

WATER SUPPLIES AND RIVER POLLUTION

The tenth annual report of the Water Pollution Research Board has been issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, 9d.). The Board carries out research mainly on the treatment of water for domestic supply and for other purposes, the treatment and disposal of sewage and trade effluents, and on problems of river pollution.

Water-softening Materials

Experiments have been continued on the preparation of materials for softening water by the base-exchange process. This process is used in household water-softeners, and is also employed on a large scale at a number of waterworks. The investigations of the Board have shown that satisfactory water-softening materials can be prepared from fuller's earth, which is found in parts of the British Isles. The base-exchange capacity of the final product depends on the type of fuller's earth used, yellow, weathered varieties being more satisfactory than blue varieties.

Removal of Salts from Water by Resins

The discovery that acids, bases, and salts can be removed from solution in water by means of synthetic resins has aroused widespread interest both in this country and abroad. It has been shown, for example, that fresh water can be prepared from saline water by treating it first with a suitably prepared base-exchanging resin and then with an acid-exchanging resin. The removal of traces of deleterious substances from water used for domestic supply or other purposes is desirable in many parts of the world. For example, it is known that a defect of the teeth, known as "mottled enamel," may be caused by drinking water containing as little as one part per million of fluorine in the form of compounds. Experiments are in progress to determine whether these compounds can be removed from water by treatment with suitable resins. Again, in recent years considerable attention has been given by agricultural chemists to the presence of compounds of boron in water used for irrigation; certain plant diseases are caused by excessive or insufficient concentrations of these compounds. Recent work has shown that partial removal from water of boron compounds is effected by treatment with a resin prepared from a tannin.

Lead in Drinking Water

Certain types of water take up appreciable quantities of lead from lead pipes and fittings. An investigation is in progress to determine the average quantities taken up by waters of different types under the conditions of household supply. A method is used in which a volume of 50 to 300 gallons of water is passed through a meter and then through a filter containing a mixture of chalk and magnesia, which takes up the whole of the lead from the water; the amount of lead taken up is determined by analysis. Apparatus of this type has been tested in eight towns in England and Scotland. Average concentrations of lead ranging from less than 1 part per 10 millions to as much as half a part per million of water have been obtained.

Milk Factory Effluents

Work on the purification of waste waters from dairies and milk products factories, which is being carried out in collaboration with the milk industry, has been continued. One of the most important results of the work has been to show that the loss of valuable products and by-products carried away with the waste waters from dairies and milk products factories can be considerably reduced by inexpensive modifications in the manufacturing processes. For example, when churns of milk are brought from farms to a central milk depot they are inverted and emptied into a large receiving tank. If sufficient time is not given to allow the churns to drain an appreciable quantity of milk remains in the churns and is later washed out and discharged with the waste waters. By a short increase in the time of drainage of the churns the

average quantity of milk carried away with the waste waters can be reduced from more than one-half of 1 per cent. to less than one-quarter of 1 per cent. of the milk handled. For a depot receiving 10,000 gallons of milk daily this represents a saving of over 9,000 gallons of saleable milk annually. Besides the saving of valuable material, the polluting nature and thus the cost of treatment of the waste waters are greatly reduced. The work of the Board has shown that the unavoidable waste waters from dairies can be purified by processes similar to those used for the treatment of sewage.

Work in progress includes investigations on the biochemical and biological processes of purification of sewage by the activated sludge process, and on the removal of organic matter by flocculation and sedimentation.

TUBERCULOSIS IN TANGANYIKA

The final report of Dr. Charles Wilcocks¹ on investigations carried out between 1930 and 1936 under the auspices of the Colonial Development Fund represents a sound piece of research, the conclusions from which add to knowledge on tuberculosis among primitive races. The results of 13,313 tuberculin tests showed that no part of Tanganyika Territory could be regarded as "virgin soil." The lowest percentage of positive reactors in adult males was 46. The highest percentage in adults (males and females) was only 5 per cent. less than that found in London by D'Arcy Hart. The results obtained showed, however, that the natives were more sensitive than Europeans to tuberculin, and that strong reactions tended to occur in contacts. This confirms the findings already reported from South Africa. The tuberculin tests related to other findings showed that the tuberculin rates provide good indices not only of the amount of infection in the districts but also of the amount of actual disease. In Dr. Wilcocks's opinion by far the most important factor in the epidemiology of native tuberculosis was contact with sputum-positive cases. Apparently the great majority of the natives who have been infected are capable of resisting that infection, though on the whole their resistance to tuberculosis is not so great as that of white races. In connexion with the allergic state of the natives a comparison is made between tuberculosis and malaria, but Dr. Wilcocks concludes that sensitivity and immunity seem to be more dissociated in tuberculosis than in malaria. The fate of the first infection appears to be similar to that already described among South African natives.

Study of the incidence of tuberculous disease in the Tanganyika natives (both radiological and bacteriological examinations were carried out) showed that the largest number of pulmonary cases were between the ages of 15 and 35, and that the curves in general bore more resemblance to those of the "young adult" type than those of the "middle age" type recognized in Britain. The incidence of disease in proportion to population was exceedingly difficult to estimate because it was impossible to examine large numbers of completely unselected natives. The figure of 11.55 per 1,000 of the population, calculated over the whole of the places investigated, is probably too high, because it seems likely that more tuberculous patients presented themselves for examination than would be proportionate to the whole. Bovine tuberculosis is not considered at present to be a factor of importance. Finally, it is of interest to note that examination of the x-ray films of the native cases of definite pulmonary tuberculosis showed a preponderance of acute "galloping" consumption and of bilateral disease. Fibrosis was not common, being found chiefly in middle-aged people. The base of the lung was often affected. Cavitation was often seen, but it was rare to see a zone of fibrous tissue around it. Dr. Wilcocks concludes that on the whole the appearances, while not so gross as would be seen in a "virgin" race, were not so fibrous as are seen in civilized countries; these natives thus "lie midway between the completely primitive races and our relatively resistant selves."

¹ Tuberculosis in Tanganyika Territory. By Charles Wilcocks, M.D. 1938. Dar-es-Salaam: Published by the Government Printer. Price 3s.