Medical Entomology for Students

FIFTH EDITION

Despite numerous scientific investigations on vector-borne human infections such as malaria, filariasis, Lyme disease and typhus, these diseases continue to threaten human health. Understanding the role of vectors in disease transmission, and the most appropriate control strategies, is therefore essential. This book provides information on the recognition, biology, ecology and medical importance of the arthropods that affect human health.

The fifth edition of this popular textbook is completely updated, incorporating the latest strategies for controlling insects, ticks and mites. Numerous illustrations, with new colour photographs of some of the most important vectors, aid recognition. A glossary of entomological and epidemiological terms is included, along with a list of commonly used insecticides and their trade names.

Clearly presented in a concise style, this text is aimed at students of medical entomology, tropical medicine, parasitology and pest control. It is also essential reading for physicians, health officials and community health workers.

MIKE SERVICE is a world authority on medical entomology and has over 50 years' experience of research and teaching in the field. He is Emeritus Professor of Medical Entomology at the Liverpool School of Tropical Medicine. In 1997 he was awarded the Sir Rickard Christophers medal by the Royal Society of Tropical Medicine and Hygiene, and in 2002 the Harry Hoogstraal Medal by the American Society of Tropical Medicine and Parasitology, for research on medical vectors.

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Mike Service

Emeritus Professor of Medical Entomology,
Liverpool School of Tropical Medicine, Liverpool, UK

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To Wendy, for all her help over many years with this and previous publications

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Colour plate section appears between pages 140 and 141.

Preface to the first edition

This is not intended as a reference book on medical entomology; those interested in such a book should consult *Medical Insects and Arachnids* (1993) edited by R. P. Lane and R. W. Crosskey (Chapman & Hall). The present book is aimed at students, whether they be physicians, nurses, health officials, community health workers or those studying for a masters' degree in parasitology or medical entomology. Its aim is to provide basic information on the recognition, biology and medical importance of arthropods and guidelines for their control. In a teaching book such as this it is always difficult to decide how much detail to include and what to omit; you cannot satisfy everyone. Nevertheless I have attempted to write a book to suit the needs of most students.

The reader should be selective. For example, I hope that most will find all, or most of, the information given in the chapters on fleas, lice, bedbugs, scabies mites and flies relevant to their needs, but I would expect readers to be more selective with some other chapters, such as those on mosquitoes. These insects are undoubtedly the most important arthropod vectors; nevertheless some students may think I have included too much detail on certain aspects for their needs, and if so they can largely disregard such bits. I have also tried to be selective and avoid giving too many references at the end of each chapter, but with some vectors this has not been easy.

May 1995

Preface to the second edition

This new edition remains largely unchanged in respect of area covered from the first edition, and I have generally kept to the same style and format. As stated in the first edition this is a student textbook on medical entomology; those interested more in reference books should consult the publications listed at the end of this Preface. I have revised the text where necessary and rewritten many of the sections on control as these can quickly become outdated. A number of new figures are included, and some previous ones have been redrawn or modified. A few of the older references under the headings 'Further reading' have been omitted and several new ones added. Finally I have added a Glossary, mainly entomological, that I hope will help students to understand better some of the entomological terms commonly used.

February 1999

Preface to the third edition

The philosophy remains the same, to try and present clear and concise accounts of the most relevant information on the identification, life cycles and infections transmitted by arthropods of medical importance. The text has been completely revised and updated to include most recent vector and disease control strategies and new discoveries relating to the epidemiology of disease transmission. In 2000 some mosquito species formerly in the genus *Aedes* were transferred to the new genus *Ochlerotatus*, so that for example *Aedes togoi* is now called *Ochlerotatus togoi*. Although this change will inevitably lead to some confusion, I nevertheless have used it here because the name *Ochlerotatus* will now be found in most of the more recent scientific literature. Not to use this new generic name would create greater confusion! Some figures have been redrawn and new ones added, as have new tables and an appendix.

