

plant for a few days were again offered to the lizard, which ate them readily. Thus it is shown that a mere change of food plant may be of great importance in relation to destruction by natural enemies; furthermore, that some distasteful larvæ do not possess "warning" coloration, and again, that these cryptically colored larvæ were not recognized, after a few days, as objectionable. It would be interesting to repeat the experiment, having, if possible, ornamented the larvæ in some way so that they would be more easily recognized.

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Sewage Disposal. By LEONARD P. KINNICUTT, Director of the Department of Chemistry, Worcester Polytechnic Institute; C.-E. A. WINSLOW, Assistant Professor of Biology and Biologist in charge of the Sewage Experiment Station of the Massachusetts Institute of Technology, and R. WINTHROP PRATT, Chief Engineer of the Ohio State Board of Health, late director of Sanitary Engineering of the Republic of Cuba. New York, John Wiley & Sons. Price, \$3.

This octavo book of 421 pages consists of a well-blended recital of American and European, especially English, experiences which have established the principal features now recognized in the science and art of sewage disposal. Almost without exception it is free of views that are either radical or so old-fashioned as to be regarded as superseded.

The joint authorship of this book has much to commend it and it will be noted that it includes in Professor Kinnicutt one of the foremost sanitary chemists in America, and one who has been fortunate enough to make numerous inspection trips to sanitary works in Europe, during the past thirty years. Professor Winslow, formerly of the Institute of Technology, in Boston, now of the College of the City of New York, has had unusual opportunities of studying the biology of this subject, particularly in connection with extensive experiments made at Boston. The practical side, from an engineering standpoint,

has occupied the attention of Mr. Pratt for many years, first in Massachusetts and later in Ohio, with a valuable experience in Cuba.

The chemical and biological aspects of the book are more comprehensive and detailed than those of an engineering nature. Probably this is wise in a book of this size on a subject of such a wide scope as this one and which is undergoing such rapid changes in some of the more important aspects of engineering practise. Numerous references are given to details of results obtained from the findings of the Royal Commission on Sewage Disposal of Great Britain, as well as the results of tests and practical operations in America and abroad, especially in England. References are rather meager as to German investigations and experiences. To some extent the same is true of the results of current practise in the design and operation of disposal works in the United States other than in Massachusetts and Ohio.

After an interestingly stated introduction as to the sanitary demand for sewerage and sewage disposal, the book is divided into thirteen chapters, of which brief mention may be made to advantage as follows:

Chapter 1, pp. 1-20, deals with the composition of sewage in the terms of the analyst. Chapter 2, pp. 21-44, outlines the disposal of sewage by dilution. Chapter 3 gives many details as to the screening and straining of sewage, pp. 45-67.

The preliminary treatment of sewage by sedimentation, chemical precipitation and septic process occupies Chapters 4, 5 and 6, pp. 68-166. These chapters are unusually well-written, although they do not bring fully up to date very recent developments with the so-called "Imhoff" tanks, which have shown themselves to be a marked step in advance during the past year or two in practical operations in western Germany.

The expensive, bothersome and frequently unsuccessfully solved question of the disposal of sewage sludge is well outlined on pages 167 to 192.

Chapters 8 to 11, inclusive, on pages 193-274, contain a well-balanced statement of ex-

periences in this country and abroad as regards filtration in intermittent sand filters, contact beds and trickling filters.

The remaining chapters, pp. 375-409, contain first a full statement of the recent work done in this country in the sterilization or disinfection of sewage, with data as to the efficiency and cost, while the book is concluded with a brief summary of the main features of sewage analysis with particular reference to those tests of most benefit in practical operations.

The book is very attractively written and is well indexed. There are 113 figures illustrative of the various distinctive features of the principal processes. The more one studies the book the more apparent it is that there has been a vast amount of study given to the compilation of a wide fund of information so as to embody it compactly for convenient reference. The book is free to an unusual extent of statements to which exceptions will be taken by experienced sanitarians. The principal points on which there would be differences in opinion are in reference to the residual quantity of dissolved oxygen which would be found in a stream into which sewage has been discharged, and the disparaging reference to automatic controlling devices for the operation of contact beds.

Taking the book as a whole, it may be safely said that it will be of much assistance in the class-room in teaching this subject to students and especially to the public hygienist desiring to get a general insight into the subject in its broader phases, with ample opportunity to ascertain where the various results with different styles of plants have accomplished definitely recorded results.

GEO. W. FULLER

The Practise and Theory of the Injector. By STRICKLAND L. KNEASS. Third edition, revised and enlarged. New York and London, John Wiley and Sons. 175 pages, 53 illustrations and diagrams.

This book possesses the great merit of having been written by one who is a master of his subject. It is no ordinary compilation; it

is the reflection of a life work. Its author for more than a quarter of a century has given serious attention to the problem of perfecting the injector. He has made it a part of his business to study the fundamental principles underlying its action, to conduct experiments which would supply data with which to embellish the theory, and to contribute to the working out of actual designs which from time to time have become the standards of a great manufacturing company; yet such is his modesty that nothing which is printed suggests his personal activity in the development of the instruments he describes. The book presents in logical order the fascinating story of the development of the steam injector, an instrument which serves to feed water to a steam boiler through the action of a jet of steam drawn from the boiler which is fed. In the language of the book, "'its mode of action, extraordinary in appearance, contrary to that which we are in the habit of seeing or supposing, is explained by the simplest laws of mechanics and has been foreseen and calculated in advance.'" The book is interesting throughout because its story is well told. It deals with a subject which can not be freed from mathematical theory, in a manner which is sufficiently complete to satisfy the most fastidious lover of equations, and yet the work is so admirably arranged that no one who is interested in the subject is likely to find difficulty in reading it.

The introductory chapter on the early history of the development of the injector, from which the lines quoted above were taken, is chiefly a story of the achievements of Henri Jacques Giffard, who as early as 1850 had succeeded in developing the principles underlying the design of the present-day instrument. The injector, as a device for feeding boilers, was introduced into England in 1859, and into this country by William Sellers and Company the following year. The story of a demonstration of its action in England by one who had received a sample instrument from France is graphically told as follows:

I set to work at once, and by good luck coupled up the correct pipes to their proper flanges, but