at the tap in Christ Hospital there were 258?

A. Yes, sir; that is correct.

Q. What is the size of a microscopis organism?

A. The sizes, collectively, the amount of space of a given number of them, or the number of them in a given amount of water occupied as given here.

Q. When you say microscopic do you mean organisms that can only be detected with the aid of the microscope?

A. There are some few that can be seen, but they are minute; an ordinary observer might not see them at all.

Q. By using the word microscopic you refer to organisms that are too small to be seen by the eye?

A. Yes, sir.

Q. Now, I notice that those microscopic organisms at the gate house were only 81 on that same day?

A. That is correct.

Q. On that same day the amorphous matter in the water at the Boonton reservoir was 172?

A. Yes, sir.

Q. But at the tap there were 850?

A. Yes, sir.

By the COURT:

Q. That I suppose refers to mineral substances, doesn't it?

A. Amorphous matter would take in the dead organic matter, dead vegetable matter of different kinds, possibly some mineral matter might be among them. It is usually dead organic matter.

FURTHER CROSS:

Q. How was that amporhous matter counted?

A. It is counted by putting under the miscroscope a given amount of a filtered water, filtered through sand; these organisms are collected on the sand from this given amount of filtered water, and the sand is washed well in the water, and shaken to detach it from the sand, and then that water is put in a small cell or chamber and counted under the microscope, using a special eye piece with ruled lines, and we count in squares under the microscope.

Q. Was it taken from this same four ounce bottle that you speak of?

A. It was taken from a larger bottle, but at the same place, because we used there five hundred cubic centimeter, or a pint of the water.

Q. Taken at the same time by the same person?

A. Yes, sir.

Q. Intended to be the same water?

A. Yes, sir.

Q. Or similar water?

A. From the same source, similar water.

Q. During your examination of this water as it enters the reservoir from the river did you at any time except in September and October, 1906, find b. coli in one one-hundredth of a cubic centimeter of water except upon those two occasions?

A. Found it in June the same year.

Q. Any other occasion except June in the three years, 1904, 1905 and 1906?

A. Not as given on this report; the other I cannot recollect; not shown from the time the water was turned on.

Q. You, then, didn't find on any examination of the water that you made, so far as you testified here, of the water which entered the Boonton reservoir from the Rockaway river, any occasion except in June, 1906, in September, 1906, and in October, 1906, when b. coli was found in a sample so small as one one-hundredth of a cubic centimeter of water?

A. That is correct.

Q. In that same June, you found b. coli present in the water at the tap in samples of one cubic centimeter, did you not?

A. June, 1906, did you say?

Q. Yes.

A. I did not.

Q. This is your table here, you show it on your table here?

A. I don't find it here.

Q. June, 1906?

A. No, sir.

Q. This is your table, isn't it (showing witness paper)?

A. Well, I was looking at the monthly ones, comparing the entire three, we were looking at different tables; June 4, 1906, we found it in one c. c.; yes, sir.

Q. Then you want to change your answer?

A. Yes, sir; I do.

Q. Now, did you find b. coli in samples in one centimeter of water at any time between June and September, 1906?

A. In which water?

Q. In the water at Christ Hospital?

A. We found it on June 4, 1906, in one c. c.

Q. Well, you have mentioned that?

A. And the next date was September 18th in one c. c.

Q. The next time you found it in that quantity of water?

A. Yes, sir.

Q. Now, the next time you found it in that quantity of water?

A. October 8, 1906, we found it in 1 c. c.

Q. Now, between those dates you examined the water at the tap twice; at Christ Hospital twice between September 18th and October 8th, did you not?

A. I cannot say how many times; just a moment; yes, sir; that is correct.

Q. Now, won't you look, please, and tell us how much gas you had in your long arm on those two occasions?

A. That is June 4th and—

Q. No, September 24th and October 1st.

A. Don't you mean the 8th?

Q. I understood you to say that you found at the tap at Christ Hospital b. coli on September 18th in 1 centimeter of water?

A. Yes, sir.

Q. And you found it again on October 8th in 1 centimeter of water?

A. Yes, sir.

Q. Now, you analysed it twice between September 18th and October 8th, and I want to know how much gas you had on those two occasions in one cubic centimeter of water?

A. Those two occasions were September 24th and October 1st?

Q. Yes.

A. I think you have September 24th there.

Q. I return you the sheets you have shown me, and ask you whether they are on these sheets; I cannot find them?

A. Here it is, September 24th.

Q. Now, let me see October 1st?

A. (Same handed to counsel).

Q. I call your attention to this one of the first of October, and will ask you whether you found on that occasion gas present in the tube?

A. We found it in 1 c. c. and in the 10 c. c. of water taken.

Q. And how much, Doctor?

A. In the 1 c. c. was 25 per cent.; in the 10 c. c. was sixty per cent.

Q And in the 25 per cent. you marked a negative result, did you?

A. Yes, sir.

Mr. EDWARDS:

Q. No bacilli?

A. No coli bacilli, that was vertified by the litmus lactose agar, in which we found no red colonies.

FURTHER CROSS:

Q. Did you on any other occasion find gas in 1 c. c. at the tap during 1906?

A. Find gas?

Q. Yes.

A. I cannot say without going over the entire thing, of course.

Q. Very well, look at it; will it take you some time to answer that?

A. Yes, sir; it will.

Q. Then I will ask you this question,—at any other time did you get a positive test in 1 cubic centimeter of water from the tap at Christ Hospital, except on this occasion?

A. During this year, or any time?

Q. During this year?

A. During the year 1906 we obtained positive presumptive tests for b. coli in 1 c. c. of water on March 5, on June 4, and on September 18th and October 8th; further than that the tests were negative.

Q. The last three that you have mentioned, June, September and October was the same month that you got positive results as to the presence of b. coli in 1 one hundredth cubic centimeter of water from the sample taken at the river, where the river enters the reservoir?

A. September 18th we obtained it where the river enters the reservoir, we obtained b. coli in one one hundredth, and on October 8th we obtained b. coli in one one-hundredth of presumtive test.

Q. (Question repeated)?

A. On June 11th we obtained it; I would rather confine myself to the dates than a whole month.

Q. I am perfectly willing.

A. On June 11th we obtained b. coli in the Rockaway river in one one-hundredth.

Q. Taking your analysis of the water at the tap at Christ Hospital from September 18th to October 8th, 1906, inclusive, what was the percentage of times when positive coli tests were obtained in one cubic centimenter of water?

A. Inclusive that is?

Q. Yes.

A. There were four examinations of water made during that time, and in two of the samples we obtained b. coli in one cubic centimeter by the presumtive test, therefore it would be fifty per cent.

Q. Now, fifty per cent. was the test which you mentioned?

A. Twice out of four examinations.

Q. Now, to return to your tables; I show you D-17.

A. What is the heading?

Q. Table of results of bacteriological examination of Jersey City tap water?

A. And the year?

Q. 1904.

A. Yes, sir.

Q. You gave us the averages, which you said was 451?

A. Yes, sir.

Q. Then you said the average for 1905 was 268; D-18?

A. Yes, sir.

Q. Then you said the average for D-19 was 94?

A. That is 1906?

Q. Yes.

A. Yes, sir.

Q. Now, you found the average 451 on D-17, 1904, in what way?

A. By adding together the counts of the different examinations, made the counts per c. c. of bacteria and dividing by the number of counts made.

Q. And that is the way you did that, 1905 and 1906?

A. Yes, sir; I should say so.

Q. Well, now, in 1904, you had twenty analysis in June?

A. Yes, sir.

Q. You had none in July?

A. That is correct.

Q. None in August?

A. No, sir.

Q. Now, in 1905 you had five in June?

A. No, I think it was four, in 1905.

Q. Yes, four in June?

A. Yes, sir.

Q. Now, do you consider that an average obtained in that way is a fair result to state to the court as the average for the year 1904, as compared with the year 1905?

A. Well, it is rather obvious that it is not as fair as—1904 is not quite as fair as 1905.

Q. In 1904 you take each month in which there is the most number of bacteria?

A. But I would also say that you frequently find in those summer months—well, I won't say that; I would say it is not as fair as the other.

Q. Not a fair average at all?

A. Not as fair.

Q. In June, 1904, you had them running from 3,700—one is 3,700—

A. Yes, sir.

Q. Now, in July, 1906, there was only fifty?

A. Yes, sir.

Q. And in August the highest number was sixty?

A. Yes, sir.

Q. Well, you leave out the months in which there were the least number, and put in the months that were the greatest number?

A. That was against my average; of course, if I had done that that would have lowered my average; I am giving you the benefit of the doubt.

Q. You say the object of these tables is apparently to show that there has been a decrease of the average of bacteria where the river enters the reservoir of from 451 in 1904 to 94 in 1905?

A. Not where the river enters the reservoir, you mean at the tap in Jersey City, that is what we are talking about.

Q. Well, it is the same thing.

A. I wish it were the river.

Mr. VREDENBURGH: I object to those tables, because they are misleading to the Court, and it would seem to show that the average was continuously decreasing, when in point of fact it don't show that at all, if it is properly made up; you cannot tell what it would show if properly made up; they select one month in which there is the greatest amount and put that in, and divide it by the number, of course it increased the amount in 1904; they leave it out in 1906, and decrease the amount, and that is misleading to the Court and everybody else, and I ask that they be stricken out.

The COURT: They cannot be stricken out; you are at liberty to argue that they are not worthy of cognizance, but I don't think I can very well strike them out; if they did not show on their face their untrustworthiness then I would strike them out, but they show on their face that they are untrustworthy,—that is to say, I won't say untrustworthy, but they show on their face that they are not so made up as to afford a fair comparison between the two years.

A. I understood you to say, Doctor, that the count of the bacteria is of far less importance than the presence of the b. coli?

A. I believe I said so; yes, sir.

RECESS.

Q. I call your attention, Doctor, to the report made by you of September 8, 1904, and will ask you as to this report whether the amount of bacteria at the gate house exceeded the amount of bacteria in the analysis, according to the report?

A. This was the report in which we found the transposition of samples; you want it according to the report?

Q. According to the report.

A. According to the report the number in the gate house exceeded the number in the river.

Q. How many was the number in the gate house?

A. According to the report there were 130,000 at the gate house.

Q. How many at the river?

A. 120.

Q. You found coli in what size samples of water at the gate house?

A. According to this report, which we had transposed, yesterday in the testimony, but reading strictly according to the report as it is here, we found in the sample from the gate house coli in all the amounts taken, namely, from one-tenth to one hundred.

