Book reviews

Molecular Evolution and Adaptive Radiation. Thomas J. Givnish and Kenneth J. Sytsma (eds). Cambridge University Press, Cambridge. 1997. Pp. 621. Price £65.00, hardback. ISBN 0 521 57329 7.

Adaptive radiation — the rise of a diversity of ecological roles and attendant adaptations in different species within a lineage — was first coined in 1902 by the palaeontologist, Henry Fairfield Osborn, but was a concept central to the thinking of Charles Darwin in *The Origin of Species*. As such, the concept sits at the heart of evolutionary ideas on the nature of mechanisms that generate and maintain biological diversity, and our understanding of why particular groups exhibit remarkable diversification, while others do not. It links effectively the approaches of ecology and evolution by focusing on the relationships between species richness and community structure, and the heritable and environmental constraints and opportunities for adaptive evolution and speciation.

A major problem with studying adaptive radiation has, however, been the difficulty of using various characters of radiation (e.g. petal type or beak shape) that were used to help classify the organisms in the first place, making the argument circular, or as put by the editors '... leading to traits being traced down evolutionary pathways determined, at least in part, by the traits themselves.'. What is needed is to construct a phylogeny for the study of adaptive radiation that has been derived independently of the traits under study. This compendium of multiauthored papers, based on a symposium in 1995, identifies in an illuminating, refreshing and convincing way, the major role that molecular systematics using sequence and restriction-site variation in nuclear and organellar DNA is playing in our understanding of adaptive radiation.

A major achievement of the book is that it avoids the all too frequent descriptive, and sadly, often 'dry' presentation of how nucleotide sequence variation (nuclear, mitochondrial and chloroplast) can be used to reconstruct phylogenetic pathways, and how such data can be utilised to explore the origins and significance of the adaptive diversity that we see. This is an unusual book in that it will appeal equally to those interested in natural history, molecular evolution, and ecology. Each of the numerous, detailed case studies is placed well into context though comprehensive accounts of the salient biological and environmental factors likely to influence radiation, together with animated accounts of the nature and range of diversity observed. Through lively and detailed descriptions of the morphological, reproductive and behavioural diversity of specific cases, the reader is able to integrate the biological and molecular information to appreciate fully the issues, hypotheses and evidence.

There is a valuable and comprehensive range of reviewtype articles that set out the historical development of ideas on adaptive radiation, followed by clear expositions of related concepts such as the nature of adaptation, competitive displacement, key innovations, estimation and significance of variation in speciation rates, allopatric vs. sympatric speciation, homoplasy and phylogenetic inference. The sheer diversity of case studies beyond the familiar, though instructive, African cichlids, Hawaiian Drosophila, marsupials and New World monkeys, add much to the utility and excitement of the text. Articles to Daphnia, the aquatic plant family Pontederiaceae, nectarfeeding Old World fruitbats, epiphytic orchids, echinoids and sticklebacks, to name only some, provide an unparalleled taxonomic diversity for consideration, enabling the identification of general patterns and contrasts in evolutionary scenarios and molecular approaches. Three particular highlights for me personally were chapters to the intricate and novel adaptations of obligate twig epiphytism in orchids by Chase and Palmer, the elegant integration of experimental and molecular approaches on character displacement in sticklebacks by Taylor, McPhail and Schluter, and hypotheses to account for differences in speciation rates by McCune.

Although there is some unnecessary repetition between chapters (e.g. Chapters 1 and 8) and unavoidable though not distracting differences in style typical of edited books, most chapters are extremely well written, and compiled with great care, rendering it much more than a conference proceedings. It is, however, a pity that a simple glossary of terms was not placed into an appendix to widen accessibility to the undoubtedly many non-molecular geneticists who are likely to read it. The editors maintain that adaptive radiation is an effective bridge between ecology and evolution. Givnish and Sytsma have certainly put this into practice by producing a text which is made exciting not only through the advances in molecular technology, but also by the sheer complexity and elegance of biological diversity. It is rare to say that a text will reach a truly wide audience. In this case, it is assured, and should reach the shelves (funds permitting!) of specialists in molecular evolution and of specific taxa, as well as those who are just curious about the marvel of biological diversity.

