

Book reviews

Species: The Units of Biodiversity (Systematics Association Special Volume Series 54). M.F. Claridge, H.A. Dawah and M.R. Wilson (eds). Chapman and Hall, London. 1997. Pp. 439. Price £49.00, hardback. ISBN 0 412 63120 2.

‘...the Swiss sometimes find it difficult to say exactly where the Junfrau and neighbouring Monch mountains start and stop, but this does not lead them to doubt the reality of these two mountains because their limits are unclear.’

(Van Regenmortel, Chapter 2)

If species are the ‘units of biodiversity’, or even if they are just used as such in our measurement of the diversity of life, it is clearly important that the concept of species is used consistently in practice. One might also hope that the species was a meaningful unit. Given the long and often acrimonious debates that have surrounded both of these aspects of species definitions, the Systematics Association, and particularly the meeting organisers who became the editors of this proceedings volume, took on a major task when they sought to bring together a wide interdisciplinary group to consider ‘The Units of Biodiversity: Species in Practice’.

The approach was to consider the species problem in each of a wide range of taxonomic, or in some cases ecological, groups. The result is a sequence of sixteen chapters covering the ground from viruses to mammals. The surprise, to me at least, was the similarity between these different points of view. The same problems exercise the minds of virologists, nematologists and arachnologists: how can asexual organisms be incorporated in a common system with sexuals, can species be paraphyletic, and how can one deal with the continuum of divergence among allopatric populations? These are familiar questions indeed and one needs to be a dedicated connoisseur of species to work through all their variants from start to finish.

Not only are the problems consistent across taxa but so are the solutions. Most authors offer a choice between ‘biological’ or ‘phylogenetic’ species concepts. Some stay on the fence while others jump one way or another with varying degrees of conviction. Knowlton and Weigt’s excellent contribution on marine invertebrates, for example, comes out in favour of biological species after a thoughtful discussion of these two alternatives. Cracraft’s chapter, ostensibly the one about birds, stands out because it lacks the doubts expressed by most other authors! It is actually one of the most enjoyable reads in the book: proselytising for his phylogenetic species concept but also directing his remarks to a ‘user community’, conservation biologists, where most authors seem more interested in speaking to other systematists.

It is a pity that the authors of the first 17 chapters did not read the last two as part of their preparation for the meeting. Hull argues that a species concept should be judged, like any scientific theory, on the basis of its theoretical significance, generality and applicability. He then discusses several classes of species concept, in the process making an important distinction between ‘diagnosable’ and ‘monophyletic’ concepts that are both called ‘phylogenetic’ elsewhere in the book, and argues that they inevitably make trade-offs between these desirable attributes. A species concept cannot be simultaneously general, applicable and theoretically significant and so the ‘ideal species concept’ cannot be found. This conclusion, reached after 376 pages, may cause those of jaundiced mien to give up on species altogether. Mayden fortunately comes to the rescue in the final chapter where he ‘reveals a hierarchy of species concepts that should finally put the species problem to rest!’ This feat is achieved by formalizing a way of thinking that is, I suspect, quite widespread: a ‘primary concept’, roughly the real thing that actually underlies biodiversity, has to be theoretically significant and general while subsidiary concepts can sacrifice these qualities for applicability or operationality. These subsidiary concepts govern the way systematics is carried out in practice. Mayden identifies 22 species concepts and forms them into a hierarchy beneath the evolutionary species concept of Simpson, his candidate for the prime concept.

Even if few readers can face the full survey of ‘species in practice’ taxon by taxon, hopefully many people will read and ponder on these last two contributions. They will not stop the debates among proponents of different species concepts, of course, but they may help to keep the arguments in perspective.

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An Electronic Companion to Genetics Workbook + CD-ROM. Philip Anderson and Barry Ganetzky. Cognito Learning Media, Inc., New York (Oxford University Press, Oxford). 1997. Pp. 304. Price £19.53, paperback. ISBN 1 888902 39 6.

As the title suggests, *An Electronic Companion to Genetics Workbook + CD-ROM* comprises two parts which, together, promise ‘customised learning with easy access to review and self testing’. The approach is built around thirteen topics which cover Mendel, Chromosomes, Pedigrees, Linkage, Prokaryotes, Genes and Proteins, Replication, Repair and Mutation, Gene Expression,