in my judgement the editors are to be congratulated for producing such a remarkably error-free work, especially where multiple authors wrote the species accounts and introductory sections.

It is a pleasure to read *Bull's Birds of New York State,* and I have no doubt that I will refer to it often in the future, just as I have done with its predecessor. It is a visual treat because of the artfully produced line drawings by Dale Dyer. It rightfully belongs on the shelf of any birder or field ornithologist who has an interest in avian distribution and species trends, whether specifically in New York State, or in general. Likewise, conservation planners in the Empire State should use this book to supplement data gathered by the National Audubon Society's New York State Important Bird Areas program.—WAYNE R. PETERSEN, *Massachusetts Audubon Society, Center for Biological Conservation, South Great Road, Lincoln, Massachusetts 01773, USA.*

LITERATURE CITED

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Fundamentals of Molecular Evolution, 2nd Edition.—Dan Graur and Wen-Hsiung Li. 1999. Sinauer Associates, Sunderland, Massachusetts. x + 443 pp. ISBN 0-87893-266-6. Paper, $48.95.—There exists a tremendous range of data and theory regarding the patterns and processes of molecular evolution. In a concise manner, Graur and Li provide a synopsis on the basic and dynamic elements underlying the theories and practices necessary to understand and derive this knowledge. Like the first edition (1991), the second edition attempts to bridge the data (e.g. molecular biology) with the concepts and theories (e.g. population genetics and systematics) and does so in an exceptional manner, synthesizing much of the information gained over the last decade into a broad evolutionary context. The authors state in the preface that "We set out to write a book for 'beginners' in molecular evolution." This volume certainly represents an excellent primer for beginners, but it also embodies a valuable reference for more-advanced students and scientists with an interest in the field. This is partly due to its comprehensive breadth regarding the rapidly enlarging theoretical and practical framework in molecular evolutionary studies. Using the scientific method and a straightforward writing style, Graur and Li use mathematical and intuitive explanations to address problems in molecular evolution including subjects such as likelihood, mutation, transposons, genomic evolution, exon and intron change, duplication, RNA viruses, concerted evolution, and the C-value paradox.

The organization of the chapters is fairly consistent. In most cases, key concepts are introduced with brevity and clarity and the operating terms are defined. Many of the subjects are discussed within a scientific framework and are often provided with supporting evidence, alternate theories, and clear mathematical or biological examples. Most chapters contain good citations of the primary literature, and the end of each chapter includes a valuable list of papers and books suggested for further reading.

The first three chapters provide the foundation for the remainder of the book. These chapters are an excellent review of the genetics of the evolutionary process. They interweave some of the important concepts of population genetics in an outstanding manner, particularly at the level of understanding genic and nucleotide diversity. The third chapter is a commendable review of the tools and concepts necessary to use the comparative approach in the field of molecular evolution.

The fourth and fifth chapters cover a broad range of topics. In many ways, these chapters serve as a jumping-off point to the utility of molecular evolution in investigating basic questions of molecular and organismal diversity. Particularly impressive is the emphasis on the potential factors associated with rates of mutational change (e.g. adaptive radiations, loss of function, replication-dependent and replication-independent factors, gradualism vs. punctuated equilibrium, and synonymous vs. non-synonymous patterns). There is ample discussion regarding the various distance methods used, and the mathematical arguments are easily followed.

The final three chapters are a concise synthesis of some of the most recent discoveries within an evolutionary context. In these chapters, Graur and Li introduce theoretical and methodological elements involving genomic diversity and evolution as well as many of the problems being encountered in molecular evolution. These chapters illustrate the dynamic theories and mechanics of molecular evolution and are an excellent foundation for outside discussion and inquiry. The two appendices are also helpful. The first is a brief discussion of the spatial and temporal geological scales and their relevance to species diversity and the field of molecular evolution in general, and the second is a discussion on some of the basic elements of probability.

A key feature of the book, and one extremely relevant to avian biologists, is that it transcends any organismal bias for the more straightforward task of addressing contemporary and classical issues in evolutionary biology using molecular and theoretical techniques. In many cases, the examples are lucid

and well chosen. Any book that treats such a diverse and large body of knowledge, particularly in a rapidly expanding and changing field, cannot escape the occasional error. For example, the authors cite paleobotanical evidence regarding the origin of the angiosperms to support elements of the molecular clock theory in part. Unfortunately, however, the paleobotanical data cited were misdated, and one hopes that such information does not enter into the world of dogma.