Q. Did you find it in one one-hundredth cubic centimeter?

A. It wasn't taken in this examination.

Q. Now, your explanation of this is that the 130,000 bacteria was at the river, but not at the gate house?

A. Yes, sir; those samples were transposed.

Q. And at that time, if that is so transposed, then the amount of coli at the river was such that you found it in the smallest amount that you analysed?

A. Yes, in the largest amount.

Q. Yes, and in the smallest amount, too?

A. And in the smallest amount; yes, sir; at the river; yes.

Q. Now, Doctor, if you will look at January 12, 1905; have you it there?

A. I have.

Q. How many bacteria did you find that day at the river, where it enters the reservoir?

A. 2,700.

Q. How many at the gate house?

A. 5,400.

Q. Then there were twice as many at the gate house, about, as there were at the river?

A. Yes, sir.

Q. Now, how long apart in time were the samples taken from the gate house and from the river?

A. The sample at the gate house was taken at 10.30 A. M.; the sample at the river was taken at 11.08 A. M., making 38 minutes between the samples.

Q. Is it your understanding from that, that the whole of the reservoir between the entrance to the river and the gate house contained somewhere between 2,700 and 5,400 bacteria to each cubic centimeter of water?

A. No, sir, couldn't say that.

Q. Well, what is the conclusion to be drawn from that, if any, by you?

A. Simply draw the conclusion that the water coming into the reservoir was a given bacterial content on this paper, namely, 2,700 per c. c. The water going out of the reservoir at that time was 5,400.

Q. Do you draw no conclusions from that as to the intervening water?

A. The conclusions I might draw from that as to the intervening water was that it may have been—the river may have been in a fairly good condition, some difference from the tap water, but the figures are fairly close for counts; I don't ever mean to say that the count is mathematically exact; I would not call that such a great difference in the two.

Q. Well, at that time the total amount of microscopic organisms at the river were four?

A. Yes, they have usually been less in the river.

Q. Now, at the gate house there were 282 of them?

A. Yes, sir.

Q. And at the tap in Jersey City there were 287?

A. Yes, sir.

Q. The amorphous matter at that time at the river was considerably less than at the gate house or at the tap in Jersey City—the tap in Christ Hospital in Jersey City?

A. The amorphous matter was highest in the river, namely, 500; at the gate house 232, and in the tap in Jersey City 100.

Q. Now, look at February 13, 1905, if you will,—one moment; the b. coli on that day at the river was found in what quantity of water?

A. Found as low as one-tenth cubic centimeter of water.

Q. How, as to the gate house?

A. The gate house, it was found as low as one cubic centimeter of water.

By the COURT:

Q. What is your theory with respect to the quantity of b. coli in the lake, between the gate house and the mouth of the river; is it from the mouth of the river to the gate house b. coli without diminution?

A. Yes, sir; there is a diminution.

Q. Do you think that that diminution is in all stages of the water and at all seasons of the year?

A. Water that is standing would have a greater diminution than water that might be churned up by the wind temporarily, but as far as my answer goes, I should say that that would take place at all seasons of the year.

Q. Well, now, suppose that a high wind—as I recollect the lay of the lake, the direction of the gate house and the mouth of the river would be a northwesterly direction—I don't know whether I am right or not, but suppose that there was a strong wind blowing from the northwest, blowing, we will say, at the rate of thirty or forty miles an hour, would that have any tendency, in your view, to carry the b. coli in the river down to the gate house?

A. It might carry them towards it, but I don't admit or don't believe it could carry them to the depth, —or that it would carry them to the depth of water which the gate house drained from, namely, about fifty feet.

Q. Do you think it would have carried them to the top of the dam away down, the specific gravity being greater than the specific gravity of water they might sink down?

A. They might, but—

Q. You think the wind would carry them as far as the gate house, under the conditions that I mentioned?

A. It would depend a good deal on how long such a wind blew, your Honor, in my opinion.

FURTHER CROSS:

Q. Now, Doctor, you again examined this water on February 13, 1905?

A. February 9th; the report is dated the 13th.

Q. The report is dated the 13th, but the examination was made on February 9th?

A. Yes, sir.

Q. Now, how many bacteria were there at the river on that date,—the mouth of the river?

A. Six hundred.

Q. And how many were there at the gate house?

A. 1,400.

Q. And you found b. coli at the river in what amount of water?

A. Found it as low as one cubic centimeter.

Q. How low at the gate house?

A. Ten cubic centimeters.

Q. And at one cubic centimeter you found how much gas in the tube, at the gate house?

A. Gate house, fifty per cent.

Q. Fifty per cent. of gas in the tube at the gate house?

A. Yes, sir.

Q. But at one cubic centimeter; and you found coli at the river in one cubic centimeter?

A. Yes, sir.

Q. Now, June 15, 1905, will you look at that, Doctor; on that date how many bacteria were there at the river?

A. 52,000.

Q. How many were there at the gate house?

A. 1,050.

Q. In what quantity of water did you find b. coli at the river?

A. Found it as low as 1 c. c.

Q. And in what quantity of water did you find it at the gate house?

A. Found it in one c. c.

Q. The same?

A. Yes, sir.

Q. So that day there was just as many coli at the gate house as there was at the river, so far as this report shows?

A. Yes, sir.

Mr. EDWARDS: Just as many coli?

Mr. VREDENBURGH: Yes.

Mr. EDWARDS: Just as much indication of coli.

Q. Now, October 3, 1905, how many bacteria were there that day at the river?

A. 13,500.

Q. How many were there at the gate house?

A. 500.

Q. And in what quantity of water did you find the coli at the river?

A. Found it as low as one.

Q. And at the gate house?

A. One cubic centimeter.

Q. They were, then, both the same?

A. Yes, sir.

By the COURT:

Q. Let me understand; suppose that you should find no b. coli under the circumstances just mentioned by Mr. Vredenburgh in the water of the river in a tenth of a cubic centimeter, and suppose you should find none in a tenth of one cubic centimeter at the dam, but, suppose, as you have said, that you did find indications of the b. coli in a cubic centimeter at each place, what would be your inference as to the quantity,—the relative quantities of b. coli in each sample of water?

A. In those particular cases I should draw the inference combined with the higher count in the river and say that the b. coli found in the one c. c. of the river sample, together with the higher count, which is 13,500, was more especially a true intestinal b. coli, while the b. coli found at the dam, where the bacterial content was 500 per cubic centimeter, might have been an allied organism or might have been some other organism, giving us this presumptive test, not necessarily b. coli.

Q. I am speaking of the quantity; now, you don't find any b. coli in one-tenth of a cubic centimeter at either spot, but you do find it in the cubic centimeter at each spot; now, that would suggest to my mind, and I want to be corrected if I am not right, that would suggest to my mind that the quantity of b. coli were about the same, or very nearly the same; of course, I can understand they might not be exactly the same, because the b. coli might be found in one-fifteenth, for instance, of a cubic centimeter at the river and in one-fifteenth at the dam; but still, inasmuch as the witness has taken these two, one-tenth and one cubic centimeter as to be nearly allied, would not the inference, so far as quantity is concerned be that the b. coli was in about the same quantity?

A. The b. coli in the sample at the river might be 9 b. coli to the cubic centimeter, not enough possibly to give us the b. col in 0.1 cubic centimeter, while at the gate house it might be just one b. coli.

FURTHER CROSS:

Q. It might be just the other way?

A. Well, it might be one way as well as the other.

Q. If it does not indicate what the Chancellor has just said, what does it indicate?

A. It does indicate what the Chancellor just said.

Q. It does indicate what the Chancellor said?

A. Yes, sir.

Q. Well, now you said that the number of bacteria—you now say that the number of bacteria has something to do with the question of the amount of b. coli present in the water?

A. In such a case, I would take it into consideration; yes, sir; because there is such a marked difference, 26 times.

Q. Why?

A. Because we naturally want to know all the light possible on such a question.

Q. Why would it make any difference?

A. Because if we had large numbers of b. coli in the river we would have a higher bacterial content.

Q. Why?

A. Because it would indicate possible contamination.

Q. Why would you have more count, these may be hardy bacteria?

A. Well, the more b. coli we have in the sample, generally speaking, the more bacteria we have in it.

Q. Is that generally speaking, or always?

A. Well, I guess that is pretty nearly always.

The COURT:

Q. I want to know whether the presence of bacteria alone, in larger or smaller quantity, is an indication of the presence of b. coli; I understood you to say it wasn't; that there was no necessary relation, I think?

A. There is not, you are quite right there; there is no necessary relation between them, but in such case the bacterial count has some bearing on the case; it enables us to draw inferences.

FURTHER CROSS:

Q. Let me ask you about that,—this count of bacteria was at the river?

A. Yes, sir.

Q. Now, what possible connection had that with the count at the gate house?

A. One was at the river, and the other at the gate house; one sample for b. coli was examined at the river, and one at the gate house.

Q. You found at that date 130,000 at the river, what did that tell you there was at the gate house?

A. This date we found 13,500.

Q. Yes; now, what relation had the number of bacteria there to the amount of coli at the gate the same day, within an hour, any at all?

A. It would be difficult to answer that question unless we knew how much water is flowing in; generally speaking, it might not have.

Q. When you said it did have you didn't mean it?

A. Not quite in that sense.

Q. It couldn't have any connection?

A. There were two samples of water.

Q. To far apart to have any connection whatever?

A. Yes.

The COURT: Well, I understand that the sample at the river was taken after the sample at the gate house.

Mr. VREDENBURGH: Well, it may be an hour after, but it was very close together.

Q. Which was first?

A. The sample at the gate house was first; about half an hour's difference.

By the COURT:

Q. Then, of course, the river could not have any effect,—whether the river flowed directly toward the gate house, or within a few minutes—

A. Yes, sir.

Q. Because you had the water from the gate house first ;if you had taken the water from the river first and then an hour after, why there is the possibility that the water might have flowed, in an hour, under certain conditions, in the water in the gate house, but if you took it the other way it is an absolute impossibility.

Mr. VREDENBURGH: Yes, sir.

FURTHER CROSS:

Q. Then you desire your answer to be corrected in that respect?

A. Yes, sir.

Q. Now the next date that I call your attention to is December 11, 1905—

By the COURT:

Q. Let me ask you another question. Suppose, if you can conceive such a thing in this country—suppose a region in which there were no animals, and no water flowing through such a region, would you expect to find bacteria in the water—any bacteria in the water—and b. coli or any bacteria?

A. Yes, sir, you would.

Q. In large quantities or in small quantities?

A. It would depend a good deal on the soil. I should say in a sandy country or sandy soil you would find it in small quantities.

Q. Where would it come from?

A. They come from the ground, they are in the ground, especially some bacteria,—are there as a means of aid to cultivation of plants, growth of plants, etc., is largely influenced by the bacteria in the soil.

