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Reviews



EDITED BY REBECCA L. HOLBERTON

The following critiques express the opinions of the individual evaluators regarding the strengths, weaknesses, and value of the books they review. As such, the appraisals are subjective assessments and do not necessarily reflect the opinions of the editors or any official policy of the American Ornithologists' Union.

The Auk 117(2):531–532, 2000

The Evolution of Avian Breeding Systems.—J. David Ligon. 1999. Oxford University Press, New York. xxi + 504 pp., 1 black-and-white plate, 62 figures, 9 tables, 1 appendix. ISBN 0-19-854913-X. Cloth, $98.00.—The mating behaviors of animals have always fascinated scientists and the public alike. In the last decade a suite of new genetic, physiological, theoretical, and phylogenetic methods has advanced our understanding of mate choice, sexual selection, and parental behavior. For example, just a decade ago most researchers got on well with simple laboratory and field devices, whereas now students of mating behavior routinely use techniques of molecular genetics and immunology, develop advanced mathematical models, and use sophisticated statistical tools. Avian research was, and is, at the cutting edge of these studies.

Ligon has taken up the challenge of reviewing most of the key topics in avian mating behavior. The literature is vast, as reflected by the nearly 1,000 references included in this volume. Ligon summarizes much research about mate choice, including the topical issues of good genes, parasites, and fluctuating asymmetry, and he also deals with sexual selection and speciation and investigates how various mating systems might have come about. In contrast to most current books on sexual selection and mating systems, Ligon's treatise stands out by having a broad, primarily historical (phylogenetic) perspective and by focusing on a popular group of animals, the birds. The ideas are expressed beautifully, although at times at great length.

The book can be divided into five parts: introduction (Chapter 1); sexual selection and mate choice (Chapters 2 to 6); issues related to mate choice that include speciation, female-female competition, and the evolution of parental care (Chapters 7 to 10); mating systems (Chapters 11 to 16); and conclusions (Chapter 17). Each chapter ends with a substantial summary. The Introduction defines the key tenets of the book. First, Ligon investigates how mate choice, mating systems, and parental care might influence each other. These relationships are familiar to most avian biologists, although specific examples would have provided a better grasp of the feedback among the three subjects. Incidentally, I found no definition of ''breeding system'' and wonder whether Ligon's definition is different from that of Reynolds (1996). Second, whereas most current work emphasizes the role of ecology in influencing mating systems, Ligon emphasizes the significance of phylogenetic constraints. The phylogenetic approach clearly is timely because reconstructions of phylogenies (largely based upon molecular data) and analyses using comparative methods have advanced considerably in recent years.

Chapters 2 to 6 deal with mate choice. Ligon proposes that traditional ethological concepts (e.g. sign stimuli, innate releasing mechanisms, fixed action patterns) are useful in understanding mate choice. I must admit that I am skeptical about reviving these concepts for this purpose because I don't see what would be gained from using them over standard proximate (e.g. neurobiology and neuroendocrinology) and ultimate (e.g. behavioral ecology and sociobiology) analyses of mating behaviors. Ligon also presents a wealth of information on the diversity of ornaments such as plumage, wattles, and spurs and argues that some of them actually are not used in mate choice. This leaves the reader wondering whether the lack of such relationships is genuine or perhaps the consequence of low statistical power and/or unrealistic experimental manipulations. I particularly enjoyed the chapter that deals with case studies of major hypotheses; Ligon presents balanced arguments and does not hesitate to add his views on several controversial topics.

Chapters 7 to 10 are a bit of a potpourri. One of these chapters is devoted to sexual selection and speciation, and I am sure that this treatment will inspire much research in coming years. I particularly welcomed the chapter on mate choice by males and female-female competition, because these topics are somewhat the reverse of what many researchers

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might expect and thus rarely come into the forefront of interest. I was slightly puzzled by the chapter on avian parental care. First, Ligon repeatedly states that his book does not deal with parental behavior. Yet, as this chapter makes clear, it is virtually impossible to understand sexual selection and mating behavior without it. Second, the ancestral state of avian parental care, as well as phylogenetic transitions, are contentious issues, and Ligon makes clear his favorite views. Nevertheless, I found it unsatisfactory that the only rigorous study that was based on a large data set (McKitrick 1992) was mentioned only briefly, whereas other somewhat more hypothetical scenarios were discussed and praised at length.

