

BOOK REVIEWS

Sanitary Entomology, the Entomology of Disease, Hygiene, and Sanitation. Edited by WILLIAM DWIGHT PIERCE, Consulting Entomologist, U. S. Department of Agriculture. Boston, Richard G. Badger, (1921). 518 pp., 28 pls., 88 figs. in text. \$10.

Interest in sanitation resulting from the desire of entomologists of the United States to contribute to the efficiency and success of the Allied armies in the World War is responsible for this book. It originated as a mimeographed text in 1918, sent out to over 500 members of a voluntary class of entomologists aspiring to prepare themselves for sanitary service along entomological lines. The work is a coöperative one, the contributors all being members of the staff of the Bureau of Entomology, United States Department of Agriculture, with the single exception of Dr. H. A. Ballou, Imperial Entomologist, Barbados, who contributes the chapter on "Flies and Lice in Egypt." Dr. W. D. Pierce is the editor of the entire work and the contributor of 19 of the 35 chapters dealing with such subjects as How insects can carry or cause disease, necessary steps to prove insect transmission of disease, the needs of entomological sanitation in America, the seriousness of insect-borne diseases to armies, the relations of climate and life to medical entomology, the diseases borne by, and the life histories of the non-biting flies, the control of the housefly and related flies, diseases transmitted by, and biological notes on the bloodsucking flies, diseases transmitted by mosquitoes, mosquito control, diseases borne by lice, fleas, cockroaches, the bedbug and other bloodsucking bugs, and by mites and ticks, insect poisoning, and a tabulation of diseases transmitted by insects. Dr. Pierce collaborates with Mr. C. T. Greene in a chapter on the biology of mosquitoes and with Mr. R. H. Hutchison in an account of the life history and control of human lice. Dr. B. H. Ransom writes a critical and informing chapter upon the relation of insects to the parasitic worms of vertebrates. Mr. F. C. Bishopp treats of the control of flies in barn yards, pig pens and chicken yards, of the causes, prevention and treatment of myiasis, the life history and control of fleas, and the biology, habits and control of ticks. Mr. J. L. Webb discusses the biology and habits of horse flies, and Mr. S. H. Lamson

deals with the lice affecting domestic animals. Mr. A. N. Caudell writes on cockroaches and Mr. E. W. Laake recounts the rather repulsive relations of insects to the packing house industry.

This book is invaluable to all workers in tropical sanitation because of the relatively larger significance of insects to disease in warmer climates as compared with that in the cooler ones. The tropics favor the rapid multiplication of insects, their persistence throughout longer periods of the year, their prevalence in great numbers because of the abundance of vegetation and animal life upon which they depend. Insects loom large in the tropics also because of the low stage of development of hygiene and sanitation among tropical peoples, especially as regards the use of human excreta in agriculture and resulting pollution of soil and water, which combined with irrigation prove ideal conditions for multiplication of man's worst insect foes, the fly and mosquito. This book is the most comprehensive compilation of much that has been written on the relations of insects to disease, has extensive bibliographies, especially of the American work, and is full of valuable suggestions for the sanitarian, epidemiologist, pathologist, bacteriologist, protozoologist and helminthologist, whose fields it necessarily overlaps to varying degrees.

As a compilation covering so large a field and prepared under the stress of a great emergency, it has the faults of its qualities. In the present state of progress in investigation, and of literature and bibliographies, with the disruptions attendant upon the war, it is an almost superhuman task to critically review the field covered by this work, and much more so for a group of entomologists alone to attempt it. The authors have had the coöperation of Dr. Ransom in his critical contribution on the relations of insects to the helminth infections of vertebrates but their work lacks such contributions from the bacteriologist, protozoologist, and epidemiologist, and is therefore at times uncritical in the fields of these specialists.

The mass effect of the vast amount of detailed evidence that insects may mechanically for a time carry the active or encysted stages of organisms which are etiological factors in disease, or be their facultative or obligatory hosts, is so great that even the biologist, much more the novice in sanitation, may be inadequately impressed by the fact of the widespread occurrence of normal parasites among insects and also of the fact that the spores, cysts, eggs and larvae of the disease-producing organisms of vertebrates may be harbored not only by insects, but also by other animals in contact with excreta, offal, and

polluted soil, such as the sow bugs, earthworms, robins, gulls, pigs and rodents. Furthermore, the *relative sanitary significance of all such carrier action* is of fundamental importance in preventive medicine. At the best, it is difficult in the present stage of our knowledge in these fields to attain the scientifically correct perspective of such relative significances, and the reader of such a compilation as this must be on his guard to segregate the important from the unimportant, the proven from the hypothetical, and the possible, but as yet merely suggestive, from the erroneous. The mere fact that data, conclusions, inferences, or a mere hypothetical suggestion has once appeared in print is no scientific justification for repeating it. Error rides a fleet horse, truth follows afoot. The inclusion in the table of diseases transmitted by insects of eczema and the unqualified statement that it is transmitted by the direct attack of *Pediculus corporis* is a case in point, and no amount of general prefatory demurrer of responsibility justifies the perpetuation of this error *without correction*.

The user of the work must not rely upon the bibliographies as complete or even representative. For example, Hart's (1895) careful account of Tabanidae of the Illinois River is omitted in the bibliography of the horse flies. Minchin's (1915) epoch making investigation of *Trypanosoma lewisii* in the rat flea is omitted in that of diseases transmitted by fleas, and the crowning act of omission is that of Schaudinn's (1902) most fundamental discovery of the life cycle of *Plasmodium* in the mosquito. Incidentally there is no reference of methods of mosquito control at Panama, or to the work of Ross or Watson or Herms in this important field. Laveran's (1917) critical discussion of insect transmission of leishmanioses is apparently unknown to the writers as is also the discovery in California of a trypanosome in the kissing-bug, closely allied to that of Chagas found in *Triatoma* in Brazil and reputed to be the cause of Brazilian infantile trypanosomiasis.

While it is true that the mere presence in the digestive tract of the fly of active forms, spores, cysts or ova of human parasites render the fly a *potential* menace to the health of man, it does not follow, until proved by experiment that the menace is an actual one. For example, the work of Wenyon and O'Connor (1916) and of Root (1920) has shown that cysts of protozoans pass through the digestive tract of the fly in a viable state (as shown by eosin staining). We still await proof, however, that such parasites will later excyst and are still uninformed as to the relative *sanitary* importance of water or air borne cysts, fly borne cysts, rodent carriers, and the dirty hand of the food handler, as the medium of infection in human intestinal amoebiasis and flagellosis.

As a piece of book-making, some features call for criticism. Editing has not eliminated some unfelicitous phrases, such as "entomology sanitation." The date of the book, which the user is certainly entitled to know, is omitted from the title page and preface and is found only in the statement of copyright. Some of the illustrations, especially the half tone plates, are inexcusably indistinct and a few of them, as for example plate 9 "Carcass partly destroyed by larvae of the American screw-worm fly," have so little scientific or practical value that they ought to have been omitted so as to reduce the already large cost of the book. Many of the otherwise excellent diagrams of life cycles are so labelled and so reduced in reproduction as to bring some of the lettering to the size of 4-point type, a condition readily avoided by forethought in location of labelling and with very little increased demand for space. There is no correlation between the pagination of the preface (pp. i-xxvi) and that of the text proper (p. 20). The bibliographies vary in the matters of inclusion of and translation of titles, in citations, and very much in completeness and scope.

Notwithstanding these minor defects, the book will be a useful addition to the library of every one interested in sanitation and preventive medicine and should stimulate interest in this very important field of applied entomology.

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