Book Reviews

Electron microscopy methods and protocols

Editor M.A. Nasser Hajibagheri
Methods in molecular biology, Volume 117
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1999
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$89.50

This book, the 117th in the series, *Methods in molecular biology*, is a collection of 15 chapters authored by 23 scientists from seven countries. It may not be what the title leads the reader to expect, and prospective purchasers would be well advised to check the contents carefully before purchasing it. The editor's preface suggests that this is a suitable reference work for the newcomer into the field of electron microscopy, but reading on it becomes obvious that there are other reference works which are more suitable for this particular purpose. Other than the first and last chapters, this book is for the specialist looking for information on, and protocols for several techniques used for the preparation of material for electron microscopy in the fields of microbiology and molecular biology.

The opening chapter is an introduction to specimen preparation, aiming to provide enough information in eleven pages to enable those who have not previously done any processing for electron microscopy to prepare a wide variety of material for EM. This is an impossible task which the author attempts to fulfil by providing some detailed information on materials required and a few selected protocols. Unfortunately, though, the author clearly is severely constrained by the number of pages allocated to her and therefore is forced to leave out much information which should be included in a chapter of this nature. This results in a mixture of insufficient detail in some areas interspersed with over-attention to trivialities in others.

The subject of the series of which this book forms part – methods in molecular biology – determines the contents of 13 of the next 14 chapters.

The chapters on specific topics open with as thorough a coverage of negative staining of biological particulate material as is possible in the space available. J. Robin Harris provides lists of materials required which are extensive and details of protocols which should be easy to follow. Harris, with Marc Adrian, then consider the use of cryo techniques for the preparation and observation of viruses and macromolecules by transmission EM. This is done in sufficient detail to be valuable to those who are able to use this technique for their research. The following chapter continues on the cryo theme with coverage by Paul Webster of the use of cryo-ultramicrotomy in the preparation of material for immunocytochemistry (ICC). This chapter provides good detail but it does include inaccuracies (ICC being a technique for EM only?) and ambiguity (p. 53, '11. ... Stir the powder into hot water. Methyl cellulose is slow to dissolve and dissolves better in cold water, ...!'). The freehand drawings in this chapter are refreshingly informal but are they perhaps rather too unprofessional for such a publication? High pressure freezing (HPF), a highly sophisticated technique for producing frozen biological specimens with minimal ice-crystal damage, and which is an appropriate preliminary method for other techniques covered in this book, is dealt with in the next chapter by Kent Macdonald. Unfortunately HPF requires the use of costly equipment and much of the information in this chapter – the operation of a HPF apparatus – is of interest only to those with access to this equipment. Nevertheless, discussion of the principles involved in operating this equipment are interesting and protocols for other associated techniques which are covered (e.g. freeze-substitution) are useful. The two chapters which follow deal with embedding methods for TEM, with particular attention being given to methods suitable for use with immunocytochemical techniques. JR Thorpe provides detailed and easy-to-follow protocols for the use of the acrylic resin, LR Gold, which has many advantages as the embedding medium when ICC follows a fixation-dehydration-embedding-ultramicrotomy procedure. Methods for low temperature embedding, another technique for circumventing loss of antigencity during tissue processing, are provided in detail by Pierre Gounon. This chapter also includes a protocol for immunogold labelling which has a useful section on problem solving. The quantification of the results of immunolabelling techniques is assuming increasing importance and it is appropriate, therefore, that this book should contain a chapter devoted to this topic. Catherine Rabouille's coverage of the subject is thorough and should be of great assistance to anyone wishing to obtain quantified results from ICC studies. Microwave processing techniques provide a quick and sometimes more effective alternative method for preparing biological materials for TEM and in Chapter 9 Rick Giberson and Richard Demaree detail several different ways of applying this technique, both for conventional TEM and ICC. Localization of enzymes and detection of nucleic acids receive coverage in the following two chapters with Nobukazu Araki and Tanenori Hatae providing a brief, but adequate, chapter on enzyme cytochemistry, and Jean-Guy Fournier and Françoise Escaig-Haye giving detailed protocols on *in situ* molecular hybridization, both for the preparation of the probes and for their immunocytochemical visualization. For readers interested in the ultrastructure of yeast and immunocytochemical studies on it, there is much on offer in the following chapter in which the editor details techniques used in the preparation of yeast for ultrastructural and ICC studies, and includes a comprehensive list of references on the subject. The editor continues in the next chapter with protocols for the preparation of DNA and RNA molecules for TEM. This is detailed and includes several examples to demonstrate the usefulness of the techniques. Application of these and similar techniques in the study of Protein-DNA complexes by electron microscopy is the subject of the following chapter by Maria Schnos and Ross Inman.