Chapters 11 to 16 provide excellent syntheses of social monogamy, extrapair copulations, polygyny, cooperative breeding, and classical polyandry and include many detailed case studies of some of the best-known avian systems. However, I have the feeling that some of Ligon's conclusions are premature. For example, Ligon concurs with David Lack that monogamy (associated with biparental care of young) must be the most productive mating system for most birds (p. 265). To demonstrate that socially monogamous birds achieve higher reproductive success than deserting ones, one needs to show that (1) the payoff from staying with the mate and caring for the young exceeds (2) the payoff from desertion (i.e. reproducing with a new mate and / or improving survival until future breeding seasons) for males and females. Although simple male-removal experiments (summarized in his table 11.1) potentially could estimate (1) for the male, they neither investigate (2) nor say anything about the payoffs for the female. Because behavior (e.g. caring / deserting decisions) and qualities (e.g. body condition, attractiveness) may be phenotypically correlated, both (1) and (2) must be estimated experimentally. As far as I know, this has not been done fully with any socially monogamous bird.

The ''Conclusions'' propose several interesting lines of research for further investigation. I fully concur with the author that new phylogenetic studies are required to understand the evolutionary history of mating behaviors. However, I was somewhat surprised that Ligon does not express concern that much of our current information on the costs and benefits of certain mating systems (e.g. classical polyandry) is based on observational studies and thus is open to alternative explanations. Few research projects have estimated fully the major components of mating decisions from a life-history perspective, especially for both sexes. In my view, additional experiments, preferably in the natural habitats of various bird species, remain necessary to have a better understanding of why a particular mating behavior occurs in one species but not in another.

Overall, I liked this book because it condenses a wealth of information. The book is timely, because studies of mating behavior are rapidly proliferating. Also, the basic questions and some of the research methodologies have been defined, but luckily controversial issues exist that still attract students and keep researchers busy. However, I was disappointed to find little mention of recent advances in theoretical models of sexual selection. Some of these models focus on a single sex and use standard optimization procedures (e.g. static optimization), whereas others explore the interactions between individuals using a game-theoretic approach. The latter are particularly important for analyzing the conflicting interests of males and females that lie at the heart of sexual selection. From a broader perspective, theories often have a major influence on the way empiricists think about their favorite animal. In turn, influential empirical studies frequently motivate modelers to focus on some specific questions in a rigorous way. Thus, my point is that the feedback between contemporary theoretical and empirical research is one of the cornerstones of research in animal behavior, and much remains to be learned by integrating such approaches in studies of mating behavior.

These concerns should not reduce the value of this ambitious book, which is the best review available on avian mating systems. Overall, I found the book to be strong in factual information and packed with good natural history, although it is less useful if you want to update your knowledge about the theoretical foundation of mating behavior and match these theories with current empirical studies. I highly recommend this book to professional and amateur ornithologists. Unfortunately, it is quite expensive at $98, so many students and amateur bird fans probably will not be able to buy it. In any case, it is well worth recommending it to your institution's library.—TAMÁS SZÉKELY, *Centre for Behavioural Biology, University of Bristol, Bristol BS8 1UG, United Kingdom.*

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Handbook of the Birds of the World, Volume 5, Barn-owls to Hummingbirds.—Edited by Josep del Hoyo, Andrew Elliott, and Jordi Sargatal. 1999. Lynx Edicions, Barcelona, Spain. 759 pp., 76 color plates,

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406 color photographs, 758 distribution maps, 10 figures and tables. ISBN 84-87334-25-3. Cloth, $185.00.—With the appearance of Volume 5 (of a projected 12 volumes) of this series, reviewers are running out of superlatives. To embark upon the task of producing a fully illustrated handbook covering every species of bird in the world is audacious enough; to actually bring it off at the level of quality established in this series will be an incredible accomplishment. At this point, the odds of completing the series sometime near the target of 2010 look very promising indeed. Not only is the book comprehensive and authoritative, it is also beautiful. Despite the wealth of detailed information that is de rigueur in a work of this sort, the text, especially the lengthy treatments of each of the families, is very readable in spite of being packed with interesting facts.