Mr. EDWARDS:

Q. And the water bacteria?
A. Of course there are some, that are natural to the water.

FURTHER CROSS:

Q. On December 11, 1905, how many bacteria did you find at the river?
A. 2,700.
Q. And at the gate house?
A. One thousand .
Q. And in what quantity of water did you find the b. coli at the river?
A. In 100 c. c. Not in ten.
Q. At the gate house in what quantity did pou find it?
A. At the gate house in one c. c.
Q. So that on that day, so far as your examination shows, there were twice as many coli at the gate house as there was at the river?
A. Yes, sir; it showed apparently no connection between the river and the gate house.
Q. Well, I didn't ask you that; I asked you whether it showed twice as many?
A. Yes, sir; it showed over twice as many.
Q. Twice as many?
A. In the river.
Q. Didn't it show a hundred times as much?
A. You are speaking of coli?

Q. Yes?

A. Well, I am speaking of the river. You said twice as many and I said over twice as many.

Br. Mr. EDWARDS:

Q. I don't understand that that table shows the numbers at all of the coli?

A. It shows approximate numbers, that is, it shows in a given amount there must be so many or possibly more. In the Rockaway river here we find b. coli in one hundred cubic centimeters; in the tap we find it in one. There may have been nine; I would not say 100 because in the one hundred cubic centimeter—

By the COURT.

Q. Give us the minimum at the tap and the maximum at the river?

A. There must have been at least one bacteria per c. c. at the gate house, one colon bacillus per c. c. at the gate house, and in the river sample there must have been less than ten per 100 centimeters because in ten c. c. b. coli didn't show, but it showed in 100.

Q. And at the tap?

A. At the tap b. coli was negative in 1 c. c. but positive in 10 c. c., so that at the tap there must have been—the numbers would lie between 1 and 9 in 10 c. c.

FURTHER CROSS:

Q. Well, so far as that paper shows, the water in the river was just as good as the water at the tap, Christ Hospital, so for as b. coli was concerned?

A. Yes, sir, it was; that was a good sample of the river, an excellent sample that day.

Q. That still had less connection between the tap and the river, there was still less connection?

A. Practically no connection.

Q. Now I will ask you about April 9, 1906, last year, have you that sheet?

A. Yes, sir.

Q. How many bacteria were there at the river?

A. 2,200.

Q. How many at the gate house?

A. 200.

Q. And which was taken first?

A. The gate house was taken first.

Q. How long before it was taken at the river?

A. It was taken 45 minutes later.

Q. Later in the day?

A. Yes, sir.

Q. And what with regard to the quantity of water in which you found b. coli at the gate house?

A. The gate house b. coli was found in 1 c. c.

Q. And how at the river?

A. Found in 1 c. c. at the river.

Q. How at the tap?

A. At the tap it wasn't found.

Q. That day?

A. Yes, sir.

Q. But there was the same amount of coli at the gate house as there was in the river?

A. That is the same question you asked before. You couldn't say that; they occurred in 1 c. c. samples, but there may have been one in the one sample and there might have been nine in the other.

Q. And either way you cannot tell at all?

A. Might be either way.

Q. Now will you show me December 11th?

A. What year?

Q. Just one question. In how many of the samples of the Boonton samples on these sheets was the dam sample collected above the river?

A. I cannot tell you; it was simply left to the sampler; I gave no instructions about that.

Q. Doctor, you gave us some experiments as to the percolation of water through the soil. Where did you get the soil from that you used in those experiments, the garden soil you said it was?

A. The garden soil was obtained from the upper part of the ground; it was top garden soil from the grounds of Christ Hospital, just under the grass.

Q. Did you obtain it yourself?

A. I did.

Q. Did you examine any of the soil near the cesspools in Dover?

A. I did not.

Q. Or near the vaults in Dover?

A. I did not.

Q. Isn't it a fact that the percolation of polluted matter through the soil increases in distance through the soil as time goes by?

A. It depends on a number of factors taken into consideration, however, that would have nothing to do with this case, because the soil that I used was a soil that had been sterilized, as I so stated in my papers. This experiment simply showed the effect of soil as a filter, not on the bacteriacidal action of the soil at all.

Q. Well, would the result have been the same if instead of garden soil you would have had boulders or stones the size of marbles only?

A. Well, with boulders of course I couldn't have made the experiment, but I should say in nature, that would be on a large scale, we would expect to get the same result.

Q. If you had stones about the size of marbles through together,—if you put this stuff on that it would be the same?

A. Not simply stone, no, sir. I thought you meant occasional stone in the soil such as you would find it in nature.

Q. I mean stone the size of marbles instead of the soil?

A. That would be another question.

Q. Do you know in stones how far pollution would have extended under those circumstances?

A. Probably would have extended a considerable distance, simply stone.

Q. Did you make any experiment as to coarse gravel?

A. No, sir.

Q. Do you know the distance different foreign matter in water will sink in a given space of time?

A. Cannot say.

Q. Do you know how far clay, ordinary clay when in the water will sink, in a given length of time, how many feet?

A. Well, generally speaking, I don't know how far it will sink; I know it will carry—you take the river from the Rhone Glacier of Switzerland, clay and stone will carry in this glacial stream a considerable distance into Lake Geneva, and it is there deposited; I say considerable distance, it is probably within a mile it is deposited and the water is beautiful and clear.

Q. How far into Lake Geneva did you say it carried?

A. I should say it was within a mile.

Q. Do you know, if you deposit clay or other material of that character in the water, at what rate of speed it sinks?

A. I do not.

Q. Do you know at all at what rate of speed typhoid bacillus will sink in water, as compared with clay?

A. I cannot say; I should imagine the clay would sink more rapidly, its specific gravity being greater.

Q. You made no experiments in that direction at all?

A. No, sir; not especially for tythoid bacillus.

Q. You said that they would have a tendency to cling to foreign substance in the water, the different bacillus.

A. The clay that carries them down, it is a mechanical action you might say.

Q. They cling to it?

A. Well, they are carried down,—some clinging effect, yes, sir.

Q. How is it with leaves that came down the river, for instance in freshets or at other times?

A. Of couse they might not be carried down as rapidly by leaves; that would be a different question.

Q. Would they have a tendency to cling to leaves?

A. Leaves would float more on the surface than sink.

Q. What?

A. Leaves would have a higher or at least a lower specific gravity than clay and that would be quite a different proposition.

Q. Well, would the bacteria have a tendency, just as much of a tendency to cling to the leaves as to sand?

A. I should say no, because the sank would sink and come in contact with more bacteria than floating leaves that would not sink so far.

Q. You think there would not be so many of the bacteria clinging around the leaves as there would be around the cay?

A. I think that if you had a sedimentation tank and had leaves floating in it and another sedimentation tank and had clay matter suspended in it, and allowed both to settle, that in the tank containing clay matter you would have greater bacterial clearance in the water than in the tank containing the leaves.

Q. You would have greater?

A. Yes, sir.

Q. Then more would cling to the leaves than sand?

A. No, sir, the reverse; the greater in the clay.

Q. Is that true with regard to dead wood and those things that come down the river; small particles of dead wood?

A. Well, that would float mostly, I imagine.

Q. You think the bacteria would not cling to them?

A. It would not come in contact with necessarly quite as many as with the clay.

Q. Is the inside of the water pipes, as a rule, coated with a gelatinous substance?

A. I cannot say as a rule; I don't know as a rule; I know in some instances there is a kind of a matty substance, something like burlap.

Q. Would that have a tendency to hold bacteria that might be passing along the water?

A. It might, yes, sir.

Q. You produced a book as to Lawrence and a table, can I see that book and that table?

A. Yes, sir.

Q. Now, doctor, this table that is marked D. 26, you have placed on the upper part of it the Merrimac river, and first, I think you said that the water of the Merrimac river compared with the water of the Rockaway river, as to purity, before it came to the filters?

A. Well, I don't know that I said that. I said from the bacterial content here the waters resemble each other somewhat from the bacterial content alone. I didn't say that they exactly compared.

Q. What Cities are there on the Merrimac river just above Lawrence?

A. Well, there are several Towns up the river there, I don't pretend to know much about the geography.

Q. And they sewer into this Merrimac river?

A. Yes, sir; I believe they do.

Q. What was the rate of filtration at Lawrence each month, according to this table?

A. You will find that in the report there. I haven't given that on the table.

Q. So you don't know that?

A. I don't know that.

Q. Don't you know that in this very report they tell you in substance that the City had out-grown the filter plant, and they were preparing to put a new one in?

A. I don't know that sir.

Q. Well, in this book you produce of April 28, 1904, I see a letter dated April 25, 1904 with reference to the purchase of a new filter plant, didn't you see that in that report?

A. I didn't notice it.

Q. But you did take this table?

A. Simply took the table.

Q. Took the table from the report from a filter plant which was just about to be replaced by a new one?

A. I don't know that it has been replaced at the present time.

Q. The lower part of the page, doctor, is supposed to be the Rockaway river. Now the percentage, I notice the percentage of removal of efficiency in the plant at Lawrence varies from 99.2 to 99.9. This paper states that the percentage of removal efficiency in the Rockaway river varies from 81.9 in some months to 99.9 in others varying at different months. How do you find out the efficiency of the Rockaway river?

A. By taking the column in which the average number of bacteria per c. c. is indicated, namely, 19,-000, and taking the column, average number of bacteria per c. c. Rockaway river water, Jersey City, namely 100, and ascertaining the percentage removal in that way; that is the percentage removal by averages.

Q. Well, you have percentages of removal each month, don't you?

A. Yes, sir.

Q. How do you find the percentage of removal each month?

A. That is given here, that is by taking exactly the same way, the average number for January and the average number of bacteria in the City for the same month and dividing it.

Q. What you did do was to take the amount of bacteria in the river an hour after you took it at the gate, and then saying that the difference between those two figures was the efficiency of the reservoir?

A. No, sir; in this table one was the river water and the other was the tap water in Jersey City.

Q. Well then you took the water at the tap on the same day,—you analysed the water at the tap on the same day you analysed the water at the river?

A. Yes, sir.

Q. And you compared those two and said that was the efficiency?

A. Yes, sir.

Q. Well, had they any relation to each other by which you could determine the efficiency?

A. They had as near relation as I think you could ever find.

Q. Was that the relation that you took in the filter plant?

A. Well, will you tell me how to obtain a nearer relation between the river and the Jersey City tap.

The COURT: That don't seem to me to be any method at all. It seems to me in that respect the result is entirely untrustworthy.

Mr. EDWARDS: What we get is the average, as well as we can at the river. We are getting the average efficiency, that is all we can get.

