

very recent and are they there in such quantity that any given amount of *Bacillus Coli* is present in one, ten, a hundred or a thousand cubic centimeters? What is the ratio of their presence to the amount of water drawn in, and could you do better by any system of purification in keeping them out?

*By Mr. Chabot:*

Q. Supposing, for instance, that East Templeton, Buckingham, Masson, Thurso, Cumberland, etc., were cities, instead of villages or small towns drawing their water from Ottawa, and that there was an epidemic of typhoid in Ottawa. If Ottawa continued to pour its sewage into the Ottawa river, above Rockcliffe, without any treatment whatever, would you say that these cities would be exposed to the same infection that we were suffering from?—A. Certainly they would.

Q. Notwithstanding the dilution or precipitation or anything else?—A. They are exposed to the same nature of danger but not to the same degree of danger. You apply the question of dilution and that will determine it very largely. I won't say the danger is not very much, but the point I want to make clear is what you do here by sewage purification methods to remove that danger? We have not got—and that is the point I am trying to make—any sedimentation, any septic tank treatment, any filtration that will remove them entirely.

Q. But these methods will remove bacteria to a very large extent?—A. It means this, that they say in England or France that you have taken out the element of putrefaction, the smelling element. You have not removed the *Bacillus Coli* present.

Q. But the death rate from typhoid has been very materially decreased.—A. Because of the purification of the water by filtration. I hope the Committee understand me when I say that it is not that I oppose purification. But I do want it made clear that we can in practice pour sewage into enormous waters like our great lakes where there is great dilution, and get a less number of *Bacillus Coli* per cubic centimeter than by the best known methods of purification adopted elsewhere on small streams.

*By Mr. Northrup:*

Q. As I understand it, the Colon Bacilli are the fellows we are after?—A. They come from the intestines of men and animals.

Q. Exactly.—A. And measure the possibility and presence of typhoid germs.

Q. So that the Colon Bacilli are the fellows we want to get rid of, are they not?—A. Yes. You know you get rid of the typhoid germ if you get rid of him.

Q. And he is a pretty hard fellow to obliterate?—A. That is the point I referred to, that the death of the bacillus in water is rapid. Houston tells us that in the experiments in his London Laboratory it was found 99 and a point per cent disappear in a week in raw Thames water; it is a foreign element in water. Now if you take 99 per cent of the bacilli out of the sewage, and take one per cent that is left, you can imagine what the danger really is, especially when you bear in mind the fact that the fellow that is left is probably not dangerous because he has lost his vitality; he is nearly dead, necessarily so when the others are all dead.

*By Mr. Chabot:*

Q. But he will revive quickly?—A. He will not revive as a dangerous germ as far as any evidence that we have goes. He has lost his effective virulence.

*By Mr. Northrup:*

Q. This Colon Bacillus is the one we have to dispose of and we have so far as the streams are concerned, three ways by which we may get rid of him; by the current, by precipitation, and by dilution. Now in the Niagara River it has been shown that if the current is swift it is not an effective factor?—A. No.

Q. If the current is slow there is a better chance of disposing of him?—A. Yes.