This volume covers the families Tytonidae (barn-owls; 16 species), Strigidae (true owls; 189 species), Steatornithidae (Oilbird; 1 species), Aegothelidae (owlet-nightjars; 9 species), Podargidae (frogmouths; 12 species), Nyctibiidae (potoos; 7 species), Caprimulgidae (nightjars; 89 species), Apodidae (swifts; 92 species), Hemiprocnidae (tree-swifts; 4 species), and Trochilidae (hummingbirds; 328 species). Several of these are difficult groups. The nocturnal owls, nightjars, and allies often are poorly known, and very few species have been studied in detail. In these groups, as well as in the swifts and hummingbirds, the relationships of genera and species limits are not well understood.

As with previous volumes, this one contains a foreword dealing with some general topic. In this case, Nigel Collar discusses risk indicators and status assessment in birds. He describes, with examples, the IUCN system for classifying the conservation status of bird populations. After discussing the criteria used to identify species at risk, Collar concludes that ''. . . the single most important perception that follows from the criteria . . . is that the majority of extinction-prone species can only be secured by protected areas, many of them large, many of them strict; only, in other words, by setting aside significant tracts of the planet with the full intention that the factors rendering their inhabitants extinction-prone shall be absolutely minimized'' (p. 26). This, of course, is not news, but perhaps if we repeat it enough times we will someday actually do something about it. It is possible that he thought the connection so self evident as to require no explicit comment, but I think it unfortunate that he made no mention whatsoever of unrestrained growth in the human population, the direct cause or exacerbating factor in virtually all of the problems faced by bird populations that are at risk.

Each family is introduced with a lengthy discussion that includes information on the fossil record and taxonomic history of the family, morphology, habitats occupied, general habits with many specific examples, voice, food and feeding habits, breeding behavior and ecology, movements, relationships with humans (an eclectic collection that is fun to read), and status and conservation. These family accounts are heavily illustrated with stunning photographs that are not only technically superb in nearly all cases, but also illustrate a vast array of interesting aspects of the biology of these birds. The photos are not just present as pretty pictures (though they are surely that), because most of them make some salient point related to the accompanying text. Simply locating all of these photographs must have been a daunting task. Given that many of the species treated in this volume are nocturnal and poorly known, it is remarkable that such excellent images even exist. Many rare photos and photos of rare species appear: Congo Bay-Owl (*Phodilus prigoginei*), a species with only two definite records from a single locality; Long-whiskered Owlet (*Xenoglaux loweryi*), a cloud-forest endemic discovered in Peru in 1977; Sokoke Scops-Owl (*Otus ireneae*); Seychelles Scops-Owl (*O. insularis*); Comoro Scops-Owl (*O. pauliani*), known only from the type specimen and a few photos; the only known photo of Javan Scops-Owl (*O. angelinae*); Forest Owlet (*Athene blewitti*), rediscovered in 1998 in India; Puerto Rican Nightjar (*Caprimulgus noctitherus*); Scissor-tailed Hummingbird (*Hylonympha macrocerca*) of northeastern Venezuela; Juan Fernandez Firecrown (*Sephanoides fernandensis*); and numerous others. As other reviewers have noted, these volumes easily qualify as beautiful coffee table books as well as serious scientific works.

The species accounts come after the treatment of each family and follow a standard format. French, German, and Spanish common names are provided. Taxonomic notes follow, including reference to the original description (citations provided in a separate reference list). Distribution is described, and if there are recognized subspecies, their ranges are very briefly noted. Each species account is accompanied by a range map. These appear to be generally accurate, but they are small and not detailed. A description is given for sexes and ages, including a verbal description of vocalizations. The descriptions are not designed to facilitate field identification, and little note is made of features that distinguish similar species. Then follow brief descriptions of habitat, food and feeding habits, breeding season, nest, clutch size, etc., movements, and status and conservation. Each account ends with a list of citations by name and date; full references appear in the bibliography. Information on many of these species is scant, so most of the species accounts are short (typically about a half column). The extensively studied and worldwide Barn Owl (*Tyto alba*) merited the longest account in the series so far (one and two-thirds pages).

The species accounts are accompanied by color plates by 19 artists. Each species is illustrated, and in cases where significant geographic variation or color

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morphs exist, there may be as many as three or four illustrations per species. Both sexes are depicted when there is significant sexual dimorphism in plumage. The birds are presented in unadorned field-guide type plates, typically in perched poses. Swifts are depicted in flight, and small flight paintings accompany many of the nightjars as well. The plates vary somewhat in accuracy, but overall they are excellent.