The COURT: How can you get it in this way,—it seems to me that while it would be very usual, you cannot possibly have it in this way, you must find out in some approximate way how the water which is measured in the river, tested in the river, is affected by passing through the basin.

WITNESS: The tap in Jersey City for 1906 varied from—

Q. No, let us take 1904.

A. But 1906 we are talking about.

Q. No, we are talking of 1904, at the Lawrence, and 1906.

A. It varied in the tap in Jersey City, 1906, from 20 per c. c. to 375.

Q. To 400?

A. 400, yes.

Q. From 20 to 400?

A. And it averaged 94.

Q. Now doctor, in the column showing the efficiency of the filter, the efficiency is substantially the same every month, is it not, that is to say,—in January it was 99.3. In February 99.2. March 99.2. April 99.3. May 99.5. June 99.6. July 99.9. August 99.6. September 99.9. October 99.5. November 99.4. December 99.6.

A That is correct.

Q. You say that was substantially the same when treating of a filter?

A. These are the filter figures that you are reading?

Q. Yes.

A. Would I say what was substantially?

Q. They were substantially the same each month?

A. I would say it was, yes, sir.

Q. There they traced the same water, the same colony of water substantially from the river to the point where it was filtered?

A. They couldn't trace the same water exactly, approximately they do, but it was impossible for us to trace it as closely as that.

Q. It is impossible for you, it almost goes without saying, but it is impossible for you to trace colonies from the river to the gate house, isn't it?

A. I should say it was, yes, sir.

Q. Now I notice by this table of average that you produce, that in January it was 99.4. and in March 85.2 and in April 95.7, and then dropping in December to 81.9. So it varied considerably even by this table, during each month, didn't it?

A. Yes, sir.

Q. You said, doctor, that when you had examined water for b. coli and negative results were produced that no b. coli were present; do you mean to state that absolutely, or do you mean to say that presumptively they were not present?

A. I should state that absolutely in the tests in which—in some small number of tests we obtained gas and—

Q. But I mean where you obtained no gas?

A. Where I obtained no gas at all I should say no b. coli was present.

Q. Do you state it as a positive fact that no b. coli was present in that water?

A. Yes, sir; as far as that goes it is exactly the same as though we were examining by positive test, because the positive test, if we don't find gas in our tube we rule it out and go no further.

Q. The fact that some coli will produce gas and others won't makes the test a presumptive test?

A. No, sir; that is the positive test, as far as that goes that test is positive. No gas no b. coli.

Q. In many cases there was gas and yet you gave a negative result?

A. I was explaining that when you stopped me.

Q. Yes.

A. In those cases where I gave negative result in which there was no gas we did not get the color reaction in the tube and furthermore those cases were plated out in all but a few instances were plated out subsequently to examination for b. coli by the lactose litmus agar plate.

Q. How many of those were plated out and how many not?

A. Those made during the time I was away, if any occurred during that time, they were not plated out. Those made by myself were plated out

Q. It seems there are over fifty?

A. Yes, over fifty.

Q. Of those what proportion did you plate out and what proportion were not plated out?

A. I should have to go over the details.

Q. You cannot give it without going over the tables?

A. No, sir; but the greater amount of work, by far the greater amount of work was done by myself.

By Mr. EDWARDS:

Q. By far the greater amount was plated out?

A. Yes, sir.

FURTHER CROSS:

Q. There is annexed to your tables D 17, D 18, and D 19, a statement with regard to the weather. Now I understand that you did not take that?

A. That is correct, that was taken by the sampler.

Q. You don't know?

A. No, sir.

Mr. VREDENBURGH: Now, may it please your Honor there is a public authority, I think the Government authority, which gives the daily storms. I object to this statement on the paper because it was not taken by any official party, and I ask that that portion of the table be stricken out.

The COURT: Perhaps you could compel them to bring the person who took the weather indications, here, whether it was an official investigator or not, it would be competent.

WITNESS: We did not investigate the amount of rainfall, or pretend to.

The COURT: Has not the East Jersey Water Company all this data?

Mr. VREDENBURGH: I should think so. The Government has, and we are perfectly willing that the Government record of storms shall go in.

The COURT: It is very easy to compare the East Jersey Water Company's record with the Government record, as to the amount of rain.

Mr. EDWARDS: The record is not at Boonton, it is at Dover.

Mr. VREDENBURGH: Well, wherever the Government record is,—wherever it is.

RE-DIRECT EXAMINATION:

Q. Can there be any vegetable growth without bacteria?

A. I should say not.

Objected to.

Admitted.

Q. Can there be?

A. No, sir; I should say not.

Q. Can there be any fermentation without bacteria?

A. No, sir; none that I know of.

Q. Or putrification without bacteria?

A. No, sir.

Q. What are the majority of bacteria, beneficial or otherwise to water?

A. The great majority are harmless to the water.

Q. And the great majority, also, in the world, of bacteria are harmless?

A. They are, as we term them saprophitic.

Q. Could life be maintained without bacteria?

A. I don't believe it could.

Q. Now then in your table for 1906, comparing Lawrence with Jersey City, I see that the bacterial count ranged from 400 down to 20?

A. Yes, sir.

Q. Well now, what have you to say as to its being constant or otherwise?

A. I should call that quite constant. I have here in my possession a report on the Philadelphia filter work, and it has quite an interesting bearing on that.

Q. What is the learning on that subject, what do the authorities say about that?

Mr. VREDENBURGH: Objected to, unless they produce the authorities which say that 20 to 400 are constant quantities in a year.

Q. I mean constant for the purpose of ascertaining the purity of the water?

A. I should call it so.

Q. Now then for the purpose of ascertaining by bacteriological examination, doctor, is the range rfom 400 to 20 practically constant?

A. I should say it was.

Q. In bacteriological circles?

A. I should say so.

Q. You have spoken of these microscopic creatures in the water, and they are referred to in your column, and the amorphous substance; is that damaging to water?

A. It is practically harmless to the water I should say. It may give it a color of course.

Q. Only affects the color?

A. Yes, sir; it is more the esthetic side of the water examination.

Q. Will you tell us what was the quality of the water at the taps in Jersey City, in the months of September, October, November and December, 1906?

Objected to.

A. The month of September we found b. coli but once in 1 c. c. I should say that that was a good wholesome water. The count was low, as well. The month of October we also found it but once in five samples examined. I should say that that was a good water; in the month of November we did not find it in 1 c. c. In the month of December we did not find it in 1 c. c. I would say that they were both good waters.

Q. Then under your presumptive tests in Jersey City you found nothing suspicious during those months?

A. No, sir.

Q. Can you place any dependence on a single examination of water of a water shed, or must you have a series?

A. A series of examinations is always to be desired.

RE-CROSS EXAMINATION:

Q. An examination once a month is not sufficient, is it?

A. I should prefer it oftener.

Q. Well, how often would you prefer it?

A. The ideal method would be every day.

Q. That is what they do in New York, isn't it?

A. I don't know, I believe they may.

Q. And in Boston?

A. In Boston I believe they do every day.

Q. And in Washington?

A. I don't know.

Q. In Cleveland?

A. I don't know about Cleveland.

Q. And that is what Mr. Whipple did during his examination, didn't he, every day?

A. Pretty nearly I think.

Q. That is all.

JOHN H. COOK, recalled.

FURTHER DIRECT EXAMINATION by Mr. Corbin.

Q. You were examined before and were asked to make up a diagram showing comparison of the number of bacteria with the flow of the Rockaway river at different dates; have you made up such a diagram?
A. Yes, sir.

Q. I show you here a chart, entitled Diagram showing comparison of number of bacteria with flow of Rockaway river, November 1, 1905 to December 1, 1906. Was this chart made by you?
A. Yes, sir. Another man I think drew the lines, but I checked all the plotting of the quantities and computed the quantities.

Q. Now the upper set of lines upon it indicate what?
A. The horizontal lines indicate in each case the quantity in million gallons per 24 hours flowing in the Rockaway river on the date which is given below by those black numbers here at the bottom of the diagram.

Q. Rockaway river at what point?
A. Reservoir at Boonton.

Q. That varies from what at the lowest and what at the highest?
A. The lowest quantity here shown is about 32,-000,000.

Q. On what date?
A. That was on the 17th day of September, 1906.

Q. And the highest?
A. And about 899 millions on the 4th day of March, 1906.

Q. Whence are the data taken from which those daily flows are chartered?

A. This quantity depends upon the amount that is flowing out of the reservoir at Boonton, the overflow and the quantity of water that is taken through the pipe to Jersey City.

Q. Is that record kept daily?

A. It is kept daily by the man at the reservoir.

Q. You have the records?

A. I have the record books.

Q. And the next line below the blue line, running practically level across the sheet—

A. Shows the quantity of water in million gallons per 24 hours that was delivered to Jersey City.

Q. That varies from what to what?

A. Well, it varies from about thirty millions to say probably forty millions.

Q. Per day?

A. Somewhere in there.

Q. Per day?

A. Yes, sir.

Q. And near the bottom of the map, this red undulating line, what does that indicate?

A. Indicates the number of bacteria in the sample which was taken from the tap at Christ Hospital in Jersey City on one day later than this black figure here.

Q. When I see at the bottom here, the first date, November 5, 1905, what does that date mean?

A. Well, the doctor told me,—Doctor Leal—that that is the number of bacteria which was found in the sample, which was taken from the tap on November 6th.

Q. And you have shown the quantity of water on November 5th?

A. Yes, sir; one day previous.

Q. How long does it take water to get from Boonton dam, through the pipe to Jersey City?

A. Well, I have computed that when 34 million gallons was flowing that it would take about 17 hours for the water to go from Boonton to Jersey City.

Q. So in making this chart you have about the analysis which was taken in Jersey City a day later than the quantity of the water at Boonton?

A. Yes, sir.

Q. Reckoned it took a day to get there?

A. Yes, sir; Doctor Leal gave me instructions to do so.

Q. This data you got for putting on the red undulating line, where did you get them?

A. That was furnished from Doctor Leal.

Q. Well, that comes from—

A. He told me it came from the results of the analysis that Doctor McLaughlin made.

Q. The daily deliveries to Jersey City, whence do you get the quantities of those?

A. From the meter readings at Jersey City where we deliver the water to Jersey City, at Summit avenue or very close to Summit avenue.

Q. Now take that period of extreme high flow, when nearly nine hundred millions of gallons went down one day, when was that?

A. That was the fourth of March, 1906.

Q. Your red lines below show what the bacteria were on that day or the next day?

A. Yes, sir; the next day.

Q. Take the lines generally as they reach across the sheet itself, does there appear to be any relation, that you can trace, between them, that is, as to whether the height of the water—the flow of water at the Boonton dam has any bearing on the number of bacteria found at the same time?

