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SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

SEWAGE DISPOSAL FROM THE SANITARY OR THE ÆSTHETIC POINT OF VIEW. WHICH HAS IT TO BE?

Dr. Amyot (Provincial Bacteriologist, Ontario), in an address recently given before the Toronto Engineers' Club upon "Typhoid and its Prevention," raised the question: Are modern methods of sewage disposal sanitar ywhich do not include the disinfection of sewage?

The doctor concludes that such have practically no right to the term "sanitary," and that the results aimed at are almost purely æsthetic in character. It was pointed out that the typhoid infection was not generated spontaneously by sewage or other effete organic matter. In fact, that the bacilli of typhoid did not and could have no existence in sewage unless sown or planted there from outside introduction.

Typhoid infection in sewage means either live or dormant cases of typhoid amongst the people providing the sewage.

It may be said generally that all sewage disposal methods, up to the present, have taken little or no cognizance either of the presence or the necessity of the removal of typhoid germs, or, in fact, any other disease germs from sewage.

Bacteriology is comparatively a new science. Methods of sewage disposal were in vogue, and became a necessity long before anything was known of bacteriology or the germ theory of the transmission of certain diseases.

Early methods of sewage disposal aimed at purposes of tillage without the slightest thought of disease infection being brought into contact with garden produce; and at the present day many of the modern methods of sewage disposal take no thought of the millions of bacteria which may be brought into contact with a water eventually used for drinking purposes.

The sanitary or health point of view has been neglected in favor of the point of view of removing a visible nuisance which at once makes itself apparent to our senses.

Hence we have European and American standards of sewage purification, which all take into account the removal of the tendency of the organic matter in the sewage to undergo putrefaction. In fact, most standards and tests are based upon requirements of chemical purity and entirely ignore bacteriological purity.

Bacteriological purity, Dr. Amyot considers, is of more importance from the sanitary point of view than chemical purity.

The Doctor is not content to make this assertion based on the longevity (about six days) of typhoid germs in open water, but he gives a most telling and powerful illustration of how a rapid-flowing stream may become comparatively chemically pure and yet remain bacteriologically impure.

The Niagara Falls and Rapids are cited. This river takes the whole of the sewage of Buffalo and other towns, and, after being broken up over the great falls and tossed about in miles of rapids, settles into comparative quiescence at Niagara-on-the-Lake. The water at Niagara-on-the-Lake is, chemically speaking, pure; on the other hand, it is, bacteriologically, almost as impure as before it reached the Falls and rapids. This is illustrated in a practical way by the great number of intestinal diarrhœa cases which annually occur amongst the soldiers at the summer encampment through drinking this water.

The common theory held by many that turbulent water and swift-running streams tend to bacteriological purification is refuted by the doctor as unsound in fact and experience. As a proof of this contention he points to the well-known fact that, next to slow sand filtration, storage of water in quiescent areas effects the highest bacteriological purification.

Dr. Amyot is not alone in this contention. Dr. Houston, in his report to the Metropolitan Waters Board (London) on "Storage of River's Water," concludes as follows:—

(1) Storage reduces the number of bacteria of all sorts.

(2) Storage alters certain bacteriological river water ratios. For example, it reduces the number of typical B. coli to a proportionately greater extent than it reduces the number of bacteria of all sorts.

(3) Storage, if sufficiently prolonged, devitalizes the microbes of water-borne disease (e.g., the typhoid bacillus and the cholera vibrio).

Our Great Lakes present huge storage reservoirs, and that is the reason why, apart from sewage contaminated zones, they present water purer than is found in most swift-running rivers.

The argument, therefore, often used that all danger from the sewage of Buffalo is removed simply by the action of the Falls and rapids is not a sound one.

The purification which does take place is of a chemical nature, similar, in every respect to the amount and character of purification demanded by modern sewage disposal works, whereas the sanitary or health point of view is entirely neglected.

Dr. Amyot prophesies that the time is coming very shortly when all sewage disposal methods will include a final or supplementary treatment for disinfection of sewage. He pointed out and dwelt upon the great value of chlorine obtained from calcium hypochlorite for purposes of destroying bacteria in sewage, and showed that from 98 to 99 per cent. bacteria can be actually destroyed by the application of from 2 to 2½ parts per 1,000,000