In such a massive volume containing so much factual information, there must be a substantial number of errors and omissions. Experts on particular species and groups will no doubt delight in pointing these out. In general, extralimital records are very inconsistently presented. In North America, for example, Texas occurrences of Mottled Owl (*Ciccaba virgata*) and Stygian Owl (*Asio stygius*), many records of Plain-capped Starthroat (*Heliomaster constantii*) in Arizona and Bahama Woodstar (*Calliphlox evelynae*) in Florida, and Cinnamon Hummingbird (*Amazilia rutila*) occurrences in Arizona and New Mexico are not mentioned, whereas old and probably invalid Texas records of Rufous-tailed Hummingbird (*A. tzacatl*) are noted. The Green Violet-ear (*Colibri thalassinus*) is said to stray to the extreme southwestern United States, when in fact the records are from the central and eastern parts of North America. A bird reported (p. 413, 420) to be a Black Swift (*Cypseloides niger*) of Caribbean origin from Martha's Vineyard, Massachusetts, was never identified and may, in fact, have been an *Apus* (W. Petersen pers. comm.). These are quibbles; the book was not intended to deal with distribution in this detail. However, readers should be warned that this information should be taken with a grain of salt.

The most serious flaw in these volumes, and one that reduces their usefulness, is that references are not cited in the text. Reading the family accounts, one comes across many interesting and provocative statements and fascinating facts that merit further exploration. But the text provides no efficient way to find the source of the information. At the end of each family account appears an extensive list of references, but without titles. The only way to try to ferret out the source of a particular piece of information is to check each of these citations against the bibliography. All but the most persistent readers will throw up their hands in the face of this task. The usefulness of future volumes would be greatly enhanced by using small superscript numerals or some other space-efficient means of connecting information with its source. Approximately 8,000 references are cited, and it is a shame that this vast collection of data is not made more accessible.

This volume, along with its companions, represents a stunning achievement. Collectively, this set of volumes will be the indispensable primary source of information on the birds of the world for the next several decades.—KENNETH P. ABLE, *Department of Biological Sciences, State University of New York, Albany, New York 12222, USA.*

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Bull's Birds of New York State.—Edited by Emanuel Levine. 1998. Cornell University Press, Ithaca, New York. xx + 622 pp., 7 maps, 6 figures, 8 tables, 30 black-and-white sketches. ISBN 0-8014-3404-1. Cloth, $39.95.—State bird books serve many functions and assume many formats. Some works contain lavish illustrations and provide copious detail on the precise status of every species known to have occurred in a particular region; others are either so superficial or so provincial that they provide little of interest to anyone except a reader with a specific interest only in the bird life of a particular state. *Bull's Birds of New York State* provides a pleasing blend of regional information in a format that is both informative and reader friendly. A 50th anniversary project of the Federation of New York State Bird Clubs, this publication is the product of a collegial effort involving individuals, institutions, and organizations combining their talents to produce a valuable contribution to the ornithological literature of the Empire State. This reference substantially updates John Bull's 1974 treatise, *Birds of New York State*, by effectively integrating information published in Andrle and Carroll's (1988) *The Atlas of Breeding Birds in New York State* and field reports gleaned since 1974 from the Federation's quarterly journal, *The Kingbird*. From the latter source, the majority of unusual reports and all of those representing new species or new breeding records for New York have been carefully screened by the New York State Avian Records Committee.

Besides the species accounts, which represent the main body of the volume, there is much useful information to recommend in the introductory sections of this book. In keeping with the tradition found in most state bird books, the physical environment of New York is described in considerable detail. In addition to including a revision of Bull's 1974 narrative of New York's physical environment, this book provides a 12-page description of the ecozones of the state, along with a colored ecozone boundary map and maps showing elevation contours and landcover types. Although it is nice to have this information between two covers, the fact that much of the material was previously published in *The Atlas of Breeding Birds in New York State* adds an element of redundancy. The inclusion of this material apparently is justified by the fact that many of the species accounts

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make reference to the ecozones when describing the distribution of birds.

In a 13-page summary of bird habitats in the state, Charles R. Smith and Shari K. Gregory describe New York on a smaller landscape scale. More than a simple narrative description of New York's floral communities, the authors provide a thoughtful analysis of landscape changes over time and highlight the significance of succession in determining the future of bird populations, such as those of Golden-winged Warbler (*Vermivora chrysoptera*) and Eastern Towhee (*Pipilo erythrophthalmus*). They remind readers that ''succession is a natural ecological process, not necessarily a threat, as some have asserted.'' They also emphasize that any attempt to interrupt or thwart succession means making ''a long-term commitment to active management based on ecological, economic, political, and philosophical considerations.'' In this case, the question is ''Are we prepared to cut mature forests in order to encourage regeneration that will maintain successional habitats required by shrub-land bird species?''