Objected to.

The COURT:

Q. How many millions of gallons does the reservoir hold?

A. About 7,300 millions above the gate, where the water is delivered to Jersey City.

Mr. CORBIN:

Q. You can draw that amount from the reservoir?

A. Yes, sir.

Q. What I mean is that one-eighth of the entire contents of the reservoir came into the reservoir, and either that or an equivalent amount must have gone out of the reservoir?

A. Yes, sir.

By Mr. CORBIN:

Q. During these 13 months shown on this Chart, how much of the time was the reservoir full, with water wasting over the spillway?

A. The water was wasting over the spillway about two hundred and sixty five days during the year 1906?

Q. Have you made a calculation to see what would have been the height?

By the COURT:

Q. One moment. Does that correspond with the line that you have drawn on this map indicating the amount taken by Jersey City?

A. Yes, sir.

Q. It seems to me it does not. I would like to have you explain that. I should have said, looking at this map, that this map indicated that the water must have been running over the spillway in all cases where the line that you have drawn was under the line of the least flow?

A. Yes, sir.

Q. Now if I should take that criterion it would appear, at least glancing at the map that the water must have been running more than 250 days?

A. But these are only a few of the days in the year, and I am speaking of the whole year.

Q. That don't represent the entire year?

A. No, sir; that only represents these particular days, 24 hours before the sample was taken.

By Mr. CORBIN:

Q. Are you right about that, that in the year 1906 the water flowed over 250—

A. About 250 days there was water wasting over the spillway.

By the COURT:

Q. Well then, if that be so—

A. Oh, I am mistaken about that, it is not so. It wasted over all but about 15 days,—about 350 days.

By Mr. CORBIN:

Q. It flowed over, in the year 1906, about 350 days?

A. Something like that.

Q. Have you made a calculation to show what would have been the heights in the reservoir provided Jersey City had been drawing 70 million gallons a day every day during 1906?

A. Yes, sir; I have.

Q. How many days would water have been flowing over the spillway, if they had drawn that amount, and still leave your reservoir full at the end of the year?

A. About 250 days.

Q. What is the lowest point to which the reservoir would ever have been drawn if they had drawn the full seventy million gallons a day for that year?

A. About five and a half feet.

Q. How low can the reservoir be drained to supply water to Jersey City, that is, how low is it calculated to be drained, to supply the water?

A. I believe about 43 feet.

By the COURT:

Q. What can you say as to the year being an everage year of rain fall—above or below?

A. According to the rain fall at Dover, given in the State report it was slightly less than the normal, about two inches less than the normal.

Mr. CORBIN: I offer this Chart in evidence and ask that it be marked.

Mr. VREDENBURGH: I think that the State report ought to go in.

By Mr. VREDENBURGH:

Q. Are you speaking from recollection?

A. I don't happen to have it here, but I have it at home.

By the COURT:

Q. It is in the published volume of the Geographical Survey?

A. Yes, sir. This is a State report that I have.

It is stipulated that either party may put into the case the published records of rain fall at different points in Northern New Jersey for 1904, 1905 and 1906, published by the State or Government—Reports or Bulletins.

Mr. CORBIN: I offer this Chart in evidence, entitled Diagram showing comparison of number of bacteria with flow of Rockaway river from November 1, 1905 to December 1, 1906.

Marked Exhibit D 28.

By Mr. CORBIN:

Q. In your calculations as to what would have been the conditions in the Reservoir if the 70 millions draft had been made during 1906, did you calculate on the basis that 70,000,000 of water be drawn every day during the year?

A. I did.

Q. Did you calculate to leave the reservoir full at the end of the year?

A. It would have been full at the end of the year.

Q. And with those conditions you say it would have been drawn down how much, at the greatest?

A. In the most extreme case that year about five and a half feet.

Q. And the water would have run over the dam and wasted how many days?

A. About 250 days.

CROSS EXAMINATION by Mr. Vredenburgh:

Q. The title of this Map is a little misleading. You say the diagram showing comparison of number of bacteria with flow of Rockaway river. There is no statement there where it is from?

A. Right down here you will see it. It tells what the black line is, the blue line and red line is.

Q. Showing comparison of number of bacteria with flow of Rockaway river?

A. Yes, sir.

Q. I call your attention to the fact that the title of the map is misleading in that respect, at least not certain. You said there was no connection, as I understood it, between the rain fall and the unmber of bacteria; the red line represents the bacteria and the black line represents the rain fall, doesn't it?

A. No, it represents the flow from the Rockaway river.

Q. Did you say there was no connection between the red lines and that flow, as shown by this map?

A. I said that it would appear that there was no particular connection between those two things.

Q. Didn't the number of bacteria apparently increase on this map, as the amount of water flowing over the reservoir increased?

A. No, sir; it did not.

Q. As I understand, Mr. Cook, the amount of water flowing over the spillway added to the amount of water taken from the reservoir by Jersey City is indicated on this map each day by the black lines?

A. That is it.

Q. Each day that it is taken. That black line is not the average line, but it is the line of that particular day?

A. Yes, sir.

Q. And that particular day is the day before the count of the bacteria at the tap at Christ Hospital?

A. Yes, sir.

Q. As you understand it?

A. Yes.

By the COURT:

Q. I would like to ask a question now. Here is a day of highest flow, that was on the 30th of March I think you said. Now suppose that there were eight days of such flow why wouldn't the water in the reservoir be almost completely changed. This map does not indicate that there were not eight days of that character of flow, or nearly eight days, and from our common knowledge we know that where there is a flood in spring, that flood is likely to continue for several days. Now why, in a situation like that, assuming that that flood continued for eight days, which would perhaps be an unusual period, why would not the water in the reservoir be almost entirely changed?

A. It is possible that it might. I don't think anyone could say whether it would be or whether it would not be. It would be changed to some extent undoubtedly.

Q. Now as I understand the theory of this case it is that the water of the river, so to speak pushes, keeps pushing like an advancing wall of water out of the reservoir at its outlet, whether it is the spillway or whether it is the pipe leading into Jersey City; that this wall keeps advancing all the time and finally it reaches, if I may so describe it, it reaches the spillway. Now that is the theory, isn't it?

A. I don't think it is just like that.

Q. What is it?

A. My idea is that when the water enters the reservoir that has a tendency to mix with the water that is already in the reservoir, and some of it pushes, as you say, some of the water that is in the reservoir over at the out-let, and that water that is pushed over may be some of the water that has come in, and it may be some of the water already in the reservoir, but I think that nobody could say, assuming that this quantity on this day, was nine hundred million gallons and that it was about an eighth part of the contents of the reservoir, that in eight days the water in the reservoir would be entirely changed. My idea would be that it would not be wholly changed.

Q. Well, what proportion of it, do you think, from your observation?

A. I would think that would be largely a matter of opinion, and I never had any observation which would really have given me any opinion which ought to be of value to anybody else.

Mr. CORBIN:

Q. When it is at extreme high flow, how deep is the water over the spillway or crest of the dam?

A. I can tell you in just a minute, approximately. It was about one foot and three inches on the spillway.

Q. What is the length of the spillway?

A. 300 feet.

By the COURT:

Q. When in times of flood the water of the river enters the reservoir, does it tend to flow over the top of the water in the reservoir, or does it tend to flow underneath the water in the reservoir, or does that vary according to the seasons?

A. It varies according to the season of the year and the temperature of the water.

Q. Do you think the temperature of the water has much effect upon it in times of flood?

A. I think perhaps it would not have so much effect upon it as it would when the quantity of water entering the reservoir was smaller, but it would have effect upon it, and it would be continuously affected by it. There is a tendency of the water to change its position in the reservoir because of its temperature.

Q. Where do you think the water that comes in principally goes, on top or underneath?

A. I conclude that it mingles with the water in the reservoir as it goes across the reservoir, and as it goes in various directions—from my observation there, that it might go in almost any direction, and it largely depends upon the wind. I have been there a great many times and have looked at the reservoir we have in mind and have observed several things which has led me to think so.

By Mr. VREDENBURGH:

Q. Pursuing the Vice Chancellor's question. If the whole don't go out in eight days then some that has come in goes out before eight days ?

A. Perhaps I don't just get your idea.

Q. (Question repeated).

A. It must of necessity.

Q. Now take the day on which there was the least amount of water in the reservoir, what day was that?

A. Flowing into the reservoir as shown on this diagram. Is that the idea?

Q. No, you made calculations to show the elevation of the water during the year?

A. Yes.

Q. Now what day was it that the level of the water was most below the spillway?

A. Well, I would have to look at my computation to say that. It was on the 18th of October, 1906.

Q. How soon after the 18th of October was the rain—can you tell about the elevation?

A. The river came up from the 18th to the 19th—the flow came up about 50 cubic feet per second, so I assume there was rain in there at that time.

Q. Have you made any calculations to show whether if at that time there had been no rain for 30 days, how much the water in the reservoir would have been drained down?

A. Well, I know that there would have been—that at that time there were two and a half to three times as much water in the reservoir then as would have supplied 70,000,000 gallons for thirty days, if it hadn't rained at all, it would have supplied it for three times thirty days. There were six thousand millions approximately remaining in the reservoir.

Q. At thirty days how far would it have been drained down, how many feet?

The COURT: Well, you will have to sompute various things. I take it that in such a situation as that the water of the river would flow into the reservoir but with a diminishing flow, because the ground water would be sinking all the time, and that would have to be taken into effect.

Mr. VREDENBURGH: Suppose instead of being thirty days of drought there should be two or three dry years?

The COURT: I think you ought to give Mr. Cook a chance to answer that question. You can say, supposing that the water in the river stops flowing, then how much would the level of the water sink in thirty days, if you can tell.

Q. Well, I will ask that question. If the river ceased to flow into the reservoir and there was drawn from the reservoir seventy million gallons a day?—

A. As I understand the question it is this—that with the reservoir down five and a half feet how long—

Q. And the river ceased to flow.

A. And the river ceased to flow in, how long could you continue to supply 70,000,000 gallons?

Q. Yes, to Jersey City.

A. About 90 days longer, if there didn't any rain fall, and if there didn't any water come into the reservoir.

Q. How did you calculate that?

A. There were 6,000 million gallons left in the reservoir when it was down about five and a half feet; now if it takes seventy million gallons to supply Jersey City one day it would supply Jersey City as many days if there were six thousand million gallons as seventy is contained in six thousand, which is approximately ninety days.

