

synthesis still hold true, but, over the course of the last 60 years, evolutionary theory has witnessed and incorporated major changes, such as the elucidation of the structure and nature of molecular variation in natural populations, the development of the neutral theory of molecular evolution, the invention of a methodological toolkit for reconstructing the history of life, and the emergence of the field of ethology and behavioural evolution. My opinion is that modern evolutionary theory has been 'adapting' to the emerging body of data both by accepting a more complex view of the phenotypic effects of mutations and by incorporating the findings emerging from 'evo-devo'.

In spite of these criticisms, I thoroughly enjoyed this book. In sharp contrast with other such revisionist

attempts [3], it is short, clearly written and easy to understand. Students of evolution who like controversial ideas, thinking outside the box and questioning long-held assumptions (always a healthy exercise) will relish reading this book.

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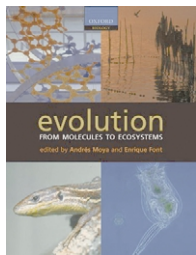
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## 'Genomic bi-focals' and a panoramic view of evolution

**Evolution: From Molecules to Ecosystems** edited by Andres Moya and Enrique Font. Oxford University Press, 2004.  
£75.00/£37.50 hbk/pbk (xvi + 321 pages) ISBN 0 19 851542 1/0 19 851543 X

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When Charles Sibley used DNA–DNA hybridization in the 1980s to produce his comprehensive study of bird systematics, Steven J. Gould commented that the problem of systematics was solved [1]. Such was the power of DNA sequence information. We have come a long way since then. Within a decade of the launch of the human genome initiative

in 1986, the first complete genome sequence of a free living-organism (*Haemophilus influenza*) had been published [2]. The field of genomics has blossomed rapidly, faster than anybody could imagine, and the fates of genomics and evolutionary biology have become intertwined – one cannot do without the other.

Thanks to genomics, researchers across disciplines can now share data that cut across taxonomic units, from molecules to ecosystems, which are often produced from the same lab. *Evolution: From Molecules to Ecosystems* is in this new genre of books that are using 'genomic bi-focals' to provide a panoramic view of evolution [3–7].

This volume is the outcome of a workshop held at the University of Valencia, and is divided into five sections. A section on 'the genetic machinery of evolution' covers neutral theory, deleterious mutations, inference of selection from DNA data, gene duplication, gene regulation, and genomics and evolution. A section on 'molecular variation and evolution' contains three chapters devoted to AIDS, parasitic protozoa, and endosymbionts in insects. 'The ecological and biogeographical context of evolutionary change' covers natural selection in freshwater systems, population biology of *Daphnia*, effects of habitat persistence

on dispersal and population structure, and the use of molecules to understand the distribution of animal and plant diversity. A section on 'speciation and major evolutionary events' covers allopatric speciation, speciation by hybridization and introgression, cooperation and conflict in the evolution of multicellularity, phylogenetic relationships among the major groups of vertebrates, and mass extinction and evolutionary radiations. The final section on 'behavior, evolution, and human affairs' covers evolution and the role of animal play, evolutionary psychology of physical attraction, genomic view of evolution, and a darwinian account of human creativity.

The collection of chapters within sections is more of an exemplary nature and is not meant to provide a balanced coverage of the literature. For example, the three chapters covered under 'molecular variation and evolution' are all about pathogens (AIDS, parasitic protozoa, and endosymbionts) and the speciation section is pretty much devoid of genetics and does not contain the oodles of literature on the genetics of speciation. Sexual selection, a continuously reinvigorating topic, is completely missing from this collection, as is anything about evo-devo or microarrays.

But, to be fair, the volume was not meant to be either comprehensive or balanced. As the editors point out, 'the volume is a sampler of the diversity of questions and research approaches' and the chapters included do not encompass all aspects of evolutionary biology. The scope of the volume was limited by the nature of the workshop, whose aim was to celebrate and launch an Institute for Biodiversity and Evolutionary Biology.

