

BOOK REVIEW

BOUCIAS D.G. & PENDLAND J.C.: PRINCIPLES OF INSECT PATHOLOGY. Kluwer Academic Publisher, Dordrecht, The Netherlands, 1998, 537 pp + 12 pp, 151 ill., 39 tab. ISBN 0-4120-3591-X. Price USD 250.00.

The Principles of Insect Pathology by Boucias and Pendland brings to an end the "old times" in Insect Pathology, the period of 50 years from the foundation of this scientific discipline by E.A. Steinhaus with his Principles of Insect Pathology (1947) and ending with the publication of Insect Pathology by Tanada & Kaya (1993). This period was mainly concerned with diagnostics and the recovery of insect pathogens of insect pests from natural materials, their laboratory cultivation and potential use in pest control. In the "new period", the Principles of Insect Pathology by Boucias and Pendland is likely to be a classic. It focuses on the use of insects and their pathogens as laboratory models for experiments in molecular biology and genetics, by using different genetic and molecular treatments to modify pathogenic activity and change the symptoms. This approach requires experimental material first be collected and identified by old style experts who then present the material to the new insect pathologists in labelled vials or cultures.

This textbook presents the general principles of insect pathology for graduate students and non-specialist entomologists and biochemists. It covers four major groups of pathogens - viruses, bacteria, fungi and protozoa, and outlines the defense mechanisms of insects. Each section has an introductory chapter that provides the general background information on the trends in each group at the molecular and cellular levels, especially the relationship between structure and function. The authors present the terminology used and problems encountered in the basic research on each group of pathogens and indicates their application in insect pathology. The pertinent terminology is printed in *Italics*, usually accompanied by a short explanation. This is a useful introduction to the actual terminology for graduate students.

In sub-chapters the authors present brief accounts of each group of pathogens, based on recent information but omit to cite the relative importance and priorities of publications. In many cases older classic observations are replaced by inferior recent citations because the computerized literature service only covers the last 5–10 years. Therefore, as proposed by the authors, students using this textbook need to complement the informations by referring to monographs such as Tanada & Kaya, 1993 or Burges & Hussey, 1971 or Burges, 1981.

The following statements of the authors: "critical work dealing the development of microbial control agents was conducted and completed in the 70's and 80's can be omitted" and "significant advances in formulation of insect pathogens and toxins have been developed in the private sector and are proprietary", should be ignored by young scientists working on insect pathogens. The statement that after more than two decades of private and public research the promised "tremendous potential" of insect pathogens has yet to be realized is rather defeatist and contradicted by the success achieved in using nematodes and fungi in bio-control. Laboratory studies of insect pathogens have made it possible to use nuclear polyhedrosis virus as stock for grafting of gene sequences in vertebrate and plant tissue cultures, to produce transgenic plants with *Bac. thuringiensis* sequences to plant millions of acres of crops and to use the insect pathogen *Tolypocladium*, to produce its mosquitocidal metabolite, the immunosuppressive Cyclosporin A which has proved invaluable in transplantations of tissues and organs in human medicine. Greater effort needs to be devoted further to

advertising the achievements and evaluating the applications in the field rather than in the laboratory.

In terms of presentation and content the most informative section is that on viruses, at least in terms of literature. It is not very instructive for students trying to identify a virus in field collected material. The differences between polyhedra of NPV and inclusion bodies of CPV are not well explained on accompanying figures where the disposition of virus particles protruding from CPV inclusion bodies is not even mentioned.

The chapters on bacterial pathogens give details of investigations in molecular biology and genetics. Remarks concerning the practical diagnostics of field collected material are rather academic and do not mention the use of the simple microscopic identification of BT as sporeformers with a crystal on sides of the spore, or BS as rods with endstanding spherical spores, and favours identification by complex chemical reactions.

Fungal pathogens are the domain of the authors and therefore well presented. Recent biochemical information and information on metabolite toxins are well documented, but the theoretic rules of production of highly active metabolites by precursor feeding and genetic improvements of producing strains for which the entomopathogenic Deuteromycetes are interesting candidates are poorly documented.

The chapters on protozoa are the poorest part of the book. They do not discuss the implications from basic research as they used in other chapters. The presentation and the selection of model species do not illustrate the characteristic interactions with insects. Lack of a deeper knowledge of these groups is evident in all the tables and figures. Louis Pasteur is credited with saving the silkworm industry from consequences of *Nosema apis* infection (p. 5). *N. apis* in fact is a very specialized pathogen of the honey bee, whereas it was *Nosema bombycis* that destroyed sericulture in France and was studied by Pasteur. The structures in Fig. 12–1 are not correctly labelled, the structure labelled as nucleus is the posterior vacuole and the nucleus may be that structure located in the coils of the polar filament. The authors' lack of practical knowledge of the matter is reflected in the many mutilated names of organisms in tables in these chapters and in all other sections that refer to viruses, bacteria and fungi (more than 30% of the tables). It is questionable if Metschnikow used *Metarhizium* in his studies of immunity. He worked on *Monospora (Metschnikowia) bicuspidata*, the yeast attacking *Daphnia magna*, which he collected in the Jardin des Plantes in Paris. He used *Metarhizium* to control the wheat cockchafer in Russia before he went to Paris.

Very useful is the part that summarizes what is known about immunity against pathogens in insects. The authors present basic information on general immunology in the context of what is known about this subject in insects.

Summarizing: the treatment is modern, and mainly uses computerized information. The rich compilation of actually used terminology (generally without citation of pertinent literature) will help molecular biologists and biochemists understand insect pathology- et vice versa. The credibility of information in this book is damaged by many printing errors (bad spelling) of Latin names and some misunderstandings, which reflect the specialized knowledge of the authors. Their tutors and instructors which are listed in the preface were excellent teachers. I wish to recommend the book as a "door opener" to modern insect pathology provided that it is used in conjunction with a classical text book on insect pathology.

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