Q. Is the whole six thousand million gallons above the gate house?

A. Above the bottom of that gate, yes, sir. I want to say this—that if you started with the reservoir full of water, and it has 7,500 million gallons in it, it must be evident to anybody that if you drew seventy millions per day out of it, it would last about a hundred days.

ADJOURNED until April 18th, at the same time and place.

Testimony of Dr. John L. Leal.

Transcript of shorthand report of the evidence given in this cause before Hon. Frederic W. Stevens, Vice Chancellor on Thursday, April eighteenth, nineteen hundred and seven, at the Chancery Chambers, Newark, New Jersey.

DR. JOHN L. LEAL sworn.

DIRECT EXAMINATION by Mr. Corbin:

Q. Are you in the employ of the Jersey City Water Supply Co.?

A. Yes, sir; I am.

Q. In what capacity?

A. Sanitary adviser.

Q. How long have you been so employed by them?

A. Why, for the Jersey City Water Supply Co. since the spring of 1902.

Q. What in general are your duties in that employment?

A. My duties consist in removing, as far as possible, any unlawful source of pollution in the water shed and on the river and its tributaries, and also to watch the quality of the water and to see if it answers the requirements of a safe potable supply.

Q. Previous to your taking up this work for the Jersey City Water Supply Co. in the spring of 1902, did you have the Rockaway water shed in your charge for any other company?

A. I did, as part of the water supply of the East Jersey Water Co.

Q. How long did you have it under your supervision for them previous to 1902?

A. I think from 1898.

Q. Have you continuously had it under your supervision since 1898?

A. Yes, it may possibly have been in the spring of 1899 although I think it was 1898.

Q. When did you begin taking measures in the Rockaway water shed in the way of changes in the outhouses and other menacing sources of pollution?

A. Why, I began I think about 1896, after the passage of the Pollution Bill, if I remember right.

Q. 1896?

A. I think in the winter of 1896, or the winter of 1897, after the passing of the Passaic Valley Pollution Bill, immediately after that I began the work, first for the City of Paterson, of which I was then the Health Officer, and then from either 1898 or 1899 for the East Jersey Water Company; I resigned as Health Officer of the City of Paterson and took up the work for the East Jersey Water Co.

Q. What was the situation in Dover at that time, with reference to the house drainage, when you began in 1896 and 1897?

A. Why, the situation was very bad, nearly all the privies along the banks of the river instead of being placed on the ground over vaults, overhung the river; the ordinary method was to carry logs out with a little buttress on each end, and then a log across this way (illustrating), and then put the house right on that, and almost all the privies which could be seen along the river were situated in that way, and many pipes led into the river also.

Q. Had that practice prevailed in any other place besides Dover?

A. Yes, sir; but to a less degree.

Q. When did you commence this rule of removing them?

A. It was back as early as 1896 or 1897.

Q. Were there sewer pipes in existence then in Dover or elsewhere to carry the house drainage into the river?

A. Yes, sir; the Morris street drain was a sewer for the whole brick block on East Blackwell street, between Morris and Sussex, and for some of the buildings on the block above, which were connected with the drain, water closets and everything, and there were other pipes, too.

Q. Did you undertake the cutting off of those?

A. Yes, sir.

Q. Have you been continuously engaged in this work since 1897 and 1898?

A. Yes, sir.

Q. That has been your sole business?

A. Yes, sir;—well,—

Q. Well, your principal business?

A. My principal business, I might say, not my sole business.

Q. Did you investigate in Dover to see just what sewers and drains there were emptying into the river?

A. Yes, sir.

Q. How frequently have your duties taken you to Dover in the early stages of this work?

A. I doubt if I ever missed a month, some times I would go daily.

Q. Did you put an inspector in the water shed?

A. Yes, sir.

Q. How early was that done?

A. Oh, I had two inspectors there, about 1896 to 1897, when I started work, and besides that sometimes I sent up other men.

Q. You still have inspectors there?

A. Yes, sir; we have at least one inspector continuously.

Q. Do you still have the water shed under your watch and care?

A. Yes, sir.

Q. Have you prosecuted violations of the law?

A. Yes, sir; we have had, I think, two cases in this Court, and well, perhaps a dozen in the lower Court; it has been our method not to go to the courts if we could possibly prevent it, it is more a method of moral suasion than force, my idea being that it was very important to keep the good will of these people; when we first went there it was an entirely new idea to them; they had no conception of their responsibilities or duties to others in this respect, and it has been a campaign of education to a very large degree.

By the COURT:

Q. When you speak of the lower courts, do you mean summary procedure under the act?

A. Yes, sir; and I can say that we won every case.

FURTHER DIRECT:

Q. In this Court as well as the others?

A. Yes, sir.

Q. Can you give an estimate, Doctor, as to how many sources of pollution by human beings—how many outhouses, how many privies you have caused to be removed within ten or twelve years?

A. Well, that will have to be a general statement, I could not give you the number exactly; Mr. Gibson swore that 500 had been removed, and that is about my recollection that there would be that number; the data which we had,—we had complete data up to the year 1902, and that was burned in the fire at Paterson, and I will state that most of this work was done before that time.

Q. Have you followed up every case where you have learned of what seemed to be a menace or pollution throughout this whole water shed?

A. Yes, sir.

The COURT: These five hundred cases you speak of are they cases in Dover alone, or were they throughout the entire water shed?

WITNESS: Yes, sir.

Q. At what other places besides Dover have you made these removals?

A. Almost every place in the water shed, Boonton, Denville, Rockaway, Hibernia and at Wharton, or Port Oram, and even up in the Berkshire Valley, up to Denmark Pond and practically all through the water shed.

Q. Have you followed up every instance of pollution or threatened pollution that you have discovered or learned of?

A. Every case; yes, sir; I will state that we have been in touch with the local Boards of Health and the inspectors of the Canal are also ordered to report anything that they know of, so that we have the services of a number of men and of every local Board of Health, and every report received by us from the Board of Health is at once investigated.

Q. What are you now doing towards supervising the water shed and abating these nuisances?

A. Just the same as ever, if the suit made no change whatever, except in that connection I have called in outside assistance.

Q. Were you present at a meeting in Jersey City at the City Hall of the Mayor and various officials of the city, and Mr. Gardner and others on behalf of the East Jersey Water Company, just before the East Jersey Water Co. acquired the stock of the— just before the Security Company acquired the stock of the Jersey City Water Company and the new contract was made with the City for a water supply?

Objected to, and withdrawn.

Q. Were you present at a conference of the Mayor and other city officials of Jersey City on the one side, and Mr. Gardner and other officials and counsel of the East Jersey Water Co. and the New Jersey Security Co. on the other just prior to the signing of the contracts of March, 1902, with Jersey City?

A. I was present at all of the meetings held; yes, sir.

Q. Was Corporation Counsel Record also present?

A. He was.

Q. Was Mr. Ringle?

A. Yes, sir.

Q. Of the Board of Finance?

A. Yes, sir.

Q. And President of the Board?

A. Yes, sir.

Q. Were the members of the Board of Street and Water Commissioners present?

A. Yes, sir; and the Mayor.

Q. Were the other members of the Board of Finance present?

A. Yes, sir.

Q. Will you state what was said in that presence by Mr. Gardner, Vice-President of the East Jersey Water Company, as to any verbal understandings or alleged undertakings outside of the written contract that was made; I will add to that, you may state who brought up that subject on behalf of the city or Mr. Gardner, and what was said about it?

> Mr. VREDENBURGH: Objected to as a conversation occurring after the execution of the contract. The contract in question was made in 1899. This is a conversation which occurred in 1902. In 1902 there was a contract entered into which your Honor will find in the book with reference to the City giving up some portion of the five hundred or fifty

dollars—whatever it was a day, penalty, and there was a contract executed in regard to that, and having no bearing at all upon the question before your Honor with regard to the contract which was executed in 1899. Now they are attempting by these conversations subsequent to that time—

The COURT: Did not your witnesses testify as to those conversations?

Mr. VREDENBURGH: Not at all, at least that is my recollection; of course it is so long ago it is hard to recollect everything. Mr. Corbin says I did ask my witnesses about it. My recollection is I did not; I cannot say. I cannot see any point in my doing it and I don't believe I did.

The COURT: Well, if you did they would be entitled to go into it.

Mr. CORBIN: The contract practically which is here and under which these works have been built, and nearly all the money spent, is the contract made in March, 1902. Mr. Flynn and his Water Company had broken down,—and the work had been suspended about a year, after a million or two million dollars had been spent. Then this contract which counsel puts in evidence was made,—the two contracts in 1902 were made, whereby the Jersey City Water Company, an entirely solvent concern and Flynn and his associates and the New Jersey General Security Co. came in and agreed that the City not only should be given a temporary supply of water, which was essential, but also agreed that they would buy the shares of stock of the old Jersey City Water Supply Company, secure the resignation of all its officers and then take charge of the corporation and carry out the whole contract to its completion, spending three million two hundred and eighty thousand dollars at least upon that work; which is what they did. These contracts were then made, new parties came in, and it was started afresh.

The COURT: I shall pursue the same course with this objection that I have pursued in all other cases. Where evidence is of doubtful admissibility the practice is to admit it subject to the objection. Now in this case the objection is two-fold. The objection, in the first place, is that it is evidence going to change a contract—vary a contract which had already been entered into, and which could, therefore, not be changed, and then the second objection is that the declarations were made by persons who were not competent to change it, were not competent to make those declarations for the purpose of effecting any change. In other words, the first objection is that you cannot change a writing by parol, and the second objection is that even if you can, what is attempted is to show conversations which are not the act of the City. Now those are the two objections and whatever proof goes in will go in subject to those two objections, and I shall reserve my ruling upon the evidence until I come to consider the whole case.

Mr. VREDENBURGH: There is this objection, too,—Mr. Corbin says that it was followed up by contract. The contract was signed. Now these conversations which occurred before that second contract, why weren't they put in that contract if it is part of it, if they had any bearing at all.

The COURT: Well, that objection may go upon the record, and the question of the admissibility of the testimony will be reserved for consideration.

Q. (Question read.)

A. At that particular meeting were present the Mayor, the members of the Finance Board, of the Street and Water Board, I think every member, though that I would not be positive of; I know generally. There was General Abernethy, and Mr. Ringle, and I think Mr. Perry, and the president of the Board of Aldermen, Mr. Brock, and Col. Smith were present. Mr. Nolan, Mr. Hauck and Mr. Sullivan, I think, and Mr. Record, and Mr. Carey came in I think later; I cannot say he was present at that time.