Smith and Gregory also cogently describe how developing technology (e.g. satellite remote sensing and standardized habitat taxonomy) may soon provide methodologies for describing landscape changes over large areas and long time periods, techniques that are already cornerstones in a number of landscape-scale conservation projects. At a more parochial level, detailed habitat descriptions and associated indicator plant and bird species lists should prove useful to anyone interested in obtaining basic information about northeastern bird assemblages.

Another introductory section authored by Smith describes the role played by the Federation of New York State Bird Clubs in integrating bird conservation projects in the state. More than simply stroking the sponsoring organization, this section gives succinct descriptions of the most important bird-based conservation programs in New York (e.g. Breeding Bird Survey, Breeding Bird Atlas, State Parks Checklists, Finger Lakes National Forest Study). In addition, it presents current, statistically significant trend analyses for increasing and declining breeding bird species. Figures accompanied by written summaries provide a convenient digest of population trends for many bird species in New York. This section effectively pulls together information that otherwise is scattered in a variety of data bases, thus making it an especially useful resource for conservation planners, legislators, and anyone else desiring a summary of population trends in New York's breeding birds.

A 15-page section by David W. Steadman on long-term changes in bird populations provides an interesting paleontological perspective on New York's bird life. Even though primarily an update of Steadman's avifaunal history that originally appeared in *The Atlas of Breeding Birds in New York State*, for many readers this section will provide an expanded context in which to view changes in bird populations. For example, one of Steadman's most chilling projections pertains to avian extinction rates. At the current extrapolated rate of approximately 20 avian extinctions per millennium, in 10,000 years New York State could lose roughly half of its species of birds! How to curtail this phenomenon will be an increasing challenge for bird conservationists in the centuries ahead.

The final introductory section includes a discussion by Carole S. Griffiths about trends in avian taxonomy, as well as a statistical chronology that traces changes in the New York state bird list since the publication of John Bull's original *Birds of New York State* (1974) and its 1976 supplement. In 1998, the official New York State bird list comprised 451 species, 243 of which were breeding species or historically had bred in the state.

The main body of the text consists of 451 species accounts written by approximately 75 contributing authors. One of the greatest strengths of the book is the efficient, easy-to-follow organization of the species accounts. Starting with a generalized description of ''Range,'' each account is followed by a brief (yet precise) statement describing the species ''Status'' in New York. Indicator terms for abundance, such as ''Common'' and ''Rare,'' are quantified by definitions such as ''20 to 50 individuals per day per locality,'' or ''1 to 6 individuals per season.'' Although by no means perfect, such an approach offers a quantifiable way for describing species abundance that is sometimes lacking or is far more subjective in some other state bird books. Along with abundance, the status of each species is described as ''Resident,'' ''Migrant,'' ''Visitant,'' or ''Vagrant.'' For species that nest in New York, the accounts are broken into ''Breeding'' and ''Nonbreeding'' sections. For nonbreeding species, the term ''Occurrence'' is used to define each species' status within the state.

Within the ''Occurrence'' and ''Nonbreeding'' sections (for breeding species), migration data include high and low counts and early and late dates; winter occurrence also is described. In some accounts, a ''Remarks'' section includes information that does not specifically fall into the regular categories described above, yet nonetheless enriches the account in some way. For example, the Black-headed Gull (*Larus ridibundus*) account describes the only United States nesting of the species in neighboring Massachusetts, and the account for Red Crossbill (*Loxia curvirostra*) provides extensive details about the taxonomic complexities of this highly variable species.

Although it might seem desirable to analyze every species account for flaws or erroneous inclusions and omissions, suffice it to say that careful scrutiny of a number of randomly selected accounts produced no glaring errors and even fewer grammatical mistakes. Considering the variation in authors' styles and the vast amount of data included in the species accounts,

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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.*

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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

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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-

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ies may depend on which species and which stages of the life cycle are examined and a consideration of the indirect interactions among three or more species.