The final chapter by John Morgan, Carole Winters and Stephen Stürzenbaum deals with X-ray microanalytical (EPXMA) techniques in biology and provides some detailed protocols for the preparation of a variety of tissues for EPXMA. Unfortunately the space available prevents the authors from giving adequate discussion of some important aspects of this technique of which newcomers to it should be well aware.

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Unfortunately there are deficiencies in the proof-reading and editing of this book which are an irritation to the reader. While it is obvious that authors have been provided with a general format for their chapters, it seems that once the chapters were submitted there was little attempt to 'pull them together' and thus produce a book which has consistency and continuity, and is easy to read. There are errors; spelling, grammatical and factual, and where authors provided information on suppliers of materials an attempt to make this relevant to readers on both sides of the Atlantic, at least, would have been useful. It is also confusing, a waste of space that could have been used to enlarge on other issues, and an indication of lack of editorial attention that some procedures receive coverage in more than one chapter; the preparation of support films, for example, receiving detailed coverage in three chapters! Care has not been given to consistency of style of drawings and the reproduction of the illustrations to the extent that in some important information is not easily visible (see Figure 3, p.193, and compare Figure 1, p.184, with the cover).

At $89.50 this book is not inexpensive and therefore the prospective purchaser may be surprised to see that it is ring-bound and soft-covered, and thus may be justified in expecting a more professional level of presentation. Nevertheless, the information this book contains is useful and as the protocols are clearly written and should be easy to follow, it would make a useful addition to the reference library of any laboratory in which this range of techniques are employed.

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Identifying British insects and arachnids: an annotated bibliography of key works

Editor P.C. Barnard
Cambridge University Press, Cambridge
1999
ISBN 0 521 63241 2
Hardback, 533pp
$80.00/£50.00

Paradoxes are learning opportunities. It may seem ironic to be reviewing a book about British insects in an African journal, since the northern hemisphere animals found in austral Africa are, commonly, introduced pests, and well known to local zoologists because of that. More is known about many of these immigrants than is known about the majority of our indigenous taxa. Surely we are more interested in a bibliography dealing with African insects?

This is the first point where the book finds relevance outside Europe: as an example of what can be done for other faunas. Most chapters deal with an insect order, starting with an estimate of numbers of species; a count of families; a summary of biology, higher classification and extinctions; comments on landmark publications; and notes on specialist study groups. This groundwork is followed by the annotated bibliographies, which are contemporary and broad in interest. Where the literature is rich, specialised or particularly fragmented, the bibliographies may be subdivided into sections dealing with general works, immature forms, or particular taxa, prefaced by introductory notes like those at the head of their chapter. Over 2000 references are included, a significant number of which are taxonomic monographs (some in French or German), and therefore deal with the European fauna at large. The bibliography is therefore relevant to a European readership.

The annotations following each citation are set off in smaller, bold print, making reading very easy. They are admirably pithy and concise about the merits of each work, and double the value of the bibliography to users.

The first chapter is aimed at non-academic readers. Simply by addressing the location and acquisition of literature (through for example bibliographies, abstracting services, and the World Wide Web), and furnishing notes on the decryption of abbreviated references, this chapter does much to ensure that the book is not out of place in public libraries (the price is rather high for private purchase). The work contains 32 other chapters by 26 authors. The Hymenoptera are handled by nine authors in 124 pages, just over a third of the book; Coleoptera and Diptera, with two authors each, fill 58 and 23 pages respectively. Several orders merit only a page or two, the nine-page index is essentially a list of the higher taxa of British arthopods from the family rank upwards, excluding the mite families and all taxa below the family level. Only primary mention of each taxon is indexed.

In short, the volume brings an enormous amount of desirable information to a wide audience in a very compact form. Because of its scope, it will be of immediate use in many European countries besides Britain, and serves as a useful model to those working in other faunistic regions.

Its role as model poses a second irony from which we can learn. Although this book contains references up to 1998, it will inevitably draw the same comment that it makes on many of the works it catalogues: as taxa are discovered or revised, it will date. With increasing pressure to counteract the biodiversity crisis through increased ease of access to contemporary information, printed works such as this are likely to give way to frequently updated, computerised databases. The cost of such information should drop too. However, the head of each chapter of the bibliography is graced with an elegant etching from Lydekker's 1896 publication, *The Royal Natural History*, and it is touches like this that lead me to prefer books over other media, however evanescent their contents. Perhaps I am dating too!

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