Q. Give their official positions?

A. Mr. Record, corporation counsel; Mr. Carey, corporation attorney; and then in our party were Mr. Corbin—

Q. Was Mr. Heinz, of the Board of Street and Water Commissioners, there?

A. Yes, he was there; and then representing the Jersey City Water Supply Company were Senator Edwards and Mr. Harrison, and representing our people were Mr. Corbin, Mr. Gardner and myself, and Mr. Ringle during the course of the conversation—

Q. What is his position?

A. President of the Board of Finance. And Mr. Ringle during the course of the conversation stated that Mr. Flynn had promised to remove the rag mill and build sewage systems at Dover and Boonton.

The thing first started in a controversy between him and Mr. Edwards on those lines. After that had proceeded a certain time Mr. Gardner arose and gathered up the papers which were ready for signing, and he says, gentlemen, if there is anything outside—he held up the printed contract in his hand, and he said, if we are to be held to anything outside of this contract—

Q. What contract was that?

A. That was the printed contract.

Q. You mean the Flynn contract?

A. Yes, sir, with the two modifications, the Flynn contract up to date at that time; it had been amended twice; and he held up the paper and he said, Gentlemen, if there is anything we are to be held to outside of this, I will simply put these papers in my bag and leave and refuse to have anything more to do with it, and there was a little more talk, and finally Mr. Record said: Mr. Gardner, you are perfectly right, we cannot hold you to anything except what is in the printed contract. Those are as near to his words as is possible to repeat them. Then Mr. Gardner went on with the negotiations.

Q. Did you give the reply of the other side?

A. Well, Mr. Record said:—Mr. Gardner, you are perfectly right; we cannot possibly hold you to anything except what is in the printed contract.

Q. What was done after that conversation?

A. Negotiations were resumed, and the contract was signed, I think, two days afterwards; the two contracts X and Y.

Q. The two contracts X and Y appended to the Bill of Complaint?

A. Yes.

Q. When you spoke of the Flynn contract up to date—

A. I meant everything in the contract up to X and Y.

Q. There had been two modifications of the Flynn contract made in previous years?

A. Yes, sir, before we had anything to do with it.

Q. When you say "we had anything to do with it," whom do you refer to?

A. I mean before the time that Mr. Gardner became president; when the General Security Company became interested; before that time.

Q. Now to return to the matter of the sanitary supervision of the water shed, who is the person that is responsible, and in responsible charge of the work of supervising the water shed?

A. On behalf of the Jersey City Water Supply Company?

Q. Yes.

A. I am.

Q. And the inspectors and others that are at it are under you?

A. Yes, sir.

Q. How about analyses and examinations of the water?

A. They are also under my direction.

Q. Where are they made?

A. Made by Dr. McLaughlin in Jersey City, in his laboratory.

Q. Did you have some understanding or arrangement with Mr. Ferris, the engineer of the City, with respect to sanitary precautions which you should take or remedies which you should use?

Mr. VREDENBURGH: I object.

Q. Did you have conferences with him in the matter?

Mr. VREDENBURGH: I object.

Objection overruled.

A. I would state that Mr. Ferris had everything to do with it; he was the only one with whom I had any dealings representing Jersey City, or with whom I ever had; he was the engineer in charge of the works.

Mr. VREDENBURGH: I object to that. The contract shows what Mr. Ferris is; Mr. Leal cannot change that by his oath.

The COURT: I shall have to exclude the latter part of Dr. Leal's answer; it was not responsive to the question.

Q. Did Mr. Ferris send you any communications on behalf of the City, with respect to sanitation?

A. Yes, sir.

Q. I mean written communications?

A. If this is allowable, I will state that Mr. Ferris and I worked together in this matter.

Mr. VREDENBURGH: I object.

The COURT: Confine your answers strictly to the questions.

Q. Did Mr. Ferris, in fact, take a hand in looking after the sanitary condition of the water shed?

A. He did.

Mr. VREDENBURGH: I object.

Q. Did he send you any written communication on behalf of the City?

Mr. VREDENBURGH: What I want to call your Honor's attention to is the attempt to load on Jersey City what Dr. Leal could get Mr. Ferris to say or do about this thing. We disclaim, on the part of the City, that Mr. Ferris had any rights whatever in the matter; the only rights he had are what were given to him by the contract.

The COURT: I think some of the evidence may be admissible and some may not. I take it that whatever Mr. Ferris did officially will go in. Now he may have exceeded his powers, and if he did exceed his powers, why then his acts will go for nothing; but whatever he did officially I will be obliged now, in view of the fact that I am so unfamiliar with this evidence, whatever he did officially I shall now admit, but it will be subject to your objection.

Mr. CORBIN: We shall claim that the proper construction of the contract demands that the City shall notify us if they see cause of complaint in the water shed, and that the contract means that, and we shall show to what extent, and that is what I am leading up to. They have done it, but to what extent? They haven't done anything at all yet. Not that the responsibility of the policing is on them, but that it is their duty under this contract, we shall claim, to inform us of any grievances they have from time to time and notify us. That is all of it, and I shall show to just what extent they did it at the first, and show the extent that they haven't done it since. For example, I say that under that contract, Mr. Griffin and those others that were inspecting in Dover, discovered a house that was connected with the river; it was their duty under this contract, to have informed us of it at once. We have the right, not only to such things as may be disclosed by our own diligence, but a right, under this contract, to be informed of anything that the City discovers and thinks ought to be remedied.

Q. (Question read.)

A. He did.

Q. Is that in the minutes?

A. No, sir; what he sent me is not in the minutes.

Q. Have you got it here?

A. What he sent me?

Q. Yes.

A. Yes, sir.

Q. State first the date of it?

A. Why, in explanation of this—

Q. No, the date of it?

A. The date of it is September 9, 1904.

Q. This communication was sent to you by Mr. Engineer Ferris?

A. It was sent to me in accordance with an agreement which existed between us, which had been confirmed by the Street and Water Board.

Q. That is already in evidence?

A. Yes, sir.

Mr. VREDENBURGH: I ask that any agreement between Mr. Ferris and Dr. Leal be stricken out.

Q. The communication is all at length on the minutes of the Street and Water Board, as I understand it?

A. Yes, sir.

Q. And this is a further communication, as I understand it, following out that scheme?

A. Yes, sir.

Q. The first communication on the minutes enumerates what ought to be done in the way of sanitation?

A. No, sir; what is on the minutes is the agreement confirmed by the Street and Water Board.

Q. What is the date of it?

A. It was in the spring of 1904. I have the agreement right here.

Q. Well, the same thing that is in the minutes?

A. Yes, sir.

Q. Well, give us the date then?

A. The date is February 27, 1904.

Q. Now, when you speak of an agreement, do you refer to this communication entered in the Board of Street and Water Commissioners' minutes on page 70, under date of February 27, 1904?

A. Yes, sir; I refer to what is there written under the date of February 27, 1904, and signed with my name.

Mr. VREDENBURGH: What is it?

Mr. CORBIN: It is in the form of letter from Dr. Leal to Mr. Garwood Ferris.

WITNESS: Mr. Ferris and I went to the meeting of the Board and referred this to them, and they approved of it.

Mr. CORBIN: And Mr. Ferris' transmission of the same to the Board, and the entry of the same upon the record. Is that what you refer to?

WITNESS: Yes, sir; that is the agreement.

Mr. VREDENBURGH: I move it be stricken out.

The COURT: So far as it is Dr. Leal's construction of what is to be found in the minutes of course the minutes will speak for themselves.

WITNESS: I was only speaking of my personal knowledge, your Honor; I heard it done.

Mr. CORBIN: Now, with the permission of the Court, I will read part of this communication, dated February 27, 1904, page 70 of the minutes, by Dr. Leal to Mr. Ferris, with reference to the matter of pollution of the Rockaway water shed.

"Paterson, N. J., Feb. 27, 1904

"Mr. Garwood Ferris,

"Engineer, New Water Works:

"Dear Sir—With reference to the matter of pollution in the Rockaway water shed, and in continuation of what was said by me at the meeting of the Street and Water Board, and afterwards in conversation with you, I wish to state as follows:

"1st. The Jersey City Water Supply Co. will cause to be removed any source of positive, direct and illegal pollution, deleterious to the water supply of Jersey City under our contract, and in the Rockaway River watershed above the Company's dam at Boonton. Said Company to bear expenses of such removal and Jersey City to endow it with any legal powers possessed by it and which may be required to effect such removal.

"2nd. All claimed sources of pollution must be indicated by you, and then inspected by you or by an educated and trained representative of yours and myself. Should we agree that a source of positive and illegal pollution exists, then such source of pollution shall be removed as soon as possible, by the company. Should we agree that a claimed source of pollution is not positive, direct and illegal, then such complaint shall at once be withdrawn by the City. Should we not be able to agree as to whether a claimed source of pollution is or is not positive, direct and illegal the company will within reason prosecute such a case, and will expect the city to furnish the necessary evidence.

"3rd. It has always been my policy, within reason, to make the water sheds under my supervision, satisfactory from an aesthetic standpoint.

Respectfully yours,

(Signed.) "J. L. LEAL, M. D.

" Sanitary Adviser,

"J. C. Water Supply Co."

"Jersey City, February 29, 1904.

"From the Engineer in Charge:

"Hon. Board of Street and Water Commissioners:

"Gentlemen—During February weather conditions have been such as to preclude any outdoor work on the Water Supply. Work has therefore been limited to the mucking necessary in Watchung tunnel to bring invert to sub-grade. At present rate of progress the required excavation should be completed in the latter part of March.

"The reservoir basin was filled up to elevation 273.88 on the 23rd of February, and water was flowing over the spillway on that day. When dam is completed the flow line will be at elevation 305.25.

"Water from storage basin was turned into conduit No. 1, for flushing purposes, on the 20th of February at rate of about 15 millions per diem and wasted at Peckman's Creek. The conduits are, however, to be emptied preliminary to testing them for capacity, etc., in order to permit of a thorough inspection as to their then condition.

"Sanitary inspection of the water shed is still being prosecuted. While generally the condition has been found unobjectionable, still there are some points that will require attention and on the 4th of February I so advised the Chief Engineer of the J. C. W. S. Co.

"Following my letter I had a conference with Engineer Harrison and Dr. Leal, sanitary adviser of the company. As agreed upon at that conference those gentlemen verbally stated their proposed action to the chairman of your Committee on New Water Supply and other members of your honorable body. Since then I have received a letter from Dr. Leal, in which he confirms the statements made by him at that meeting. As a matter of record a copy of that letter is hereto appended.

"Respectfully submitted

"GARWOOD FERRIS,

"Engineer in Charge."

"Received and ordered filed."

