late with the sediment, and notwithstanding the sediment, they succeed in reducing the organic matter of the water to the inorganic condition. The sediment is thus an advantage, but the end is better accomplished by keeping it out of the cistern and introducing the bacterial workers through the medium of a layer of clean gravel or sand.

But withal, it must be remembered that it is only organic matter in a state of decay that is thus reduced to the inorganic condition, and only organic matter in a tangible form that is thus carried down by the heavier particles of the mineral sediment. Organic matters that are endowed with vitality remain uninfluenced by the destructive and reconstructive bacterial agencies that are operating in the water ; and these, as has been seen, are the matters from which most is to be feared if sewage has unfortunately had access to the supply. The infected water which prostrated 1200 of the 8000 inhabitants of Plymouth, Pa., and killed 130 of those whom it prostrated, passed through three storage reservoirs on its way to accomplish its deadly mission.

Nor is filtration more efficient as a purifier when viewed from the standpoint which sees typhoid-fever disseminated by an infected sewage in the water supply. A satisfactory filtration removes the haze or cloudiness which may pervade a sedimented water for days after the grosser particles have subsided, and in so far its results are better than those generally effected by sedimentation. The finer particles of clay, some no larger than barley distinguishable molecules under the ordinary working powers of the microscope, are removed, and with them organic shreds of similarly minute size, and even many of the bacterial germs which were present. A water thus freed from foreign matter in suspension seems to offer the lustre of its transparency as a voucher or visible symbol of its purity, and chemical analysis may show in it only the merest trace of organic matter in solution, for the processes decomposition and recomposition of the organic elements take place with much greater rapidity when the water percolates through the pores of the soil, as in the natural process of filtration, than when it is merely stagnant in a reservoir or flowing in the current of a stream. It is now well known that the bacterial agencies which effect these changes have their habitat in the three or four feet of soil which constitutes the surface of the earth and that in soaking through this layer the organic matters of a water are transformed into matters which the roots of living plants can absorb and assimilate. Chemical analysis may therefore show in such a water merely the small quantities of ammonia or nitric acid which are the results of this bacterial action, and the water may be claimed to be pure on much stronger evidence than can be advanced on behalf of any water which is massed on the surface in a lake, pond, river-bed, or settling-basin, these surface waters having at work in them only those struggling bacteria that have been washed from their habitat in the soil into the current of the stream. In fact, so far as can be demonstrated by chemical tests, the naturally-filtered water may be free from everything of an organic nature.

In view of our knowledge of the conditions needful to a perfect natural filtration, it is impossible to allow that artificial means, operating after nature's methods, will ever produce as pure a supply as can be procured in suitable localities by digging a hole in the ground. Comparatively speaking, only a small quantity of rain falls on a stated area—a depth of so many inches during the course of a year—and of this a large proportion is turned aside for the general police of the surface, and, having fulfilled its mission, is carried off by surface channels to the ocean, while another part of the fall cools the overheated surface of the soil by its evaporation, and gives the air that proportion of moisture which is needful to the continuance of life under present conditions. Only a few inches of the annual rainfall penetrates the soil, and, escaping the roots of the living vegetation, collects on the surface of some impervious stratum as the surplus water poured into a flower-pot drains into the saucer below. Artificial filtration has neither the time nor the surface to effect percolation after nature's method. Filtering-beds of gravel are prepared which permit more water to pass