

blem is not solved after all. There is no supply of water available to the town but the river, and our system is hopelessly polluting the river, polluting it beyond the possibility of correction. The Government is again appealed to, and the same towns that were compelled by law a score of years ago to deliver their sewage to the rivers, are now forbidden under more stringent penalties to so dispose of it.

Sewage that has been lost in a flood of drainage and storm-water must be recovered by chemical precipitation or by downward intermittent infiltration through the soil, so that the effluent water shall be at least clarified. The resources of the chemist and the engineer have been taxed to provide proper means for accomplishing this work. The earlier experiments were undertaken in the hope, and, I may say, in the confident expectation, that value enough would be found in the recovered sewage and the reagents employed, to provide for the expense of the process and leave a margin of profit. Not only is the realization of this hope still deferred, but the impossibility of attaining such a result seems to have been almost demonstrated. The purification of the sewage, in other words, cannot be made to pay for itself, and the expense, whether great or small, must be added to our municipal burdens.

I am aware that we have not yet reached the end of these investigations and inventions, but I see no good reason to expect results very different from those already reached. It is furthermore to be distinctly borne in mind that water is not necessarily purified when it is clarified. The clearest water may be a source of the gravest danger.

The *sewage-farms* by which the process of intermittent filtration is accomplished, and by which the sewage is, in part at least, utilized, may be effective where suitable topographical conditions are found, but we shall scarcely find in them any general or permanent relief from the evils of river pollution. The climate of Ohio is unfavorable to their full efficiency, but they could be made to work a vast improvement on present practice in many of our towns.

The most advanced practice abroad is insisting upon these attempts to purify the sewage before turning it into the rivers, but our own practice, even the best of it, has no place for these refinements. Take the Ohio Valley, for example. It is the most favor-

able instance to be found in the State, except, perhaps, the cities of the lake border, because it is traversed by the largest river. Pittsburgh, Steubenville, Wheeling, Bellaire, Marietta, Pomeroy, Gallipolis, Ironton, Portsmouth, Ripley, Maysville, New Richmond, and a score of smaller towns, pour their unfiltered sewage, so far as they get rid of it at all, directly into the Ohio. Leaving out of the account the effect of these towns upon those below them in the list, let us consider the case with reference to Cincinnati alone. With a population of 300,000, busy with scores of manufacturing industries, many of them replete with vile and poisonous waste, not only derives her entire water-supply from a river used as a sewer by a million people, but herself opens every sewer and every channel of manufacturing waste directly into the Ohio, and still the towns below drink from the beautiful river and give thanks for their bountiful water-supply!

But when some protracted drought reduces the Upper Ohio to a narrow channel, across which a pebble can be tossed, and when into these upper waters the germs of Asiatic cholera, for example, shall have been dropped, what is there to hinder a pestilential wave from sweeping down the valley, as resistless as the floods of 1883 and 1884, and far more destructive?

Viewed, then, with reference to water-supply, that altogether vital element in the maintenance of the public health, the system that we are now pursuing in the disposal of sewage is self-destructive. It breaks down with its own weight, and I repeat the statement with which I set out, the sewage *ought not* to be turned into the rivers.

But there is a second reason of almost equal weight with the first, for prohibiting the discharge of sewage into our rivers. Even if sewage could be conveyed by the rivers without running them as sources of water-supply—and rivers of the first class may possibly be made to serve the double office—there would still be a powerful argument against such a disposition of it. The excremental portion of the sewage constituted the very life of the soil from which, by the last analysis, it was derived; and no system of agriculture can be counted other than a system of spoliation that allows it to be withdrawn and permanently lost. It is poison to the rivers, it is the life of the soil. The soil, that wonderfully beneficent covering of the rocky framework of the earth, to