In Chapter 4, Lockwood, Moulton, and Balent use an experimental null-model approach to examine patterns of successful colonization of islands by introduced avifauna. Thus, statistical approaches and a natural experiment are combined in a powerful demonstration of the importance of assembly rules. Such an experimental approach is revisited by Lockwood and Pimm in Chapter 13, ''When does Restoration Succeed?'' Because restoration ecology is inherently experimental in nature (or at least it should be), restoration projects may provide the best opportunity to test hypotheses about community assembly. In their review, Lockwood and Pimm discover that full restoration is rarely achieved, but that restoration efforts that include secondary succession are more likely to succeed than those that rely on micromanagement of community structure.

In Part II, the reader learns about other nontraditional perspectives on assembly rules. In the introductory chapter of the book, Keddy and Weiher provocatively state that ''asking if there is pattern in nature is akin to asking if bears shit in the woods.'' In Chapter 9, Weiher and Keddy start with the assumption that nonrandom patterns of assembly exist in natural communities and then ask if it is possible to devise a set of rules that can be used to predict patterns of assembly of functional groups along environmental gradients. Quite interestingly, they find that when the analysis is focused on traits rather than species, some trait patterns show evidence of competition (i.e. limiting similarity inferred from morphological overdispersion), whereas others show evidence of having passed through an environmental filter or sieve (morphological underdispersion). The authors suggest that filtering is more important in stressful habitats, whereas competition appears to be more important in less-stressful habitats. Similarly, Strange and Foin (Chapter 11) expand the concept of assembly rules to include an emphasis of the role of the physical environment on stream fish assemblages. In an extremely well-written chapter, Diaz, Cabido, and Casanoves (Chapter 12) use a similar trait-environmental analysis to identify assemblages of functional groups of plants that are predicted to change with global climate change. They further highlight how changes in functional-group composition of assemblages in response to global environmental change may alter ecosystem function. Other chapters in Part II (e.g. Chapter 8 by Drake et al., Chapter 10 by Lomolino) fruitfully expand the concept of assembly rules to evaluate the spatial and temporal dynamics of community assembly.

To summarize, this timely and important book has much to offer anyone interested in community ecology, avian or otherwise. For those interested in a review and reading about the current status of the debate over the statistical methodology used to test for the existence of ''forbidden combinations,'' this volume suits that purpose perfectly. For those interested in empirical data on assemblages rather than disputes over methodology, read Martin Cody's detailed chapter (no. 6) on plant and bird communities. Booth and Larson's chapter (no. 7) provides an interesting and informative history of the study of assembly rules, pre-Diamond era. For those interested in the potential for expanding the concept of assembly rules beyond Diamond's original intent, all of Part II is helpful.

Ecological Assembly Rules, along with Gotelli and Graves' (1996) *Null Models in Ecology*, is ideal for use in a graduate-level seminar on the assembly of communities. Chapters 4 and 6 deal specifically with bird communities and, thus, could be read in seminars pertaining to avian ecology. Also, the book would serve as excellent supplementary reading in a graduate-level Community Ecology course while also being extremely helpful at suggesting and guiding avenues for research in community ecology. Unfortunately, the exorbitant price ($90.00) may place the book beyond the financial reach of many graduate students. Nevertheless, I highly recommend the book for research and graduate-level teaching.—J. Stephen Brewer, *Department of Biology, University of Mississippi, University, Mississippi 38677, USA*.

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John Gould the Bird Man: Correspondence. Volume 1, through 1838.—Gordon C. Sauer. 1998. Maurizio Martino, Mansfield Centre, Connecticut. xiv + 340 pp. ISBN 1-57898-063-1. Cloth, $58.00. **John Gould the Bird Man: Correspondence. Volume 2, 1839 through 1841.**—Gordon C. Sauer. 1998. Maurizio Martino, Mansfield Centre, Connecticut. x + 408 pp. ISBN 1-57898-078-X. Cloth, $64.00 (available from Maurizio Martino Publisher, Box 373, Mansfield Centre, Connecticut 06250).—It is difficult to imagine that anyone had a greater influence on 19th century ornithology than John Gould. In the 50-year

