



## **Speciation and the Recognition Concept: Theory and Application.**

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also clear from these chapters. Sticking a gene for a growth regulator into a genome in order to get a bigger animal, for example, just will not work. The physiological difficulties arising from what appears to be a simple genetic alteration is described for virtually every system covered in this book. This is a sober, no-frills look at this technology, which I think provides the reader with a healthy dose of reality. Certainly this technology is sophisticated; one senses after reading these chapters that the technology is still very crude, but with tremendous potential.

The book was targeted to advanced undergraduates and graduate students, and the writing and level of detail is about right for graduate students. This book will be of value as a teaching tool that provides a reasonably good perspective on the field. The text is not excessively long and could be covered easily in a semester, and the cost puts it within relatively easy reach of all those with some interest in the area.

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#### SPECIATION AND THE RECOGNITION CONCEPT: THEORY AND APPLICATION.

*Edited by David M Lambert and Hamish G Spencer. Baltimore (Maryland): The Johns Hopkins University Press. \$65.00 (hardcover); \$35.00 (paper). xviii + 502 p; ill.; author and subject indexes. ISBN: 0-8018-4740-0 (hc); 0-8018-4741-9 (pb). 1995.*

In the late 1970s and the 1980s H E H Paterson defined species as a set of individuals that share a common Specific-Mate Recognition System (SMRS). This book contains 20 chapters by different authors that address Paterson's species concept. The chapters are arranged in three sections: Ideas about the Nature of Species (7 chapters); Consequences of the Recognition Concept for Speciation, Ecology, and Evolution (6 chapters); Properties of Specific-Mate Recognition Systems (7 chapters).

The first section addresses how SMRS influences our thinking about complex systems, paleontological data, and the difficulties of defining a species. Hailman addresses the latter question, and his frustration is palpable as he discusses the intractability of genealogical methods for an optimal species definition. Some chapters, such as that discussing Kinji Imanishi's "biological thought," seem forced in their attempts to forge some relationship with Paterson's ideas. Carson, on the other hand, gives an especially well-reasoned synopsis of the role of the sexual environment in generating selection, and how this might relate to some aspects of the SMRS concept.

The second and third sections of the book are more empirical and address some recurrent themes of the SMRS. Two ideas are paramount in Paterson's writing. One is his prediction that reinforcement does not occur. The other is the definition of species in relation to conspecifics rather than heterospecifics, and its ancillary prediction of strong stabilizing selection on the SMRS.

The efficacy of reinforcement seems to me an empirical question, and one that should avoid much of the philosophical discussion it has engendered. This is not a topic discussed at length in this volume. Butlin, however, offers some skepticism regarding the recent studies of reinforcement in *Drosophila* by Coyne and Orr; these are studies that many would consider among the most compelling in support of reinforcement.

Studies have examined patterns of geographic variation in signals to test the hypothesis of strong stabilizing selection on the SMRS. It is fair to say that in most accounts in these chapters, as in other recently published studies which address acoustical and chemical mate recognition in insects, there is substantial geographic variation in the signals used by males to attract mates. White et al., who are strong proponents of the SMRS concept, defend Paterson's theory in the face of this seemingly overwhelming evidence in their chapter on chemical signals. They point out that the SMRS concept does accommodate some variation (how much they do not say), that variation in the entire mate recognition system rather than in individual components must be evaluated, that the presence of signal variation is sometimes indicative of cryptic species, and that variation in signals must be evaluated not in isolation, but in the degree to which this signal variation actually influences the receiver. All these points are true; the latter point, especially, needs to be emphasized. If we know anything about animal communication it is that animals can filter substantial portions of signals during their perceptual processing. The problem with their defense of SMRS is that one is left feeling that it is a hypothesis that cannot be rejected, one in which all apparent falsifications can too easily be explained away. Nevertheless, these last sections are rich in the biology and the messy variation of animal communication, and in themselves make the volume well worth the price. These empirical studies draw a stark contrast with the idealized diagram of stickleback courtship that Vrba (p 7) uses (and Paterson has used elsewhere) to emphasize the coadapted signal-response reaction chain that leads to specific mate recognition. It might be debatable to what extent the SMRS concept can accommodate variation in such allegedly coadapted systems, but as these chapters illustrate, it is no longer a debate that variation is rampant.