> GARY R. CARVALHO Molecular Ecology and Fisheries Genetics Group Department of Biological Sciences University of Hull Hull HU6 7RX U.K.

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Feminism and Evolutionary Biology: Boundaries, Intersections and Frontiers. Patricia A. Gowaty (ed.). Chapman and Hall, London. 1997. Pp. 623. Price £39.00, paperback. ISBN 0 412 07361 7.

'The cosmic process has no relation to human ends' T.H. Huxley, *Evolution and Ethics* (1893)

Do the insights of feminism on the conduct of human affairs have implications for the theory of evolution? These implications could range from radical (evolutionary biology could be toppled by the exposure of prefeminist, patriarchal errors in the theoretical core) to politically important but scientifically peripheral (evidence for social biases in the gender of evolutionary biologists which reflect those of their source societies).

This book, collected papers arising from a 2-day meeting in 1994, is illuminating and infuriating by turns. It has two themes: the role of feminist (or female-centred) bias in re-routing concepts in behavioural ecology and ethology, and a continuing debate on the moral consequences of evolutionary theory, in particular the genes vs. environment debate, albeit with a feminist slant. The radical feminist critique of science as a flawed patriarchal process is mentioned but avoided, and a review of the gender biases in hiring and firing of female evolutionary biologists reveals the familiar sad story of bias (but less extreme than that seen in other 'harder' sciences). While it is true that it has generally required a dedicated female evolutionary biologist to notice matriarchy in animal societies, there is no evidence that female evolutionary biologists tend to select female-centred research topics (Holmes & Hitchcock).

Several authors present arguments suggesting that female-centred (but not necessarily feminist) perspectives on the evolution of behavioural traits in higher vertebrates result in insights into their benefits (e.g. Mesnick, Stamps, Altmann). Thus research focused on the phenomenon of female choice of mate makes sense of patterns of sexual selection and territoriality in birds and mammals. Particularly revealing is a discussion of seabird mate choice and fitness, where the merging of two research programs, one concerned with male and the other female biology has yielded more satisfying, and gender-neutral, hypotheses of the function of particular behavioural suites (Pierotti *et al.*).

The nature-nurture debate, in several disguises, takes up most of the book, and prompted the organizers of the conference to place a significant personal statement on the topic as the closing chapter. The exploitation of evolutionary thinking in eugenics and in 'pop sociobiological' justifications of the inequitable status quo has led to a common feminist rejection of evolutionary theory. The presence of significant eugenic argument in core volumes in evolutionary biology (e.g. Fisher's *Genetical Theory of Natural Selection*) cannot be avoided. Several authors lambast the justification of the exploitation and abuse of female humans by reference to the 'natural' state of affairs described by sociobiological hypotheses. This abuse of sociobiological thinking leads to rejection of the whole edifice: as the conference organisers point out, this rejection is both intellectually unnecessary and stifles debate. Evolutionary biology considers the role of heritable differences in traits in determining reproductive success in particular environments. It may aid in the understanding of human behaviours but adds no weight to discussions of their desirability.

> MARK L. BLAXTER Institute of Cell, Animal and Population Biology University of Edinburgh Edinburgh EH9 3JT U.K.

Mechanisms of Transcription (Nucleic Acids and Molecular Biology 11). Fritz Eckstein and David M. J. Lilley (eds). Springer–Verlag, Berlin. 1997. Pp. 327. Price £95.50, hardback. ISBN 3 540 62397 3.

My first thought on receiving this for review was, 'oh, another book on transcription', but this book is clearly different to many of its predecessors. Like the other volumes in this particular series, it consists of a set of mini-reviews by various experts in the field, with a distinct emphasis on the structural and mechanistic aspects of the topic. The central role of RNA polymerase in transcription is well covered and there are a number of articles on various transcriptional activators and DNA binding proteins, but the book has a particular bias towards the role of DNA structure in the transcription process, no doubt reflecting the specialist interests of the editors.