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period between 1831 and 1881, Gould described more than 600 taxa of birds, including 98 genera and 386 species that remain valid to this day (A. P. Peterson pers. comm.). Moreover, he directed the production of lavishly illustrated and scientifically accurate works on the birds of Europe, Australia, Asia, Great Britain, and New Guinea, in addition to definitive monographs on toucans, trogons, New World quails, and hummingbirds. It is equally difficult to imagine that anyone from the 20th century has been more devoted to understanding the life of John Gould than has Gordon Sauer. Dr. Sauer's first major work on Gould, *John Gould the Bird Man: A Chronology and Bibliography* (1982), provided a detailed look into the life and works of this fascinating man. Sauer later published *John Gould the Bird Man: Associates and Subscribers* (1995) and *John Gould the Bird Man: Bibliography 2* (1996). At present, he is in the midst of a most ambitious project: reproducing the more than 4,500 extant letters from, to, or about John Gould. Volume 3 of *Correspondence* will appear before this review is published, and Sauer is hard at work on volume 4; he estimates that 18 volumes will be required to complete the project!

Volume 1 includes a thorough genealogy of the Gould family. Both volumes contain a list of Gould's major published works, a brief chronology of Gould's life, and notes on the correspondence to facilitate the use of the books. The bulk of the correspondence material was supplied by Gould's living family members, the Mitchell Library in Sydney, Australia, and the British Museum (Natural History), the latter containing the largest intact collection of Gould correspondence (ca. 3,500 letters). Sauer was ably assisted by Ann Datta of the British Museum, who supplied him with photocopies of many of the original letters, and by Storrs Olson of the Smithsonian Institution's National Museum of Natural History, who painstakingly reviewed the manuscripts and updated the nomenclature for many of the birds mentioned in the correspondence.

The letters themselves have been typed directly from photocopies of the originals or from the originals themselves, sometimes in their entirety, and sometimes in part. Many contain Sauer's brief annotations that help set the context by identifying the person connected with the letter or by providing some other useful tidbit of information. Sauer makes no attempt to identify all of the people mentioned in the letters, but he states that biographical notes on more than 2,770 of these individuals are provided in *John Gould the Bird Man: Associates and Subscribers* (1995). Thus, one should obtain a copy of that book to maximize the utility of the *Correspondence* volumes.

The correspondence from the first two volumes spans the period from when Gould was appointed ''curator and preserver'' for the newly formed Zoological Society of London in 1828 to the death of his wife Elizabeth in 1841. In between, Gould got started in the publishing game with *A Century of Birds Hitherto Unfigured from the Himalaya Mountains* (1830 to 1832), which was followed closely by *The Birds of Europe* (1832 to 1837) and the first editions of his monographs on toucans (1833 to 1835) and trogons (1835 to 1838). This period also includes Gould's visit to Australia from September 1838 to April 1840 (accompanied by Elizabeth and Gould's valued field collector John Gilbert), which ultimately led to his monumental work *The Birds of Australia* (1840 to 1848).

In these volumes we find letters to and from many of the prominent naturalists and scientists of the day, including Audubon, Darwin, Jardine, Owen, Selby, Strickland, and Swainson. Volumes 1 and 2 also include several letters from Edward Lear, who worked for Gould from 1831 until 1837, during which time Lear executed some of the finest bird illustrations ever produced. That said, William Hewitson's remarks (7 November 1836) to Gould concerning *The Birds of Europe* are especially vexing: ''. . . beautiful it certainly is, except where Mr. Lear is allowed to blot its pages . . . .'' Also of interest is the letter by William Swainson to a Dr. Williams on 3 April 1832, in which Swainson remarks of *A Century of Birds* ''. . . this tawdry publication has been well puffed into notice–without any other claim to attention than the *few* new species it contains. The figures evince a total ignorance of the anatomy of birds, and are, with scarcely one exception, distorted poses of the attitudes stolen from Audubon and myself . . . .'' Does one detect a hint of jealousy here?

Especially interesting are the many letters between Gould and William Jardine; one such letter, written by Gould on 19 December 1833, includes a sketch of the head of an Imperial Woodpecker, a spectacular species that Gould had described several months earlier. Also of special significance are the exchanges about Darwin's collections that took place among several scientists shortly after Darwin returned from his famous voyage on *The Beagle.* Space limitations preclude me from doing any more than scratch the surface with regard to the many letters included within these *Correspondence* volumes. Suffice it to say that anyone with an interest in 19th century ornithology will find no shortage of fodder to feed his or her curiosity.

