Molecular Markers, Natural History and Evolution.

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generate some controversy among paleontologists. So much the better.

This monograph represents a comprehensive work on a single trace-fossil genus. As such, it contains more detail than most readers may want. Nevertheless, this treatment of the history of research and current understanding of *Climactichnites* makes quite enjoyable reading. Given the somewhat fanciful reconstruction of the *Climactichnites* animal, the decision to apply this name to the hypothetical animal rather than the trail, and the range of perspectives contributed by Yochelson and Fedonkin's earlier works, nobody should accuse the authors of conventionality. We are fortunate that our field still has such imaginative, iconoclastic souls as Yochelson and Fedonkin.

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MOLECULAR BIOLOGY

THE PHOTOSYNTHETIC REACTION CENTER. *Volumes I and II.*

Edited by Johann Deisenhofer and James R. Norris. Academic Press, San Diego (California). (I) $129.00. xiv + 432 p.; ill.; index. ISBN: 0-12-208661-9; (II) $129.00. xviii + 574 p.; ill.; index. ISBN: 0-12-208662-7. 1993.

Photosynthetic reaction centers are integral protein-pigment complexes that drive the light-mediated redox reactions of photosynthesis. They are essential links between absorption of photons and electron transport to acceptors in photosynthetic membranes. In 1984 Deisenhofer, Michel, and colleagues published the first x-ray structure of a prokaryotic reaction center and presented a model of the chromophore of a photosynthetic reaction center. Their efforts were rewarded with the Nobel Prize in 1988. Reaction centers of both bacteria and green plants had been the object of intense study for years, and the publication of a model gave further impetus to this fascinating area of research. Work continues in structural analysis and functional properties, with the additon of the powerful tools of molecular genetics to isolate and study reaction center proteins.

Much of this work is summarized in these two volumes, which cover green plant and bacterial reaction centers. Volume I is concerned primarily with structural aspects, while Volume II covers electron transport. The editing has resulted in lucid explanations by the various contributors, so that the nonspecialist, with a little help from standard references, can catch the gist of the chapters. The 13 chapters of Volume I provide a comprehensive view of reaction center structure. Readers will be impressed with the elegance of the approaches, especially the blending of biophysical analysis with molecular biology. I was personally pleased with the chapters by Kaplan and Donohue and Arkin and Youvan in this regard, but let me hasten to say this is a personal prejudice; the rest of the chapters are of equal quality.

Volume II will be somewhat more difficult for the nonspecialist, as it deals mostly with the arcana of electron transport, but even here a careful reading of Chapter 1 (Moser et al.), Chapter 2 (Parson and Warshel), and Chapter 3 (Kirmaier and Holten) will provide one with the tools necessary for understanding the rest.

The volumes are well produced with a clear typeface and excellent reproduction of figures and plates. As a final bonus, the last chapter of Volume II is a description by Deisenhofer and Michel of their model for the reaction center of *Rhodopseudomonas viridis*. This is worth the price of admission.

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BIOMEMBRANE PROTOCOLS: II. ARCHITECTURE AND FUNCTION. *Methods in Molecular Biology, Volume 27.*

Edited by John M. Graham and Joan A. Higgins; Series Editor: John M. Walker. Humana Press, Totowa (New Jersey). $59.50 (paper). xiii + 362 p.; ill.; index. ISBN: 0-89603-250-7. 1994.

MOLECULAR MARKERS, NATURAL HISTORY AND EVOLUTION.

By John C. Avise. Chapman & Hall, New York. $37.50 (paper). xiv + 511 p.; ill.; index to taxonomic genera and general index. ISBN: 0-412-03781-5. 1994.

In the Preface of his extraordinary book, John Avise unnecessarily confesses his admiration for natural history and organismal questions. Every reader will immediately notice the author's genuine love for animals, and for birds in particular. Avise has long been a master at posing interesting biogeographic and organismal evolutionary questions and at getting answers to them through the detour of molecular markers. This mastery could be achieved only because of his complete appreciation for nonmolecular approaches to evolutionary biology and his comprehension of the biology of animals.