The second edition of Graur and Li's *Fundamentals of Molecular Evolution* is an essential tool for an introductory molecular biology or upper level/graduate evolution class, although a wider audience will probably appreciate its comprehensive and abbreviated discussions of multiple theories within different contexts. For example, scientists from other fields who have an interest in the progress of molecular evolutionary studies would find this text very approachable and a valuable desktop reference. It also provides useful information for population geneticists and systematists by clearly explaining the mechanics of molecular biology and, similarly, by demonstrating the application of data in a conceptual and analytical evolutionary framework for molecular biologists. Fortunately, the authors did not refine or shorten the book by excluding certain examples and theories. Instead, they embrace the scientific format and provide an intricate forum for additional discussion and critical thinking.—ANDREW W. DOUGLAS, *Department of Biology, University of Mississippi, University, Mississippi 38677, USA.*

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Ecological Assembly Rules: Perspectives, Advances, Retreats.—Edited by Evan Weiher and Paul Keddy. 1999. Cambridge University Press, Cambridge, United Kingdom. xii + 418 pp. ISBN 0-521-65235-9. Cloth, $90.00.—Community ecology has encountered several crossroads in the past and is currently at another. In the 1960s and 1970, several ecologists recognized that advancement of the field would require testing hypotheses about the relative importance of bottom-up and top-down effects on the structure of communities and food webs. This was evident in the pioneering experiments by Paine, Connell, Dayton, Menge, Lubchenco, and Sousa in intertidal communities (many of which are reviewed in Chapter 3 by D. A. Kelt and J. H. Brown in this volume). In the 1970s and 1980s, a contentious debate began over the existence of what Jared Diamond called "forbidden combinations" of bird assemblages in archipelagoes. This spurred the development of novel statistical approaches (e.g. null models; Connor and Simberloff 1983) to test these ideas. Community ecologists discovered that making inferences about the importance of competition from assemblage patterns was not as straightforward as one might initially think, and the statistical methodology that may have been used mattered.

The current crossroad is different in that it is not about whether people are going to test new hypotheses or develop new statistical methods to advance the state of knowledge in community ecology. Rather, it is about whether the time is right for a synthesis of descriptive and experimental approaches in community ecology. Can the study of community assemblages be taken in a new direction? Fundamental questions such as "Why are there so many species?" and "What factors limit species diversity?" have been addressed primarily with either descriptive or experimental approaches. An important conclusion that I drew after reading Weiher and Keddy's *Ecological Assembly Rules* is that a synthesis of experimental and null-model approaches may be the best way to answer these fundamental but vexing questions.

Inferring process from pattern has its advantages and disadvantages, as illustrated in Part I: "The Search for Meaningful Patterns in Species Assemblages." An advantage of using inference in such an approach is that it aims at describing combinations of species/taxa and, thus, applies to communities as a whole. A disadvantage is the difficulty in ruling out the importance of factors other than competition in structuring assemblages. The difficulties are well illustrated in exchanges between Fox (Chapter 1); Simberloff, Dayan, and Stone (Chapter 2); Kelt and Brown (Chapter 3); and Wilson (Chapter 5). In these chapters, we learn about a dizzying array of type I and type II statistical errors that may occur when using inappropriate null models. These are given colorful names such as "The Narcissus Effect," "The Icarus Effect," "The J.P. Morgan Effect," and "The Jack Horner Effect." Although disputes over methodology are just as contentious today as they were in the 1970s and 1980s, a gentler tone characterizes the debate in the current volume. For example, we find Brown (Chapter 3) betting Simberloff (Chapter 2) a beer over the results of what both agree would be an "interesting study" on the assembly of desert rodent communities.

There are also advantages and disadvantages to strictly experimental approaches in community ecology. One advantage is that factors other than competition can be ruled out unequivocally. One disadvantage, however, is that the results of most experimental studies relate to present-day, short-term processes, usually describing the responses of individual species to competition and other factors, rather than how communities as a whole are structured. Interpretations about the role of competition in structuring communities derived from such stud-