A brief look at either volume of *Correspondence* is sufficient to make one realize that Sauer is doing historians and ornithologists a huge service in compiling this vast storehouse of information. Each volume is thoroughly indexed so that one can find every mention of a particular person or species, no matter how minor a role that entity played in the letter in question. As stated in Storrs Olson's review of *Associates and Subscribers,* Gordon Sauer's compilations will enable some future historian of biology to assess ''the breadth and depth of Gould's lasting contributions to ornithology'' so that we may ''understand

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fully just how extraordinary Gould's accomplishments really were'' (*Auk* 114:541, 1997).

Despite the value and utility of these volumes, they are not destined to become ''best sellers,'' because the production of each is strictly limited to 400 copies. Who should obtain these books? Without question, the libraries of all major ornithological research institutions should acquire them. So, too, should those among us whose interest in Gould borders on obsession. If your interest in 19th century natural history is strong but not consuming, you probably will be better off investing in Sauer's *Chronology and Bibliography* (1982), if you can find a copy. But if you are in this latter category, don't hesitate to track down and peruse at least one of the *Correspondence* volumes, for your efforts will be rewarded.—JEFFREY S. MARKS, *Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana 59812, USA*.

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Hancock House Encyclopedia of the Lories.—Rosemary Low. 1998. Hancock House, Blaine, Washington. 432 pp., 175 color photographs, numerous maps and tables. ISBN 0-88839-413-6. Cloth, $70.00; Limited collector's edition, $300.00.—Rosemary Low spent 10 years in the production of this important work. It is not a rewrite of her 1977 *Lories and Lorikeets*, but rather is a completely new book. The collector's edition is limited to 100 copies and has a special green binding with gold lettering and comes with a signed and numbered print of a Red-chinned Lorikeet (*Charmosyna rubrigularis*) by wildlife artist Gamini Ratnavira. The print is suitable for framing but is not one of Ratnavira's better pieces. The regular edition has a beautiful color cover depicting a family of Red-collared Lories (*Trichoglossus haematodus rubritorquis*) painted by Australian artist Rachel Lewis. Both editions are printed on high-quality paper.

The Encyclopedia is divided into four parts. Part 1, ''Alphabetical Listing of Topics,'' includes more than 90 listings, with topics ranging from lories in art to lories in zoo exhibits. In between are such diverse subjects as CITES, field studies, and the reproductive span of lories. These topics are listed alphabetically and are really quite informative, as an encyclopedia should be.

Part 2, ''Lory Species Accounts,'' takes up 238 of the book's 432 pages. Low's accounts of the 53 lory species are written in an interesting and personal style. She combines scientific observations with ornithological, avicultural, and personal experiences. The species accounts are very detailed and describe the adults as well as the immature birds, sexual dimorphism, if any, and subspecies descriptions. Also included are the topics of natural history and aviculture. Under these headings such things as range, habits, nesting, status in the wild and in captivity, breeding data, and chick development are covered. A tremendous amount of avicultural detail is provided for the more common species. It is unfortunate that the color photographs were not interspersed with the text for each species. Of course, grouping them all in the center certainly cut printing costs, but it would have been nice had each photo appeared next to its respective descriptive text. In many cases, the photos are spectacular. Some of the head studies are especially nice. Most notable are the Kuhl's Lory (*Vini kuhlii*) on page 103 and the Blue-streaked Lory (*Eos reticulata*) on page 115. There are a couple of interesting photos of New Guinea tribesmen, including one depicting a medicine man's headdress that contains, among other things, the skins of Josephine's (*Charmosyna josefinae*) and Yellow-billed (*Neopsittacus musschenbroekii*) lorikeets.

Part 3, ''Lorikeets in Australian Gardens,'' is a brief six-page contribution from a variety of Australians on the lories in their gardens and parks. Low makes a plea here for the use of natural shrubs and trees for attracting lories into yards rather than the less-than-ideal practice of offering sugar water at feeders. A list of the appropriate plants is included.

Part 4, ''Gazetteer,'' alphabetically lists the various islands in the range of lories and the species that occur there. Like the previous section, this one is small, consisting of only five pages. It would probably be most useful to the traveler in Indonesia as a quick reference for species likely to be encountered at any given location. Ten pages of references follow this last part.

Anyone with an interest in parrots should have Low's *Encyclopedia of the Lories* in their library. The detailed tables and charts of mass gains may be most useful to aviculturists, but they also will appeal to the person interested in the natural history of these beautiful birds. This volume is the best treatment of the Loriinae to date.—DICK SCHROEDER, *P.O. Box 305, Fallbrook, California 92088, USA*.

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