Avise argues for the application of molecular approaches to organismal evolutionary problems "because they open new empirical windows" (p. xiii)

to these questions. This book, however, is not limited to addressing organismal evolutionary questions; it also considers more molecular issues, such as gene trees and species trees, the evolution of the genetic code, and concerted evolution, all of which are covered eloquently. Molecular natural history (as in descriptive nonexperimental molecular biology) is a flourishing field of inquiry, but nobody else in the field (except for the late Allan Wilson) has worked on so many different organisms and on so many meaningful biological questions as the author of this book. Avise's joy in writing also comes through loud and clear. His engaging writing style makes it a pleasure to read. This book is not only for everyone in the field of molecular natural history; it is also for everyone else.

Molecular Markers, Natural History and Evolution is divided into two parts: Background and Applications. The second part is really where Avise's strength lies; his nose for interesting questions and case histories is legendary. The first part covers four chapters that discuss the question of why molecular genetic markers should be employed, the history of molecular phylogenetics, molecular tools, and interpretive tools. These methods sections are really not comprehensive enough (and not intended to be) for the reader to follow recipes, and they would not allow a novice to get going on projects. More detailed books and reviews for the technical portions on data collection and data analysis are available and referenced by Avise. Also, the coverage of the phylogenetic analysis section is too uneven; maximum likelihood is hardly mentioned. Ample reference to more specialized "cookbooks" and recent reviews on phylogenetic methods is made, allowing the reader to dive deeper. Clearly, Avise does not particularly enjoy phylogenetics for its own sake; trees are only interesting to him if they provide an answer to a question.

In the five chapters of the applications section of the book Avise covers: individuality and parentage, kinship and intraspecific phylogeny, speciation and hybridization, species phylogenies and macroevolution, and conservation genetics. No other book in this field tries to bring together so much under one cover, and Avise succeeds admirably in his opus magnum. I cannot remember another recent book that I enjoyed reading more.

Avise has a supreme command of the literature, and his ability to recognize interesting questions and examples shows through in every section of the book. Avise modestly states that he does not attempt to be exhaustive in his treatment; however, with 112 pages of bibliography and nearly 2,500 references cited, it might be nearly complete. He provides a real service to the research community. The reference section alone makes the book one's main reference in this biological discipline. It is particularly noteworthy that Avise successfully ventured outside his immediate area of expertise and made a strong effort to include many examples from bacteria and plants. This makes *Molecular Markers, Natural History and Evolution* even more comprehensive and balanced. Avise's book will delight and edify — it is a "must-read" for every modern biologist.

There are not many things to critize about this book, except maybe it should be pointed out that the production quality of the paperback edition is not high, and after several plane rides, the cover of my copy has bent out of shape. In light of the poor binding, I would strongly recommend buying the hardcover edition. This book furnishes a plethora of research ideas and successful examples of biological applications of molecular markers. It is very up to date and will be used as a reference for many years to come; readers will want the book to be sturdy because they will use it over and over again.

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GENE TRANSCRIPTION: A PRACTICAL APPROACH. *The Practical Approach Series.*

Edited by B. David Hames and Stephen J. Higgins; Series Editors: D. Rickwood and B. D. Hames. IRL Press (Oxford University Press), Oxford and New York. $42.00 (paper). xx + 364 p.; ill.; index. ISBN: 0-19-963291-X. 1993.

This book contains seven chapters and three appendixes dedicated to techniques on the analysis of gene transcription. In the Introduction Keith Yamamoto clearly and rightly states that molecular biology is driven by techniques and that this is another volume loaded with useful protocols. The protocols are clearly written and easily followed. Although the chapters are written by different authors, as they must be, all the protocols are uniform in their format and are well organized. Each chapter contains useful general introductory material on what can be achieved by the described protocols.

Chapter 1, entitled "Assay of gene transcription *in vitro*," is especially well done, and contains specific sections dealing with problems that commonly arise. The rest of the chapters could have benefited by including such specific sections on potential pitfalls and problems. Chapter 4, entitled "Transcriptional analysis using transgenic animals," is dedicated entirely to the mouse system. This chapter is sparse considering its importance, and could easily be expanded into a separate volume to include information on other transgenic systems. All of the chapters contain extensive and timely references. This