

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

two volumes, the first of which was devoted to Lewontin's more technical contributions to evolution. In this second volume, the authors discuss interconnected historical, philosophical and sociological aspects of evolutionary thinking. These are all broad subjects to which Lewontin has actively contributed. He has been responsible for exposing common scientific and logical errors, and challenging accepted views of society, evolutionary biology, and the relationships between them. Lewontin is one of those rare individuals who is an excellent scientist, has a deep social commitment, and is also a true intellectual. The volume starts with a typical Lewontin essay followed by an interesting interview, and both give the reader a strong flavour of Lewontin's concerns and attitudes. Lewontin is clearly also a great teacher, who has influenced all of the people that have studied and worked with him (and many of those that have just read him). The 26 essays following Lewontin's own essay and the interview were written mostly by former students and colleagues, and all testify to this fundamental influence through adopting his deeply skeptical, critical attitude. Not all are in agreement with him, although most are, but they are all sensitive to the historical framework in which genetic and evolutionary ideas have developed, to conceptual issues, and to the political influences and effects of past and present evolutionary ideas.

Thinking about Evolution does require that you make the effort of thinking, which is refreshing and much needed in these days of cheap preaching of biological wisdom. Most of the contributors avoid the inflated rhetoric associated with the 'Darwin Wars', although the views of the authors are quite clearly critical of the selfish gene view of the world. The essays cover many subjects, and, inevitably, not all are of the same quality and eloquence. For example, I was not very convinced by an essay defending neo-Darwinism, nor impressed by an essay advocating a Platonic approach to the study of cognition and rationality, but most essays in the volume are both readable and informative. We learn, for example, that eugenic arguments were not so much the result of bad biology, but rather due to bad politics; that genetic studies of the Indian caste system lead to a better appreciation of social determinism, not genetic determinism (there is great genetic overlap among the castes). We also learn how population genetics developed in early 20th century France, how economic interests define genetic thinking and practices in agriculture, about the many methodological problems in behavioural genetics, and about the effects of social and economic interests on the increase (and more rarely, the decrease) of cancer. There are also interesting essays on philosophical issues, mainly about units of selection and the constructive aspects of organism — environment interactions. The breadth of the book is in a sense a virtue, but the lack of a strong common thread among the different essays makes continuous reading tedious. I certainly recommend the book, and I believe it will be very useful (in spite of its forbidding price) for teachers of the history, sociology and philosophy of biology. Some essays, mainly the historical and 'political' ones, may also interest evolutionary biologists and geneticists; they provide a useful

antidote to the naïve beliefs in genetic utopias that are so fashionable today.

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Genes, Peoples and Languages. Luigi L. Cavalli-Sforza. Penguin Books, London. 2000. Pp. 228. Price £18.99, hardback. ISBN 0 713 99486 X.

Anthropological genetics is a fascinating field that provides us with a reflection of our past; a view of our species' history based on patterns of genetic diversity among and within living human populations. Genetic data can be used to detect signatures of past history that might otherwise be unavailable, dealing with events before written or oral history. The study of the genetic history of humans is also often difficult to understand from a literature necessarily laden with complexities of molecular biology, population genetics theory, and statistical methods. Teaching this subject is often complicated by a lack of material clear enough to present to the non-specialist. Fortunately, *Genes, Peoples and Languages* helps fill this void. This book provides a non-technical summary of relevant work on human genetic diversity and history, much of which has been dealt with in the comprehensive publication *History and Geography of Human Genes*, written by Cavalli-Sforza, Menozzi, and Piazza (1994, Princeton University Press).

The book is organized into six chapters. The first nicely introduces the use of genetic data for analyzing population history, covering a variety of topics in a clear and non-mathematical presentation, including 'race', molecular biology, genetic distance, and isolation by distance. The second chapter reviews the evolutionary forces and gives one of the clearest discussions I've seen on building evolutionary trees (even though I would argue that trees are not always the most appropriate way to illustrate genetic distances between populations *within* a species). Chapter three discusses the ways in which genetic data have been used to help reconstruct the origin of modern humans, including discussion of 'African Eve', Y-chromosome polymorphisms, and microsatellite DNA. Discussion of these technical issues is done clearly and concisely, although I disagree that the data provide strong support for a recent African origin of *Homo sapiens*. I would argue that the data are also compatible with a much older history of the lineage leading to modern humans that includes genetic contributions from 'archaic' humans outside of Africa. Chapter four focuses on the genetic evidence for late Pleistocene and Holocene population expansions, with primary attention given to the work of the author and colleagues on the demic diffusion of agriculture from the Middle East into Europe. Chapter five reviews the author's work on correlations between genetic and linguistic 'trees', arguing for correlated