tion is dated February 1962 and the text appears to be of about the same date but the date of publication is 1964. A supplementary list of references up to August 1963 is given, but the papers in this list are not discussed in the text. Partly as a result of the delay between writing and publication, the book presents a rather unsatisfactory account of this developing field.

The account of lysosomes, cytosomes and microbodies is confused. The author includes the work of Daems in his additional list of references, but he does not consider it in the text in relation to his own. Fig. 77 and 78 of vacuoles containing Periston are identical to the structures found by Daems after injection of dextran. Daems showed that these structures are lysosomes containing the injected material and not dilated endoplasmic reticulum as David suggests. Many other aspects of the subject have changed significantly since the book was written. The use of histochemical techniques is dismissed in two paragraphs. The work of Novikoff and of Sabatini and his colleagues is included in the additional list of references and again not considered in the text.

The material in the volume is of interest and the technical standard of the electromicrographs is good. The presentation, however, is most extraordinary; the work is in two volumes, the text in one and the electronmicrographs in the other. The text is in German followed by an English and then a Russian translation; however, the English translation is stilted and betrays a lack of familiarity with the subject-matter. The legends to the illustrations are in the text volume, but the figures are not referred to in the body of the text when a point illustrated is alluded to, but are given as a list at the end of each chapter. In reading the book one has an exasperating time referring rapidly from one volume to the other. The structures in electronmicrographs are profusely labelled with abbreviations of their German names. It was only after looking through the book many times that I discovered the key to the abbreviations hidden under the dust cover inside the back cover. Probably the most extraordinary thing of all about the two volumes is their price, £25.

D. B. Brewer

MECHANISMS OF ENDOTOXIN ACTION

Bacterial Endotoxins

Edited by Maurice Landy and Werner Braun. (Proceedings of a Symposium held at the Institute of Microbiology of Rutgers University.) Pp. xvi+691. (New Brunswick, N.J.: Institute of Microbiology, Rutgers, The State University, 1964.) 12 dollars.

In September 1963 a three-day symposium devoted to the problems of bacterial endotoxins was held at Rutgers University. Following the example set by the Society for General Microbiology the texts of the principal papers were circulated to the 212 participants and this greatly increased the time available for discussion. The symposium has been published with commendable speed and consists of the original papers grouped into eight sections, each one being followed by an edited version of the discussion. The habit of publishing the discussion has its critics but in this volume it reads well and does supplement the preceding section.

There are a total of 58 papers which vary in length and quality. Some are well-documented reviews of a particular problem while others are short reports of a few experiments. There is a variation in the treatment of the references in that in some papers the bibliography gives the titles of the works cited while others do not. Many readers prefer to see the titles quoted, and it seems a pity that all the papers did not follow this pattern.

There is an extremely interesting introduction by Dr. I. L. Bennett which clearly describes the type of problem which is to be discussed. As he points out, endotoxins have a complex chemical structure which attracts considerable interest in its own right. On the biological side their range of activities is not only vast, it is confusing, since to take two examples they may raise or lower body temperature and increase or decrease resistance to bacterial or viral disease. While they are antigenically specific, in many biological tests they are surprisingly non-specific. Endotoxins, while not so potent as some exotoxins, are very toxic and have been used clinically to produce artificial fever. Repeated injection may, however, lead either to tolerance or hypersensitivity. These few pages set the scene for the papers that follow.

The first section is devoted to the chemical research that is taking place and covers such problems as the structure of bacterial cell walls and the relationship between structure and biological activity. The pharmacological effects are discussed in two sub-sections and the attempt is made to relate the action of endotoxins to the fundamental processes in the cells involved.

Parts 4 and 5, devoted to immunological phenomena and the effects on host resistance to infection, overlap to some extent and may be taken together. The problems of natural antibodies and recovery from infection figure largely in these sections. In Part 6 there are eleven papers devoted to the conflicting problems of tolerance and hyperreactivity. The symposium closes with two sections devoted to the mode of action of endotoxins and in many ways this is the most interesting.

In terms of research interest for many years endotoxins have been the poor relations of the exotoxins. *Bacterial Endotoxins* will, I think, do a great deal to redress the balance and may be warmly recommended to a wide range of readers.

R. H. Gorrill

THE POGONOPHORES

Pogonophora

By A. V. Ivanov. Translated from the Russian and edited by D. B. Carlisle. With additional material by Eve C. Southward. Pp. xvi+479. (London: Academic Press, Inc. (London), Ltd., 1963.) 90*s*.

Pogonophora, although rather common marine animals, have until recently been almost unknown. In 1962 only three species were recorded against the eighty species described by 1964. Such a sudden acquisition of knowledge of a widespread group of animals is unprecedented in the history of zoology, and it is all the more surprising in a phylum related to the Protochordata. During the 1920's the R.R.S. *Discovery* dredged enormous masses of apparent fibres from the abyssal depths of Antarctic and sub-Antarctic waters, and many tons of unrecognized Pogonophora in their tubes were shovelled overboard. These amazing animals, lacking a gut and feeding exclusively by means of tentacles, form the dominant element in the fauna of quite large stretches of the sea bed, but elsewhere they appear to be entirely absent.

The examination of Pogonophora is now an active pursuit in the marine laboratories of many countries. These animals have been exhibited alive in the rooms of the Royal Society in London. But it is the intensive collection by Soviet oceanographical expeditions and the subsequent investigation of this material by Prof. Ivanov in Leningrad which has provided the wealth of information concerning structure, manner of life, life-cycle and systematics of these creatures.

Prof. Ivanov's beautifully illustrated monograph on the Pogonophora, issued in Russian in 1960, has now been translated by Dr. D. B. Carlisle, and this English edition of the *Pogonophora* has been brought up to date by the inclusion of diagnoses of new species described between 1960 and 1963 and of further data concerning geographical distribution and general biology, so pro-