Book reviews

The Origin, Expansion and Demise of Plant Species. Donald A. Levin. Oxford University Press, Oxford. 2000. Pp. 230. Price £24.95, paperback. ISBN 0 19 512729 3.

This is the first book on plant speciation since the second edition of Verne Grant's (1981) classic text on the subject. Donald Levin, however, does not limit his treatment to processes of speciation, he also tackles range expansion, fragmentation and causes of extinction. All this in just 180 pages of text! The book begins with an assessment of species concepts applied to plants. The 'species problem' continues to exercise the minds of plant evolutionary biologists as plants frequently engage in interspecific hybridization and, therefore, Mayr's 'Biological Species Concept' cannot be rigorously applied. Levin concludes 'that no species concept is suitable for the contingencies of plant diversity', a view which I endorse wholeheartedly. However, this raises a problem. In order to write a book on speciation, Levin feels it necessary to define what species are and, consequently, coins what he calls the Ecogenetic Species Concept. According to Levin, an ecogenetic species is ecologically and genetically isolated from other species. He argues that it is insufficient to define a species based on ecological disparity alone, as the species' integrity would not necessarily be maintained in areas of sympatry. Likewise, populations that are reproductively isolated from each other by for example a chromosomal barrier, should not be regarded as different species if they are ecologically and morphologically identical and have very similar gene frequencies. Clearly Levin holds no truck with sibling species!

Having formulated a species concept for plants, which like all others does not always measure up in practice (see below), Levin considers, in turn, the ecological and genetical changes involved in the origin of new species, the geographical scale of speciation, the geographical expansion of new species, population differentiation, factors affecting the decline and demise of species, the fate of incipient species, and finally, species duration and the tempo of diversification. The discussions of each of these topics are concise and condensed, yet extremely interesting. I would like to have read much more about all of them, although admittedly further discussion would often have been restricted by a scarcity of relevant information. The literature covered is very up-to-date and comprehensive (40 pages of references are listed). Each chapter should be a source of lively discussion and debate among groups interested in plant evolution and will serve as a stimulus to research over the years ahead.

Minor irritations in the book for me were that legends to figures in the early chapters did not always describe sufficiently what was illustrated, there was no explanation in the final chapter for why different estimates of rates of speciation and extinction vary so widely, and (inevitably) the ecogenetic

species concept was abandoned at times without acknowledgement. For example, in a section dealing with species extinction via hybridization, some species under threat were apparently only ecologically isolated from the species now aggressively hybridizing with them. Clearly, these are not ecogenetic species as they fail the test of sympatry! A more significant irritation was that certain parts of the book were poorly integrated. This was particularly true for the treatment of the establishment of incipient species, which was placed in a separate chapter (Chapter 8) from the discussion of the geographical expansion of neospecies (Chapter 5). I was also hoping for a chapter at the end of the book that pulled the various threads together and formulated some general conclusions, sadly this was lacking.

Nevertheless, I liked this book overall and regard it as a good introduction to our current understanding of the origin, establishment, evolution and extinction of plant species. It is aimed at an advanced audience, although undergraduates will benefit from exploring its contents. For appropriate background information and a more detailed treatment of processes of speciation, Grant (1981) is still recommended, as well as Briggs and Walters (1997). Levin has spent a large part of his academic life thinking about the issues addressed in his book, and also conducting research on many different aspects of them. He has produced a synthesis that is interesting and stimulating, and which I strongly recommend to all evolutionary biologists as valuable reading.

References

- BRIGGS, D. AND WALTERS, S. M. 1997. *Plant Variation and Evolution* (3rd edn). Cambridge University Press, Cambridge.
GRANT, V. 1981. *Plant Speciation* (2nd edn). Columbia University Press, New York.

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Thinking about Evolution — Historical, Philosophical, and Political Perspectives. Rama S. Singh, Costa B. Krimbas, Diane B. Paul and John Beatty (eds). Cambridge University Press, Cambridge. 2000. Pp. 606. Price £60.00, hardback. ISBN 0 521 62070 8.

Thinking about Evolution is a thoughtful book, as befits a volume in honour of Richard Lewontin. It is the second of