Paterson's definition of species differs from Ernst Mayr's in emphasizing the positive aspects of reproductive interactions (sharing of a common fertilization system) rather than the negative (reproductive isolation). There has been considerable debate as to whether this definition offers an important insight into speciation or is merely a slightly different emphasis. Eldredge ends the book with a complimentary review of Paterson's contribution to the field of speciation, but he does not exaggerate this contribution nor downplay the importance of the Synthesis: "... Dobzhansky and Mayr had to establish the primacy of reproduction as the *sine qua non* of species; it was left to Paterson to refine the conceptualization of the nature of those reproductive communities" (p 466).

There is little doubt that Hugh Paterson has had an important influence on how we think about mate recognition and the speciation process. It might still be an open question as to whether some components of his ideas are right, wrong, or even testable. This collection of chapters, however, is a clear testament that his ideas have made a difference.

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WITHOUT MIRACLES: UNIVERSAL SELECTION THEORY AND THE SECOND DARWINIAN REVOLUTION. A *Bradford Book*.

By Gary Cziko. *Cambridge (Massachusetts): The MIT Press.* \$30.00. xiv + 385 p; ill.; index. ISBN: 0-262-03232-5. 1995.

One thing seems clear: natural selection is among the fittest of ideas. Cziko laments its delayed emergence in the social and psychological sciences, but describes how it is finally taking hold there, and in computing. He anticipates a universally applied selection theory.

This beautifully written (and produced) book has an excellent historical overview, but it cannot be considered a textbook, since it is a work of advocacy. Cziko critiques "instructionist" theories in many fields, as well as sloppy attempts to apply selectionism. He advances theory by generalizing about not only selection but also the evolution concept, so that we can see "lifetime evolution" by somatic mutations and by the construction of synapses.

Cziko has some misunderstanding of natural selection. Despite his attacks on providentialism, he stresses selection as a source only of good; nowhere does he pursue the implications of the likes of selfish genes or *t* alleles. On p 298, for example, we find "... selection theory is not intended to account for changes ... not characterized by increases in adapted complexity." But Darwinian competition is mostly between more and less adequate phenotypes with respect to local conditions, with completely

"unadaptive variations" (p 287) representing only a small proportion of that process.

Here, as in so much selection talk, we have the notion that natural selection is a "creative process" (p 302). This contradicts Cziko's detailed discussions where he gets it right, where random changes like mutations create the variants subsequently winnowed by selection. The contradiction suggests that the upbeat locution is merely a rhetorical device. I strongly impugn a second rhetorical device, "adapted complexity," for its conflation of causes. Selection can be held responsible for adaptation, but not for complexity, which has been shown to arise spontaneously in almost any material system. Selection is a colonizing idea, and we see here how easily it sneaks in to increase its hegemony!

The title suggests that the target of this book is religion. Indeed, Cziko spends much time attacking providentialism. On p 160 he notes that the function of supernatural beliefs has been to "inhibit selfish behaviors that could undermine the cooperative structure of the community," although "... to the individual, [in Darwinian theory] it is advantageous ... to be selfish ..." (p 158). Although no one can tell what a society organized along purely Darwinian lines would be like, this analysis seems to point in that direction, abetted by a "Darwinian slip" on pp 310-311, where Cziko (twice) finds it "unfortunate" for a thief not to be able to figure out how to use someone else's bank card. After all, any way to make it would be good if successful! Natural selection theory is opportunism writ large.

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EVOLUTION. *Second Edition. The Jones and Bartlett Series in Biology.*

By Monroe W Strickberger. *Boston (Massachusetts): Jones and Bartlett Publishers.* \$56.25. xiv + 670 p; ill.; author and subject indexes. ISBN: 0-86720-892-9. [First edition was published in 1990 and reviewed in this journal, 67(2)1992.] 1996.

TRACING THE HISTORY OF EUKARYOTIC CELLS: THE ENIGMATIC SMILE. *Critical Moments in Paleobiology and Earth History Series.*

By Betsy Dexter Dyer and Robert Alan Obar; *Series Editors: David J Bottjer and Richard K Bambach.* *New York: Columbia University Press.* \$50.00 (hardcover); \$24.00 (paper). xiii + 259 p; ill.; index. ISBN: 0-231-07592-8 (hc); 0-231-07593-6 (pb). 1994.

This book explores the data behind the idea that symbiosis played a role in the origin and evolution of eukaryotes. Although the idea of "symbiogenesis" was not original with L Margulis, it was largely