RESEARCH LAB. AND SEWERAGE EXPERIMENT STA.

By EARLE B. PHELPS.

In the fall of 1902 the Institute received from an anonymous friend the sum of fifteen thousand dollars for the purpose of making a three years' investigation of the problem of sewage disposal as it applies to large cities. The following purposes were specified: (1) For keeping up with the investigations of the best men in all countries. (2) For utilizing this knowledge in the work of the Institute. (3) For original experiment. (4) For distributing all over our country, in such words that he who runs may read, the results of the work. (5)And for inciting the students to make plain and simple statements of the results of their work. In this gift the Sanitary Research Laboratory had its origin and by the continuing generosity of the donor it has been supported to the present time

Work was immediately begun under the direction of Professor William T. Sedgwick and in the immediate charge of Professor C.-E. A. Winslow, Members of the staff of Biological Department and seniors and graduate students in Biology and Sanitary Engineering have been actively associated with the work from the first.

A location was secured at 786 Albany street, on the line of the nine-foot trunk sewer of the Boston main drainage system. Here were installed during the first year the necessary pumping and distributing systems and a series of twenty-two tanks and filters covering in the broadest way the various known processes of sewage treatment. The plant was first put in operation in July, 1903. During the first two years a general survey of the field of sewage disposal was made. Sand filters, septic tanks, contact and trickling filters, and processes of aeration and clarification were submitted to detailed study under carefully controlled and known conditions. The results were measured by chemical and bacteriological methods and physical and engineering data, having reference to the design and cost of works, were collected. Simultaneously an investigation of the amount and character of the sewage of Boston was undertaken. This involved continuous, twenty-four hour tests at various seasons of the year to determine the hourly, daily and seasonal variations and the average character of the sewage.

The results of this study on the crude sewage of Boston, together with special papers on analytical methods were published in 1905, as Volume 1 of the "Contributions from the Sanitary Research Laboratory." A conspicuous feature of the laboratory has always been the improvement of analytical procedure and in this first volume, as in subsequent papers, new methods of chemical and bacteriological procedure were recommended, which have later been adopted as standards. In the following year, 1906, Volume II. of the "Contributions" was published. This volume is a detailed report of the first two years' experimental study, with a history of the sewage disposal problem and a resume of investigations of others at home and abroad. The U. S. Geological Survey considered this paper of sufficient practical importance to justify its publication and general distribution as a government document.

Since 1906 three additional volumes of "Contributions" have appeared, these being made up of reprinted papers written by members of the laboratory staff upon special topics relating to sewage and water purification and allied topics. In the third volume the results of the second two years's experiments are reported, while in the next volume a detailed plan for the disposal of Boston's sewage with estimates of the cost of the project is given. In Volume V. Professor Winslow's investigations of the bacteria in sewer air and the writer's work in the new field of chemical disinfection of sewage are reported.

In June ,1909, the Albany street plant was given up and new and larger filters were installed at the Old Harbor Point Pumping Station, Dorchester. The office and laboratory were removed to the Pierce Building.

SANITARY SCIENCE

C. E. A. WINSLOW.

The special development of the Biological Department has been along the lines of the public health sciences, and this is likely, in the future, as in the past, to constitute its principal field of usefulness. There is a wave of sanitary reform sweeping over the country which leads to an ever-increasing demand for well-trained specialists. The chief factors in the war against disease are the medical expert, dealing with the individual, and the engineering expert, dealing with the environment. Second only to these two professions, however, are the public health bacteriologist, the sanitary chemist and the vital statistician and specialists of all five types are urgently needed by state and municipal board of health. It is the aim of the Biological Department to train public health bacteriologists and to furnish to men in Course V. and Course XI. the biological part of their equipment as sanitary engineers and sanitary chemists.

The Institute, under Professor Sedgwick, has taken a unique position of leadership in the work of public health reform all over the country. In water supply sanitation and in sewage disposal a majority of the leading experts are probably Tech men, and the demand for our graduates greatly exceed the supply. Only an adequate number of the right kind of students is necessary in order that the Institute may retain its position, which Mr. G. C. Whipple '89 has described in the dedication of his book on typhoid fever, "To the Massachusetts Institute of Technology. My Alma Mater A Pioneer in Sanitary Education, entitled to the Gratitude of every one who values The Public Health."

The fundamental course in this branch of the Biological work is a brief lecture course on sanitary science and the public health in which are discussed the fundamental principles of health and disease, the causes and vehicles of disease. the spread of disease by water and sewage and milk and insects and the general phenomena of immunity and vital resistance. This course is now given, not only to those students who are specializing in sanitation, but also to Option 1 in Course I. and to Course IV. It would be of great advantage if such a course were included as required work in all departments, and the day is likely to come when this will be done, not only in the Institute, but in all institutions of higher learning. It is a quite unreasonable procedure to teach the student about the various engines and motors he is likely to meet with and to give him no information, except for five lectures in the freshman year, about the complex living machine it is certain he must operate. The technical graduate furthermore is not only responsible for his own health, but often for that of many others. The time must come when such men will no longer be sent out merely to serve as food for typhoid and tubercle bacilli for the want of simple instruction in sanitary science.

For the Course VII. and Course XI. men, the next work in importance is a two hours (XI.) or four hours (VII.) course in Municipal Sanitation. Here the sanitary aspects of water supply, sewage disposal, garbage disposal, air supply, and board of health administration are considered in some detail and illustrated by visits to various plants in operation in the neighborhood of Boston. Course VII. men have next a course in Industrial Hygiene in which factory accidents, industrial poisonings and factory dust, in relation to industrial tuberculosis, are discussed. This is one of the fields in which the Institute has done pioneer work, and it is believed that no course of similar scope is given in this country. Finally in the fourth year in Course VII. informal conference courses are conducted in Public Health Problem, Epidemiology. and in the Biology of the Infectious Diseases, completing a general survey of the principles which govern the causation and prevention of environmental disease.

The Sanitary Research Laboratory offers unusual facilities, to properly qualified students, for the study of problems relating to the purification of water and sewage, the disposal of industrial wastes and allied topics.