I have tried to help students during revisionary reading by placing in bold italics words relating to items, whether morphological (e.g. ***antennae***, ***capitulum***) or biological (e.g. ***transovarial***, ***reservoir hosts***), that are important in vector recognition or for understanding the role of vectors in disease transmission.

In addition to the Further reading at the end of each chapter, there is a Select bibliography of some key publications, mostly books on medical entomology, after the Glossary.

As before, readers, whether they be physicians, community health workers, health officials, nurses, or those specializing in medical entomology or parasitology, should be selective when reading the various chapters in this book, and focus on facts and issues that are most relevant to their needs or studies. Good luck!

October 2003

Preface to the fourth edition

The layout and approach in this edition remains the same as in previous editions but the text has been revised and updated, with the biggest changes made to vector control procedures. Problems can, however, arise when advocating the use of named insecticides for control because some insecticides (acaricides) may be banned in some countries yet not in others. In general I have left it to the reader to find out what chemicals are allowed in his or her area of operation.

Two new transmission cycles on West Nile and Japanese encephalitis viruses have been incorporated in Chapter 3. However, the biggest change to this edition is the inclusion of 24 colour illustrations of some of the more important vectors and pest species. This it is hoped will help readers have a better appreciation of what various arthropods actually look like – and some may even find the photo of a *Sabethes* mosquito beautiful! Another change has been to return to the older classification of mosquitoes and place all relevant species in the genus *Aedes*; that is, *Ochlerotatus* is not recognized here as a genus. Apart from other considerations this will simplify matters for readers.

It has been difficult to decide on the amount of detail and information that should be included in a book that is essentially a primer on medical entomology. Readership is targeted at a widely diverse audience, including community health workers, health officials working in public health programmes, nurses and physicians as well as those specializing in medical entomology or parasitology. However, as before I suggest that readers should be selective in deciding the amount of detail in the book they need to know, and thus focus on the most relevant issues.

August 2007

Preface to the fifth edition

As in previous editions, the style and format of this book remains basically unchanged, as this has proved popular with students. Nevertheless this new edition has been extensively revised, and the sections on the control of the various vectors, which can quickly become outdated, have been updated to keep abreast with new control strategies. The incidence of some diseases, such as lymphatic filariasis, onchocerciasis, Chagas disease and African trypanosomiasis, has been reduced through concerted control measures; in marked contrast, other infections, such as dengue, have become more frequent, and in several areas of the world there has been an increase in bedbug numbers. And although the latest control strategies have reduced malaria transmission in several countries, in others there has been little reduction of malaria.

To keep up to date with disease outbreaks readers are recommended to log on to ProMED-mail (www.promedmail.org), an electronic reporting system with daily updates written in several languages.

Several of the black and white line drawings and colour photographs of vectors have been replaced with better ones, and in addition there are eight new colour plates.

As in the last edition, the more conservative classification of mosquitoes has been retained. In particular, *Ochlerotatus* is treated as a subgenus, not a genus, and consequently all species formerly in *Ochlerotatus* are placed, once again, in the genus *Aedes*. I have done this to make it easier for students.

As always, it is hoped that this book will serve a variety of needs. I suspect that community health workers, other health officials working in public health programmes, nurses and some physicians may find the chapters on household pests such as fleas, lice, bedbugs and scabies mites the most relevant to their needs, whereas medical entomologists, parasitologists and other physicians will probably also be interested in the chapters describing the transmission of tropical diseases.

This fifth edition will be the last one that I write. I have enjoyed writing it, and the earlier editions, and hope that this edition will help students in their understanding of vector-borne diseases.

January 2012

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I am indebted to the Trustees of the Natural History Museum, London, for permission to reproduce Figures 4.2 and 4.4a, drawn by R. W. Crosskey, and to the Museum for permission to reproduce, in a modified form, Figures 17.1 (male tick) and 19.3. I am also indebted to Blackwell Publishing, Oxford, for permission to reproduce Figures 1.14 and 11.5, drawn by Miss M. A. Johnson.

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