Species talk

R.H.L. Disney

The Natural History of Blackflies. By Roger W. Crosskey. *Wiley: 1990. Pp. 711. £75, $172.50.*

THIS is a landmark publication on a family of flies of enormous medical importance, some veterinary importance and of interest to freshwater biologists. It provides a much needed critical synthesis of a rapidly expanding literature. It is accessible to the nonspecialist and is written with evident enthusiasm. The author's reputation for attention to detail is maintained, except for an uncharacteristic failure to list in the bibliography all the references cited in the text.

Crosskey is primarily a taxonomist of distinction. He has tended to shy away from theoretical discussions and disputes and to avoid formal phylogenetic analysis. His attitude is reflected in his comment that "it is safe to assume that users of this book are unlikely to be much interested in taxonomic theory — or expect to find it here". Although this is, perhaps, a defensible assumption with respect to classification, it is an unfortunate comment when it comes to species recognition problems.

Crosskey highlights the important discovery that many blackfly species are 'complexes'. Almost every 'morphospecies' intensively investigated has turned out to be a complex in terms of cytotaxonomy. Studies on enzymes support these findings. The central theoretical question is with regard to the status of these cytotypes. Are we dealing with sibling species, polymorphism, polytypic species or a mixture of all three? The resort to cross-breeding experiments in the laboratory, which have proved invaluable with mosquitoes, has been largely unavailable with blackflies, which have proved difficult or impossible to culture in the laboratory.

Crosskey not only makes it clear that a lack of gene flow between 'cytospecies' is the criterion for recognizing that a cytotype is a species, but in blackflies it has to be inferred rather than demonstrated. The basic grounds for such an inference are stated to be (1) the chromosomal inversion, or whatever, which defines the cytotype is only found in the homozygous state; (2) there are differences in ecology, behaviour and/or distribution with respect to other 'cytospecies'.

Most cytotypes have been established on relatively small samples of larvae. As larger samples are examined the chances of finding a heterozygote must increase. With the intensively studied vectors of Onchocerciasis, the *Simulium damnosum* complex, this is precisely what has happened. Crosskey summarizes the present position thus: "Natural hybrids occur between *S. damnosum* complex siblings, and Boakye and Mosha. . . recently identified (by chromosomal features) a cross between the distantly related *S. sirbanum* and *S. sanctipauli*."

We must ask, therefore, why in the face of this evidence of invalidation of criterion 1 we do not reject the hypothesis of sibling species? The answer offered is that criterion 2 still stands. There are correlations between cytotypes and ecological differences. This argument certainly carries weight. But it does not settle the matter. On the contrary, it assumes that ecological and ethological uniformity is a property of species. Ernst Mayr has aptly warned (*Populations, Species, and Evolution*; Harvard University Press, 1970): "The more closely a species is studied, the more likely it is that some evidence will be found for ecological polymorphism or gradual ecological variation. The variation is still largely ignored by ecologists, most of whom discuss the ecological requirements of species in a strictly typological manner."

With the data on *Simulium damnosum* it is entirely defensible to challenge the current orthodoxy, which equates cytotypes with sibling species. The work of Dunbar and others suggests that these 'cytospecies' fall into about six groupings. Perhaps the latter are the real biological species and the cytotypes are evidence of polymorphism and polytypy within them. Clearly blackflies are an excellent group for exploring these fundamental issues. □

R. H. L. Disney is in the Department of Zoology, University of Cambridge, Cambridge CB2 3EJ, UK.

Fluke success?

F. E. G. Cox

Modern Parasite Biology. Cellular, Immunological and Molecular Aspects. Edited by David J.Wyler. *Freeman: 1990. Pp. 428. Hbk £47.95, $59.95; Pbk £32.95, $42.95.*

THE gap between textbooks of parasitology and the research literature has never been greater and over the last two years there have been a number of attempts to bridge this gulf. All have been multi-author texts and some have been rather specialized books. These include *Vaccination Strategies of Tropical Diseases*, edited by F. Y. Liew (CRC), *Immunity and Pathology*, edited by J. M. Behnke (Taylor and Francis) and *Parasite Communities*, edited by G. Esch, A. Bush and J. Aho (Taylor and Francis). Others have attempted a more general coverage of the field such as *New Strategies in Parasitology*, edited by K. P. W. J. McAdam (Livingstone) and *The Biology of Parasitism*, edited by P. T. Englund and A. Sher (Liss). David Wyler's book belongs to the latter category and is based on two assumptions; that modern parasitology is largely concerned with immunology and cell and molecular biology, and that the parasites of most interest are the major pathogens of humans. The book is aimed at a wide audience with interests in these areas.

For convenience this book is divided into three parts. The first, cell biology, contains contributions on *Plasmodium*, African trypanosomes, American trypanosomes, *Leishmania*, *Toxoplasma*, *Entamoeba* and *Schistosoma*. The second, immunology, is concerned with infections caused by the same organisms except for amoebiasis, which is covered briefly in the first part, plus the addition of lymphatic filariasis. The third, molecular biology, comprises chapters on *Plasmodium*, trypanosomes (essentially African), *Leishmania*, and schistosomes and filarial worms in a single chapter. In all, there are 19 chapters written by 26 acknowledged authorities in their fields.

There is, therefore, a potential feast here for anybody interested in these rapidly developing areas of parasitology, but it is, unfortunately, both stale and somewhat indigestible. Each chapter contains suggestions for additional reading but the lists are limited and dated. For example, two chapters on the cell biology of schistosomes list only five references (one subdivided into parts) of which only one is from the 1980s. There are, however, about 450 references to primary source papers but these are almost entirely from the early 1980s and are not cross-referenced in the chapters themselves. There is also rather too much overlap, thus antigenic variation in trypanosomes is covered three times. The helminth worms receive less attention than they warrant considering the extent of our understanding of the immunology and molecular biology of the nematodes and cestodes.

Overall, this is a worthy book and one that is well worth reading provided that it is realized that modern does not mean recent, that the coverage is limited and that there is nothing in it concerning some of the most exciting discoveries, such as RNA editing and the roles of cytokines, which have transformed the molecular and immunological aspects of parasitology over the last five years. □

F. E. G. Cox is in the Divison of Biomolecular Sciences, King's College London, Campden Hill Road, London W8 7AH, UK

■ Just published by Open University Press is *Molecular Parasitology* by J. E. Hyde, which describes how molecular biology has led to more detailed analyses of parasitic systems. It should be of interest to students and senior workers. Price is £45 (hbk), £18.99 (pbk).