If you are interested in the structure and function of prokaryotic RNA polymerases, this is definitely a book for you. There are two chapters describing the mechanistic aspects and structure of phage T7 RNA polymerase and a further five articles which focus primarily on promoter recognition by Escherichia coli RNA polymerase. Recent determination of the three-dimensional structures of fragments of the σ^{70} subunit and the α subunit of the enzyme, serve to highlight the rapid advances being made in this area. In addition to this familiar ground, there is also a review on a rather esoteric aspect of the subject which I find quite fascinating; namely, the effect of high pressure on the properties of RNA polymerase. To complement the emphasis on the initiation phase of transcription, there is also an excellent review discussing current models for the translocation of RNA polymerase along the DNA. Unfortunately, there is no article devoted to transcription termination, so as far as this book is concerned, RNA polymerase does not quite reach its final destination.

As mentioned above, the role of DNA topology in transcription gets a good airing with chapters discussing the effects of DNA supercoiling on gene regulation, the role of microloops in FIS-dependent activation and a review on the indirect effects of DNA sequence on transcriptional activation in prokaryotic systems. There is also a contribution describing the elegant sliding-clamp model for activation of phage T4 late transcription and a review on the biophysical principles governing long-distance interactions on DNA, a useful prelude to later considerations of transcriptional regulation in eukaryotes.

The major emphasis of this book is definitely eubacterial transcription systems and the eukaryotic arena is not particularly well-represented. There are two reviews devoted to the important role of nucleosome partitioning and chromatin assembly in regulating access of transcription factors to their targets. A chapter on the crystal structures of the TATA box binding-protein (TBP) complex with DNA and the recently solved ternary complex with initiation factor TFIIB, provides an excellent molecular introduction to elements of the preinitiation complex. However, the book provides only a cursory mention of the three eukaryotic RNA polymerases. Two structures of transcription factor domains, the human SRY-DNA co-complex and the POU domain, appear to have been added at random. Why not include other examples such as zinc-finger proteins and leucine zippers to maintain the structural perspective? Unfortunately the isolated structures leave one with a rather static view of transcriptional control in eukaryotes and the book does not address the question of how transcription factors function in gene regulation.

Apart from these obvious omissions the editors are to be congratulated in assembling an excellent collection of contributions from very eminent authors. Moreover, most of the figures, particularly those in colour, superbly illustrate the subject matter. This book will make a splendid (albeit rather expensive) addition to the shelves of those interested in the biophysics, biochemistry and structural analysis of transcription and its regulation.

> RAY DIXON Nitrogen Fixation Laboratory John Innes Centre Norwich NR4 7UH U.K.

Books received

Plant Variation and Evolution (3rd edn). D. Briggs and S. M. Walters. Cambridge University Press, Cambridge. 1997. Pp. 512. Price £22.95, paperback. ISBN 0 521 45918 4.

Evolution on Islands. Peter R. Grant (ed.). Oxford University Press, Oxford. 1998. Pp. 334. Price £24.99, paperback. ISBN 0 19 850171 4.

Asymmetry, Developmental Stability, and Evolution. Anders Pape Møller and John P. Swaddle. Oxford University Press, Oxford. 1997. Pp. 291. Price £19.50, paperback. ISBN 0 19 854894 X.

Genetics — A Molecular Approach (3rd edn). T. A. Brown. Chapman and Hall, London. 1998. Pp. 469. Price £27.50, paperback. ISBN 0 412 79870 0.

Advances in Biometrical Genetics. P. Krajewski and

Z. Kaczmarek (eds). Institute of Plant Genetics, Polish Academy of Sciences. 1997. Pp. 318. Price \$25.00, paper-back. ISBN 83 85583 16 5.

Selection in Natural Populations. Jeffry B. Mitton. Oxford University Press, Oxford. 1997. Pp. 240. Price £50.00, hardback. ISBN 0 19 506352 X.

DNA Markers and Breeding for Resistance to *Ascochyta* **Blight in Chickpeas.** S. M. Udupa and F. Weigand (eds). ICARDA, Aleppo. 1997. Pp. 222. Price Free, paperback. ISBN 92 9127 047 4. (available from Documentation and Information Services, ICARDA, PO Box 5466, Aleppo, Syria).

The Origin of Animal Body Plans: A Study in Evolutionary Developmental Biology. Wallace Arthur. Cambridge University Press, Cambridge. 1997. Pp. 338. Price £45.00, hardback. ISBN 0 521 55014 9.