ON THE DISPOSAL OF SEWAGE—SOILS BEST ADAPTED FOR IT.

BELOW are extracts continued from the excellent paper written for the State Board of Health of California, by Rudolph Hering, Civil and Sanitary Engineer, of New York, commenced in the February number of the JOURNAL, Regarding the purification of sewage by land filtration: The Massachusetts State Board of Health have for several years been engaged in experimenting on this subject at Lawrence, Mass., where a station has been erected for the purpose. They at present still continue and results are being reached, which, for the first time, place the entire subject of sewage filtration upon a scientific basis. The filtering grounds comprise about two-thirds of an acre. Upon them are ten tanks, about seventeen feet in diametar, and allowing for material to be filled in five feet deep. The tanks were filled with different materials, as follows: No. 1, very coarse, clean mortar sand; No. 2, very fine, nearly white sand; No. 3, peat; No. 4, river silt; No. 5, brown garden soil, well manured; Nos. 6, 7 and 8 were filled with three feet eight inches of coarse and fine sand, ten inches of yellow sandy loam, and six inches of brown soil; No. 9, very compact, sandy, hardpan of clay, sand, and gravel, covered with nine inches of brown soil. No. 10 was used to measure the rainfall and evaporation. The sewage used in the experiments was taken from a main sewer draining a portion of the city. From the last report of the Board the following statements were obtained: Sewage can be much more efficiently filtered through open sand than through sand covered with soil. Very fine material, like dust, in the upper layers of a filter, prevents free access of air, and when wet, may exclude air so completely as to render purification impossible. With soil or sand containing dust at the surface, periods of intermission in the application of sewage may be made so long that the surface, becoming dry, may allow air to enter, and a high degree of purification may result; but the quantity of sewage that can thus be purified is very much less than when the upper layers of the filter are composed of open sand, through which the sewage will rapidly disappear, and will leave room for air to enter and come in contact with the thin laminæ of liquid covering the particles of sand. Filtering areas of sand covered with soil, or areas of very fine sand, may be much increased in efficiency, in both summer and winter, by digging trenches in the direction of a slight incline, about two feet deep, one foot wide, and six feet apart, and filling them with coarse sand. The sewage should be applied to this coarse sand, and once in a month or two, a half inch in depth should be taken from its surface and replaced by clean sand.

A very few vegetable organisms that can be identified by the microscope have been found to occasionally pass through the coarser filters; but in general none come through.

Of the still more minute organisms, the bacteria, it was found that soon after sewage was first applied to the tanks they came through in great numbers, but became reduced in number, and during the later winter and spring months amounted to 2 per cent. and less of those of the applied sewage; but after nitrification commenced they decreased rapidly, and continued through the summer, in many cases, less than one hundred, and, in some, less than ten, while the number in the same quantity of applied sewage was about a million. The experiments made to the present time show that the number of bacteria in the sand decrease very rapidly from the surface downward. In the finer sands they nearly or quite disappear before the bottom is reached. In some of the tanks it appears, that of the large number of species found in the sewage, a single species only lives to reach the outlet. There is reason to hope that the filters may be so made and managed that all disease germs may be, with certainty, removed, and this important subject will probably be pursued to definite conclusions.

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