Books

Methods in Molecular Biology, Vol. 21: Protocols in Molecular Parasitology

edited by John E. Hyde, Humana Press, 1993. $59.50 (xiv + 470 pages) ISBN 0 89603 239 6

Molecular parasitology means different things to different people. For some, it conjures up images of hard-nosed molecular biologists moving into the parasitology field and seeking new targets for sophisticated techniques. For others, it evokes traditional parasitologists applying techniques developed in other fields to their own pet organisms, in the hope that these can make an impact where more conventional approaches have proved ineffective. The question, does molecular parasitology itself comprise a distinct field within parasitology, is perhaps debatable, but certainly it has spawned a new generation of young scientists versed in its methodology. It is also true that there is a lot of it going on, especially in the 'age of the kit' where molecular biology suppliers can provide optimized reagents, for a price!

Into this fray enters *Protocols in Molecular Parasitology*. As the title of this book suggests, it is aimed at the research worker who is investigating the molecular biology of parasites. It is a multi-authored work comprising 34 chapters each written by expert(s) in their respective field. It is also bound in ring-binder style, making it suitable for use as a bench manual. The format of each chapter consists of: introduction, materials, a section on methods containing the main descriptive body of information, notes and references. This has been adhered to throughout and gives the book a coherence not often found in multi-author works.

Molecular biologists, like most scientists, are a pretty conservative lot. Ask a molecular biologist why a particular technique was used and the usual reply is 'because I have always done it that way and because it works'. This response is quite understandable because it is often very difficult to go to the primary literature and find a good comprehensive account of the techniques used in the 'Materials and methods' section. Crucial information is often omitted or removed by editors who are seeking to minimize the length of papers. This volume seeks to overcome this difficulty by providing detailed protocols for the various manipulations needed by the molecular parasitologist. Not only should it be especially useful for postgraduate or postdoctoral workers who have limited experience of these techniques, but also for more established workers seeking to apply different techniques, or to work with a different parasite system.

In general content, the book confines itelf to dealing with the 'big five', namely, *Trypanosoma brucei*, *T. cruzi*, *Leishmania* spp, *Plasmodium falciparum* and *Schistosoma mansoni*, although many of the protocols should be readily adaptable to other parasites. The book begins with several chapters on the cultivation of parasites. These do not attempt to be comprehensive (many books have been written on this subject alone), but they do provide a useful start to the volume. These are followed by chapters that deal with the isolation of DNA and RNA from various parasites. Initially, I was somewhat sceptical of the need for five separate chapters on this topic, but each is different and deals with the problems encountered with the particular source material. This has the advantage that if, for example, one is seeking a method for malarial parasites, then you can go straight to the relevant chapter and begin reading. These chapters are followed by a series that cover the main molecular techniques, including blotting, PCR, screening libraries, chromosome methods and transfection. There are also chapters which cover related techniques such as surface labelling, immunological techniques and flow cytometry.

In summary, this is a very useful collection of protocols that should find its way onto the bench in many molecular parasitology laboratories.

Paul A. Bates
Liverpool School of Tropical Medicine
Pembroke Place
Liverpool, UK L3 5QA

Parascript: Parasites and the Language of Evolution

by D.R. Brooks and D.A. McLennan, Smithsonian Institution Press, 1993. $25.00/£19.50 (pbk) $69.00/£53.75 (hbk) (x + 429 pages) ISBN 1 56098 285 3/1 56098 215 2

Without doubt, the Appendix of this book (some 260 pages) is valuable. Parasitic protist and helminth phylogenies derived from cladistic analyses of morphology are reviewed, together with some complementary molecular trees. Taxa are not indexed and, given the current state of parasite systematics, the phylogenies are necessarily incomplete. Nevertheless, specialists may find some sections worth photocopying.

I suspect that the preceding 200 pages will see few photocopiers. The aim is to show that phylogenetic analyses can be used to examine parasite evolution, from which both evolutionary and parasite biologists have much to learn. Surely this is correct, but I would hesitate to recommend the book to a sceptic: much seems methodologically suspect and there is little evidence of how far evolutionary biology has come from story telling. A second aim is apparently to ensure Brooks' place in history as the discoverer of 'the Rosetta Stone for Manter's Parascript'.

'Parascript' is the term coined by Manter in 1966 to describe the 'language of parasites which tells of themselves and their hosts both of today and yesterday'. According to Brooks and McLennan, students of parascript, 'attempt to unravel the forces shaping parasite evolution by uncovering the patterns of geographic and host associations amongst parasite clades' (p. 21). The 'Rosetta Stone' is comparisons of independently derived host and parasite phylogenies. Congruence of the phylogenies is said to represent association by descent (co-speciation), incongruence association by colonization (host switching).

Brooks and McLennan contend that the central research problem for the 'Rosetta Stone' is deriving reliable phylogenies. But even with perfect knowledge, how are we to actually recognize congruence or the lack of it? Whether one likes it or not, this means asking whether two phylogenies have more similar topologies than expected by chance. On this (statistical) issue, the authors are silent. Furthermore, what does congruence really tell us about

co-speciation? Imagine, for example, a clade beginning to parasitize a host taxon. Even in the complete absence of host speciation, perfect congruence would arise if parasite species are more easily able to colonize related host species. Similarly, perfect co-speciation can produce incongruence if there is extinction or sampling errors. The growing literature on these problems (for a stimulating overview, see Ref. 1) is not mentioned in this book.

