

the database is now available by modem, though I suspect that plans to update this on a yearly basis will not keep pace with the accelerating progress in this vital branch of medical endeavour.

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Molecular Genetic Analysis of Populations. A Practical Approach. Edited by A. R. HOELZEL. IRL Press at Oxford University Press. 1992. 315 pages. Price £22.50. ISBN 0 19 963277 4

Molecular Genetic Ecology: In Focus. By A. R. HOELZEL and G. A. DOVER. IRL Press at Oxford University Press. 1991. 75 pages. Price £6.50. ISBN 0 19 963265 0

Such is the current interest in studies of populations which make use of molecular data that books summarizing techniques and results are to be expected, if not welcomed. Population biologists who wish to make a sortie into the world of molecular biology but who are uncertain of quite where to turn for advice have much to gain from any literary proliferation. The essential requirements for such people are a knowledge of which data are the most informative for the particular question posed, how to obtain that data, and then how to interpret it in a biologically meaningful manner.

Molecular Genetic Analysis of Populations provides a manual of laboratory protocols by which researchers may obtain the necessary molecular data. A variety of experimental techniques are described, including the starch gel electrophoresis of allozymes, the isolation and visualization of different DNAs (although emphasis is given to that obtained from animal mitochondria), and the analysis of these DNAs through the use of RFLPs, PCR amplification and sequencing and DNA fingerprinting, as well as the development of genomic libraries and species-specific probes. The protocols themselves are generally clear, and maintain the high standards set by previous members of the IRL Press *Practical Approach* series. The surrounding text, written by those well qualified to do so, provides some interesting discussions on the relative worth of different approaches to obtaining data and useful labour-saving tips, as well as some of the difficulties inherent in work of this kind.

Although a few minor criticisms might be raised concerning the organization of some of the chapters, the protocols pertaining to the isolation and visualization of mtDNA, for example, are presented in different chapters where perhaps one larger and more complete chapter would have been more satisfactory. However, for those who have a clear idea of what data they wish to obtain, *Molecular Genetic Analysis of Populations* is to be recommended in that it provides, in a single volume, a clear description of

experimental techniques for those interested in the biology of populations.

But what of those uncertain of which data they require? If there are to be criticisms of this book they are more to do with what is absent rather than with what is present. Although some of the chapters and particularly those concerning the use of allozymes and DNA fingerprinting are more comprehensive in their approach, the book is weak on advice concerning the choice and analysis of data. A far more complete presentation would be had if there was a section guiding the uninitiated into an understanding of *which* molecular techniques provide *what* information in relation to *which* question; as one of the contributors (Bernie May) puts it, 'we must examine the kind of question being addressed and decide what type of data will answer sufficiently and efficiently the question'.

Greater difficulties arise with the attempt to describe statistical (population-genetic) methodologies by which we may understand the full biological implications of a data set. What makes the needs of population biologists different from the multitude making use of the techniques of molecular biology is not so much the techniques themselves, which are often applicable to many related fields, but the nature of the data itself; that it is representative of populations and that it can be interpreted in ways pertinent to the great questions of ecology and evolution. The statistical analysis of molecular sequence data is therefore as much a topic of interest as the laboratory methods by which such data is generated, if not more so.

To be fair, the Appendix provided to cover the statistical interpretation of molecular data is only meant to serve as an introduction to what is in reality a complex subject. However, despite these mitigating circumstances, the blank description of formulae supplied does not give the hopeful reader much sense of the important biological and statistical issues involved in their derivation. A fuller chapter outlining more of the background (and references) to the relevant formulae would surely be more informative, and do justice to the rest of what is generally a thoroughly decent book.

Proof of the fact that molecular data can be interpreted in different ways is provided by *Molecular Genetic Ecology: In Focus*. This small pamphlet-like book is basically intended to give students an introduction into how molecular techniques have been used to provide more precise measures of genetic variation in populations, and what such variation means.

The first of the book's four sections describes the nature of the molecular data and the evolutionary mechanisms which produce it. We are then shown some of the laboratory techniques used to generate this data, and a third section attempts to give some population genetic-molecular evolutionary background. Finally, some examples taken from the

literature are provided to illustrate how molecular data has led to a new understanding of population biology, along with a glossary of terms considered to be relevant.

This is a book of laudable objectives but which, despite its title, is somewhat out of focus. Some of the descriptions of evolutionary mechanisms, molecular techniques, and published examples are well done, but the overwhelming feeling is one of potential not realized. Many of these problems could be easily rectified; for example, the section on the statistical interpretation of the data is confusing to read and sometimes almost mysterious (for example, the discussion concerning the relative merits of and relationship between F_{ST} and G_{ST}). Also, it is surprising that although the construction of evolutionary trees is clearly important to population biology and is used in a number of the examples presented, there is no mention at all of the value of phylogenetic inference or even the terminology of trees.

However, it is the attention given to mechanisms of DNA turnover and the process of molecular drive that is the most striking feature of this book. Although we are informed that molecular drive is an evolutionary force *equal* to those of natural selection and genetic drift, description of the intricacies of molecular drive often seems to take precedence over neutral mutation and natural selection. We are, for example, given glossary definitions of concepts as obliquely relevant to population biology as 'cryptic simplicity' and 'gene conversion domain', yet there is no mention of 'fitness' or 'genetic drift'. This is particularly

unfortunate because much use is made (alas, sometimes erroneously) of a 'classical' population genetics edifice in the section on statistical interpretation. Although the authors are quite correct to assert that mechanisms of DNA turnover can lead to interesting evolutionary phenomena at the molecular level, they offer us no means by which the influence of these processes may be assessed, and such forces are generally presented merely as means by which to undermine assumptions typical in population genetics.

At times this book seems more like an attempt to describe the ecology of the genome rather than how the genome may be useful to understanding ecology, and often reads as if it is a means by which the authors can disseminate their own particular view of the evolutionary process through the population. One is forced to conclude that the outline of evolutionary thought presented is perhaps unrepresentative for what pertains to be a mini textbook.

As population biologists delve deeper into the genome for answers, knowledge of both experimental and analytical techniques will be important. Although both *Molecular Genetic Analysis of Populations* and *Molecular Genetic Ecology* are symptomatic of such a movement, their (very different) shortcomings probably mean that we are still a little away from a discipline which is skilled both at the bench and at the computer terminal.

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