for over two years, and carrying along preliminary studies in the various schemes.

Milwaukee is now facing the problem. There the entire sewage of the city is flushed out into the lake, two and a half miles from the water intake. Filtration of the water has been recommended, with the removal of the sewage from the river and its diversion to a point about nine miles from the intake, where, later, settling basins, and finally, sprinkling filters will be required.

In Toronto the water supply is to be filtered, with slow sand filters, recommended, by the way, by Messrs. Hazen and Whipple, and the sewage is to be diverted to a point some three and a half miles to the east, where it is to be settled and perhaps disinfected before discharge into the lake Dr. Amyot can tell you more of the details.

In conclusion, I may sum up by saying that it is recognized to-day that filtration of a water supply, either by slow sand or rapid filters, according to conditions, will remove impartially 95 per cent. or more of the bacteria, and the turbidity. A small amount of hypochlorite of calcium will remove practically all the remaining bacteria. The situation in Cleveland demands a most careful, unbiased investigation, at once, in order to fix whether the available data warrant the immediate expenditure of the sum required for filtration. Conditions have changed since 1903. In matters appertaining to the public health, delay is dangerous. Sterilization with chloride of lime will, however, furnish temporary protection until the decision is rendered.

VENTILATION.

By Dr. Leonard Hill and Dr. Martin Flack.*

The authors remarked that the good effects which resulted from efficient ventilation and open-air treatment, though generally supposed to be due to the chemical purity of the air, were due really to the movement, coolness, relative humidity of the air, and the ceaseless variation of these qualities. The ventilating engineer had hitherto followed a great illusion in thinking that the main object to be attained was chemical purity of air. The heating engineer had sought after an equally great illusion in striving to obtain a uniform summer temperature. The ventilating and heating engineers should aim primarily at giving air which was cool and of proper relative humidity, and which moved so as to vary the cutaneous state of the body. Comfort and discomfort in crowded rooms and shut-up places depended, not on the chemical purity of the air, but to a minor degree on the influence of the smell of the air on the olfactory sense, and, to a vast degree, on the influence of the temperature and relative humidity, and the variations of these qualities of the air, which acted on the great field of cutaneous sensibility.

The chemical purity of the air might be considered from three points of view-the concentration of carbon dioxide, the concentration of oxygen, and the supposed presence of organic poison exhaled by the breath.

Owing to the fact that a percentage of carbon dioxide exceeding a very few parts per 1,000 was not legally permissible in factories, it was commonly supposed that any greater excess acted as a poison. The truth of the matter was quite otherwise, for whatever the percentage of carbon

* Abstract from a paper read before the Society of Arts, London, Eng., on "Influence of Ozone in Ventilation."

dioxide in the atmosphere might be, that in the pulmonary air was kept constant at about 5 per cent. of an atmosphere by the action of the respiratory centre. It was impossible any excess of the gas should enter the body even in breathing the air of the worst-ventilated room, in which the percentage of carbon dioxide assuredly did not rise above 0.5 or at the outside I per cent.

The oxygen in the worst-ventilated theatre, school-room, or chapel was never lessened by more than I per cent. of an atmosphere, but all the evidence went to show that only when oxygen was lowered below a pressure of 14 to 15 per cent. of an atmosphere did signs of oxygen want arise. A diminution of I per cent. of an atmosphere had not the slightest effect on health or comfort.

There was no positive evidence which demonstrated the poisonous nature of the condensation water obtained from the breath, as suggested by Brown-Sequard and d'Arsonval; further, there was at present no trustworthy evidence of the existence of any such poison in exhaled air.

As to the general principles which ought to control the practice of the heating and ventilating engineer, the old English methods of open fire and open window had very much to recommend them. By the open fire air was kept moving and cool air was brought in; the heating was by radiation, and uniformity of the conditions of temperature in the room was prevented. On the other hand, the impulsion of hot air into a room was the most objectionable of all the systems employed. A cool air and radiant heat were the ideal; the hot air system gave neither. In cold weather the heated air became excessively dry; the vigor and health of children in America had been seriously undermined by the impulsion of hot "desert air" into the schools.

Uses of Ozone .- In the concluding part of their paper the authors discussed the uses of ozone in ventilation, basing their remarks on experiments carried out with an ozonizing apparatus put at their disposal by the Ozonair Company. They stated that by the smell concentrations of ozone of far less than one part in a million could be detected, and the gas should be present in the air for continuous breathing in concentrations not greater than that scarcely perceptible to the smell. Concentrations of even one part in a million were too irritative. Very weak concentrations, barely perceptible to the smell, had no ill effects, but destroyed the effect of unpleasant smells and gave a certain tang or quality to stuffy air which relieved its uniformity. It was in this respect that ozone had its use. There existed in modern conditions of life so many trade shops, tube railways, cold meat stores, etc., where the employes were exposed to a persistent, uniform, and depressing smell. The air in many buildings was made to smell by the heating appliance used. The addition of ozone took away the smell and relieved the monotony of such air, and as the Ozonair apparatus could, by the turning of a switch, be put in or out of use, the uniformity of the atmospheric conditions could thus be frequently changed. The ozone, no doubt, exerted its effect both on the cutaneous and respiratory nerves. They thought that the addition of ozonized air to the Central London Railway had improved the conditions, the unpleasant characteristic smell of the tube being diminished, and the menotonous quality of the air improved.

The Harbor Commission, Los Angeles, Cal., have decided that the harbor improvements, consisting of a 2,600 foot fireproof wharf and wharf structures are to be construct ed of reinforced concrete.