Six 'myths, metaphors and misconceptions' about parasites and their evolution are evaluated. In many cases, these represent 'straw-men', or very old schools of thought [surely few modern biologists seriously claim that organisms with such fantastic immune-evasion strategies and capable of exploiting numerous habitats during their life cycle are simple or degenerate (Myth II)?]. But even where the issues are interesting, the empirical analyses addressing them are frequently uncompelling. For instance, having pointed out that sampling effort is the primary determinant of the number of hosts a parasite species exploits, no attempt to correct for that bias is made before asserting (from just four genera) that there is no predominant macroevolutionary trend in host specificity within parasite clades.

To address the 'myths', Brooks and McLennan frequently employ counts of the traits used to determine the phylogenies. One imagines (hopes?) that systematists focus on derived and less plastic traits that define whole groups; whether these provide a suitable basis for examining the frequency of character loss versus gain, and the plasticity of different types of trait is unclear. Likewise, because parasite phylogenies derived from larval and adult characters are congruent, it is concluded that life cycles are not cobbled together from an assortment of independent adaptive responses. But how often would characters used by cladists to determine descent show anything other than descent with modification? Despite repeated assertions about the rigour of their phylogenetics, the rigour of the analyses drawing on those phylogenies remains unclear.

Much of the material is from the authors' earlier book[2], and non-systematists will need a guide through the plethora of unnecessary systematics jargon (a Rosetta Stone of Systemascript?). The general aim – to link evolutionary biology and parasitology – is surely laudable. But the conclusions that emerge (the evolution of parasites does not differ from that of free-living organisms, and parasite evolution should be considered in terms of current evolutionary theory) are unlikely to excite either camp. That challenge remains.

References

1 Page, R.D.M. (1993) *Int. J. Parasitol.* 23, 499–506
2 Brooks, D.R. and McLennan, D.A. (1991) *Phylogeny, Ecology and Behaviour: A Research Program in Comparative Biology*, University of Chicago Press

Andrew F. Read
Institute of Cell, Animal and Population Biology
University of Edinburgh
Edinburgh, UK EH9 3JT

Macrophage–Parasite Interactions

edited by B.S. Zwilling and T.K. Eisenstein, Marcel Dekker, 1994. $185.00 (xx + 634 pages) ISBN 0 8247 9124 X

While it is clear that the macrophage occupies a pivotal position in the immune response to pathogens and we need to know all that we can about it, this encyclopedic volume, the 60th in the series of books on immunology published by Marcel Dekker, reminds one of the phrase about 'not solving the problem, but overwhelming it'. A vast amount of up-to-date information by leading authors is presented, but some contributors seem to have taken the opportunity to present a blow-by-blow account of their research programmes.

There are 37 chapters, divided into five sections: macrophage biology, macrophage–bacteria interactions, macrophage–parasite interactions, macrophage–fungus interactions and macrophage–virus interactions, presenting a myriad of detail not only on the macrophage, but also on the pathogens concerned, often including information on *in vitro* culture, strain characterization, etc. The role of some other cells, such as the polymorphonuclear leukocyte and natural killer cells, is also outlined in great detail. In fact, interactions between neutrophils and macrophages are so frequently mentioned that they would almost have justified a chapter on their own.

Not surprisingly, there is considerable overlap between chapters. For example, three chapters on macrophage biology cover the topic of lipopolysaccharide (LPS) and, while this may emphasize the importance of LPS, one cannot avoid the feeling that some editing would have been useful. Similarly, responses to *Leishmania* appear in two different chapters, and there is much overlap on nitric oxide, which cropsup many times. The indexing, although extensive, is not very easy to use (neutrophils are mentioned in over 60 different pages but there are no subheadings to assist one), so it takes some time to look up a particular topic and extract the relevant information.

The detailed discussions of the various subjects contained within the chapters are in surprising contrast to the fact that some topics are almost completely ignored; for example, the role of macrophages in malaria receives only minor occasional mentions in several places. The parasites with chapters to themselves are *Pneumocystis carinii*, *Leishmania major*, *Schistosoma mansoni*, *Toxoplasma* and *Trypanosoma cruzi*, and these chapters are generally clear and to the point. As the book is written almost entirely by Americans it tends, overall, to reflect the interest there in macrophages and infections in AIDS patients. There is relatively little on the potentially destructive effects that over-active macrophages may have on the host and the subsequent development of pathology.

In spite of these criticisms, this volume successfully conveys the almost unbelieveable complexity of macrophage activity. An important point highlighted in many chapters is the difference between human and mouse macrophages, although one should include the caveat that macrophages from these two host species are usually derived from different anatomical regions – blood monocytes are most often the starting point for work on human material but not for research in murine systems. There is great debate as to whether or not human monocytes/macrophages can produce nitric oxide, and the authors of this volume usually fail to demonstrate its production from human macrophages, although there may be one or two exceptions. (As the study of nitric oxide as a cytotoxic effector molecule is a relatively recent phenomenon, the book may date more rapidly in this respect than in others.) The relative importance of cytotoxicity generated by oxygen-dependent (as opposed to