The strength of this volume lies in the diversity of topics that it covers. The individual chapters are balanced, discussing general ideas and theory at a level that is accessible to graduates and advanced undergraduates.

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The references cited are minimal and are meant to provide a way into the literature. I like the idea of providing graduate students just starting out with reading materials that focus on ideas and theories but that are uncluttered with references. The book is easy to read and one can start almost at any page. This is the kind of book that I would like to see in each lab and being made available to all graduate students.

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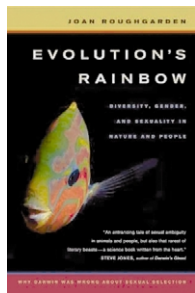
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## Is sexual selection dead?

**Evolution's Rainbow: Diversity Gender and Sexuality in Nature and People** by Joan Roughgarden. University of California Press, 2004. US\$27.50/£18.98 hbk (427 pages) ISBN 0 520 24073 1

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Readers of *TREE* will no doubt be pleased to know that sexual selection is dead, so they can now get on with research into more useful topics. Indeed, not only is the topic dead, but – and this might be slightly more surprising to *TREE* readers – Darwin got it badly wrong. At least, this is the claim that Joan Roughgarden makes in *Evolution's Rainbow*. Modern sexual selection theory is wrong, so Roughgarden claims, for three reasons: it is based on a false accounting mistake (that eggs are more costly to produce than are sperm), it elevates deceit into an evolutionary principle and, last but by no means least, it reinforces (Victorian) sexual stereotypes that are outdated.

The latter will, perhaps, ring alarm bells; with justification. *Evolution's Rainbow*, which is written for the non-scientist, has a very specific agenda: to insist that, deliberately or otherwise, science has aided and abetted the ostracizing of sexual minorities. A proper understanding of both natural history and evolutionary biology will, Roughgarden insists, show that our simple-minded sexual dichotomies (males versus females) are not only factually wrong, but also socially pernicious. In the pursuit of this agenda, Roughgarden has produced a remarkably wide-ranging and certainly erudite book. The first part is a lengthy overview of reproductive behaviour in animals; the second provides a detailed analysis of the biology of sex determination that emphasizes the broadly accepted view among developmental biologists that sex is not just a matter of chromosomes; finally, the third reviews homosexuality and transgenering in humans. The latter includes both a genuinely interesting summary of the historical record dating back to the pre-Christian era and

some intriguing anthropological case studies of modern transgendered populations (among others, the *hijra* of India, the *mahu* of Polynesia and the *guevedoche* of Dominica).

Roughgarden has had a very distinguished career as an evolutionary ecologist (working mainly with lizards and tropical marine environments). As one might expect from such a pedigree, the natural-history sections are very thoroughly researched. I cannot comment on the material in the second and third sections, because they are out of my areas of expertise, but, if nothing else, they make interesting reading.

Having said that, however, I did find the natural history and evolutionary sections full of unexpected claims. I was surprised, for example, by the assertion that sexual selection is all and only about the attempts of one sex to deceive the other. 'The appetite for seeing deceit everywhere', Roughgarden claims, 'has blinded biologists to the fact that swallows have a distributed rearing system'. Egg dumping is not a question of trying to get others to engage in genetic altruism by rearing one's eggs but rather an attempt by the community to spread its collective rearing costs. Males, she claims, invest social as well as reproductive effort, and the two might not necessarily coincide, because social effort is directed to maximizing social harmony. If you think that this sounds like group selection... well, I would have to agree.

And herein, I think, lies the source of the book's problems. Roughgarden is consumed with the no doubt laudable desire to create a more equitable and tolerant world in which those of different sexual orientations can live harmoniously together. To do that, she has to make some rather odd claims – that reproduction is a purely cooperative business, that alternative mating or reproductive strategies are the equivalent of human genders (the side-blotched lizard of the southwest USA, for