Q. That is what you refer to as the agreement?

A. Yes, sir.

Q. Will you produce that letter of which you gave us the date, from Mr. Ferris to you?

A. From me to Mr. Ferris?

Q. From you to Mr. Ferris, yes.

A. That is the letter.

Q. Is that it, what I have just read?

A. Do you mean what he sent to me, or what I sent to him?

By the COURT:

Q. Mr. Ferris says that he submits with his report a letter that he has received from you confirmatory of a verbal agreement. Now the question is whether or not the letter which is there referred to is the letter which you are now about to produce?

A. That is the letter, yes, sir.

FURTHER DIRECT:

Q. I thought you had later letters?

A. I have communications which under that was sent to me.

Q. What date is the first one?

A. Under that agreement I received two communications; the date of the first is September 9, 1904, which encloses a list of places alleged to have been discovered by Mr. Whipple.

Mr. VREDENBURGH: I object.

Q. Is that from Garwood Ferris?

A. Yes, sir.

Mr. CORBIN: I offer that letter and its accompanying statement in evidence.

Mr. VREDENBURGH: I object.

The COURT: I shall allow it subject to the objection.

Q. If it is brief please read it?

A. "September 9, 1904. Sanitary Adviser of Jersey City Water Supply Company. My Dear Sir—I have this day received copy of letter addressed to you by G. C. Whipple, of to-day's date, in which your attention is called to a number of cases of direct pollution of the Rockaway river above our reservoir. I write this so that you may consider said letter as a formal notice from me, and that you forthwith procure their abatement pursuant to the terms of the contract between Jersey City and your company.

"Yours very truly,

"GARWOOD FERRIS,

"Supervising Engineer for Jersey City."

Marked Exhibit D29.

Mr. CORBIN: This letter of Mr. Whipple's, accompanying the other letter is dated September 9, 1904, addressed to Dr. Leal. "The following is a list of the places on the water shed of the Rockaway river above Boonton reservoir where we have found positive evidence of the direct pollution of the water by fecal matter—

The COURT: Well, it is not worth while reading that.

Mr. CORBIN: There are thirteen places mentioned there, and that I offer in evidence.

Mr. VREDENBURGH: Whose letter is that?

Mr. CORBIN: Mr. Whipple's, and I offer that in evidence in connection with the other.

Mr. VREDENBURGH: Well, now, this is not Mr. Ferris' letter, it is Mr. Whipple's, and I object to Mr. Whipple's letter going in.

Marked Exhibit D-30.

Q. You said you had a second letter from Mr. Ferris; please produce it?

A. Shall I state what I did under this?

Q. No, produce the other one.

A. The other one is dated September 9, 1904.

Mr. VREDENBURGH: Well, that is the same date.

WITNESS: It is the same date, yes, sir—no, 1905 this is.

Q. From whom to whom?
A. Dr. J. L. Leal—

Mr. VREDENBURGH: Well, that was after the commencement of this suit, may it please your Honor.

The COURT: It looks to me as if it were "4," but I suppose that might be open to doubt.

Q. Is that the same date?
A. I am sure they were not received the same date; I think that is meant for a "5."

The COURT: I will ask Mr. Ferris about it.

By Mr. FERRIS: 1904.

Q. Letter dated "September 9, 1904, from Garwood Ferris to Doctor J. L. Leal. I have been notified that Messrs. Kischling and Whipple, the Expert Sanitary Engineers employed by Jersey City, in connection with the new Water Supply, consider that the continual discharge of human excreta into the Rockaway river at the Lyondale Print Works at Rockaway may become dangerous, as the evidence submitted to me seems to substantiate that opinion; I accordingly demand, as supervising engineer of the new Water Supply that you, in behalf of the Jersey City Water Supply Company, secure forthwith the complete and permanent abatement of this source of direct pollution of said river, pursuant to the terms of the contract between Jersey City and said Company.

"Yours respectfully,

"GARWOOD FERRIS,

"Supervising Engineer for Jersey City."

That is the second letter you referred to, was it?

A. Yes, sir; those are the only two which I received under that understanding.

Mr. CORBIN: I offer that in evidence.

Marked Exhibit D-31.

Q. What did you do, if anything, in pursuance of that first letter from Mr. Ferris, wherein he enumerates thirteen places where he thinks the river is being polluted?

A. Why, I at once arranged with Mr. Whipple to have a joint test made of these places, and the joint test failed in all except—

Q. Except one or two or three?

A. Except four.

Q. What do you mean by joint test.

A. Mr. Whipple sent a man and I sent a man and they tested them together and waited the result.

Q. What did you do, if anything, in response to the second communication of Mr. Ferris, with respect to the Lyondale Print Works?

A. I at once had all fecal matter removed from the raceway from whence it reached the river—but I am sure that that was meant for 1905 in place of 1904.

Q. You think there was a year between those two letters?

A. Yes, sir; I am sure there was.

Mr. VREDENBURGH: Then the last letter was after the commencement of this suit.

WITNESS: After the commencement of this suit? No, it was before that. It was before the suit began but it was after the other letter.

Q. You had the work done at the Lyondale Print Works?

A. Yes, sir, and that work was done before the suit.

Q. What was done with the excreta?

A. Well, now, that all comes later on; I will give it to you, now, or wait until it comes in order.

Q. No; we will take it up in order. I withdraw that question. Have you ever received any other later communication from Jersey City of any sort, calling attention to any threatened source of pollution?

A. Not until about two weeks ago when I received through you a letter from Mr. Carey, Corporation Attorney.

Q. With reference to what?

A. To the drainage of a lot in Dover.

Q. Two weeks ago?

A. Two or three.

Q. March, 1907?

A. Yes, sir.

Q. Did you give attention to that place?

A. I did; yes, sir.

By Mr. VREDENBURGH:

Q. Where is that letter?

A. I haven't it with me. Somebody sent Mr. Carey a communication, and he referred it to Mr. Corbin, and Mr. Corbin referred it to me. There was nothing special in it.

FURTHER DIRECT:

Q. Has it been remedied or attended to?

A. Yes, sir.

Q. Where was that place?

A. Why, it is what was called the Fahr property, and they were dumping on it, and there was a neighborhood fight, and one party wanted it dumped on and the other party didn't want it.

Q. Where is that, what town?

A. Town of Dover.

Q. Dr. Leal, have you heard or read the testimony in this case with respect to alleged places of pollution of the Rockaway water shed?

A. I have.

Q. Are you familiar with all of them?

A. I am.

Q. Now I will ask you to very briefly take these up in their order; I don't think we must waste time in dwelling on the details, because they have all been testified to by both sides. Gas works, Dover?

A. I will state that I have in a list here every place which has been testified to in this suit, and I have simply put them in order as a list. If I go over my regular report it means a long time, because I made different visits on different days, and if you say so I will run along each individual place from this list.

> The COURT: I suppose that in most of the cases there has been an agreement reached, the nuisance has been removed or it has been agreed that there is no nuisance; I suppose that is about the substance of it. Now that being so it is hardly worth while to encumber the record and take up time with enumeration of cases which had no special significance. Those cases which have special

significance the Doctor can give us, and then he can state generally with regard to the other cases, any other thing that he desires to state.

Mr. CORBIN: This list that I have here follows the order in which Dr. Herold and Mr. Chandler has used it, and the Doctor has stated briefly the result of his examination, and I am going to submit this to the other side and if there be no objection I shall ask that it be put in the record to be enlarged upon only in such places as the Doctor cares to enlarge upon it, and by cross examination, of course.

Mr. VREDENBURGH: I will ask whether this is the list from which Dr. Herold testified?

Q. Is it the same list?
A. Why, there are some things on it to which Dr. Herold did not testify.

Mr. CORBIN: This will be Dr. Leal's statement.

Q. I wish you would call attention to every one he did not testify to.
A. Yes, sir.

Mr. VREDENBURGH: Then with that exception, if this is the same that Dr. Herold testified to, except so far as Dr. Leal will tell us—

WITNESS: I will state that this list is a list of the places testified to by Dr. Herold and Mr. Chandler and Mr. Gibson, with a very few exceptions.

Q. Does this include all the places that have been testified to on the part of the city?

A. Yes, sir; every one.

Mr. CORBIN: Now, I shall, with the permission of the Court, put this list, as it is here, in the record, as if sworn to here. Will you kindly take up the places where you want to make special comment?

WITNESS: Yes, sir.

Q. Is this list correct, according to your inspections and examinations?

A. It is.

Q. Are these facts you have noted in the list within your personal knowledge, unless otherwise stated in the list?

A. There are no facts noted in this list at all; simply a list of the places.

Q. Take the Schwartz building.

A. Just let me see that. Yes, this is what is called my report and Dr. Herold's report; Dr. Herold and I worked together, we were at the end when the others put in the coloring matter. Now this is Dr. Herold's and my report gotten up together.

Q. Are all the facts stated in this list within your personal knowledge?

A. Yes, sir; everything.

Q. Are they correctly set down on this list?

A. They are, and are exactly what Dr. Herold has sworn to.

Q. Do you swear to them?

A. Yes, sir.

The COURT: Well, that paper will go in, as a part of your evidence, Doctor, so that you need not say anything that is said in that paper; but you will now state any particular thing to which you wish to call attention, outside of that.

"DOCTOR LEAL'S REPORT.

May 3, 1906, Gas Works.

Monday, May 7, 1906.

Schwartz building, tested at 9:30 A. M. No result at 10:02 A. M.

From 10:05 A. M. to 10:50 A. M. all fixtures in Mansion House, No. 6 Blackwell street, 12 Blackwell street and 16 Blackwell street were tested. Color appeared at mouth of Morris street drain at 11 A. M.

At 11:30 A. M. privy in rear of Sweedish Church was flushed with 20 pails of water and color introduced. No result at 12:15 or 12:45 P. M.

27 East Blackwell St. Post Office Bldg. Tested at 12:34 A. M. No color appeared in 45 minutes.

16 East Blackwell St. Color introduced in closet on top floor at 2:15 P. M. Introduced in closet on 2nd floor at 2:20 P. M. No result at 2:55 P. M.

14 East Blackwell St. Color introduced in closet on top floor at 2:55 P. M. In closet on ground floor at 3 P. M. Color appeared at foot of Morris St. drain at 3:20 P. M.

16 East Blackwell St. Color introduced into both closets at 3:59 P. M. No results at 5 P. M.

16 East Blackwell St. Analine red was introduced into closet at 5:10 P. M. No result at 6:30 P. M.

May 8, 1906. Tuesday.

Dr. Hunter's office, Blackwell St. Color was introduced at 9:15 A. M. No result at 10 A. M. Color found in cesspool within a few minutes.

John Molers, corner Dickinson & Morris Sts. Color introduced into closet and wash basin on first floor, closet front and rear east end of apartments