Reviews

EDITED BY BRUCE M. BEEHLER

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Distribution and Taxonomy of Birds of the World.—Charles G. Sibley and Burt L. Monroe, Jr. 1990. Yale University Press, New Haven, Connecticut. 1,111 pp., 25 maps. ISBN 0-300-04969-2. Cloth, $125.—The science of systematics is allied with the ancillary disciplines of classification and nomenclature, a historical association that has persisted probably because of tradition as well as utility. Just as editorial conventions and the rules of grammar are necessary adjuncts to the publication of scientific findings, classifications (a group-within-group organization of taxa of organisms) and nomenclature (the formulas and conventions governing the linear representation of a classification) are necessary adjuncts to the results of systematics research. Traditionally, biologists have relied on checklists and handbooks of classification as convenient resources for answers to questions like: To which group does this species belong? Are these two species closely related? What is the general distribution of this species, genus, family? Although a linear ordering of species may obscure complex relationships, most users find it a useful means to recover information relating to distribution, ecology, synonymies, past taxonomic treatments, and other compendia.

The authors have attempted the ambitious task of creating a classification and distribution checklist for all species of birds in a single volume. This work relates directly to the research on the phylogeny of birds based on DNA-DNA hybridization studies conducted by Sibley and Jon Ahlquist, the results of which were summarized in Sibley and Ahlquist (1990). Numerous reviews of this research have been published elsewhere (e.g. Gill and Sheldon 1991, O'Hara 1991, Raikow 1991, Lanyon 1992), and I have been asked instead to assess the authors' success in creating a comprehensive classification of birds. For the purposes of this review and despite my personal reservations, I will accept the trees given in Sibley and Ahlquist (1990) as being representative of avian phylogeny. For ease of discussion S&A refers to Sibley and Ahlquist (1990) and S&M to Sibley and Monroe (1990).

The stated goals of the S&M volume (p. xix) are: (1) to delineate the present distributions of all avian species; (2) to arrange the species in a classification based primarily on evidence of phylogenetic relationships from comparisons of their DNAs; (3) to provide a numbering system for the species of living birds; (4) to include a gazetteer with maps indicating positions of mentioned localities; and (5) to provide an index to scientific and English names of species. Goals 3 and 5 are trivial; goals 1 and 4 have not been met in full because of numerous lapses, typos, misstatements, and factual errors. As others have already noted the shortcomings in the maps and distributional accounts, and have provided many examples of disagreements over common names (e.g. Knox 1991, Parkes 1992), I will concentrate in this review on the second goal of S&M.

My assessment is that the authors fail to provide a classification of birds based on their stated methods and their phylogenies derived from DNA-DNA hybridization data. Their sequence of species and higher-order taxa cannot be reconstructed using the methods they describe. The subordination of taxa and the assignment of relationships are often arbitrary and capricious. Because the magnitudes of these errors are so great, I will describe in detail the nature of my analysis.

Note that S&A is based on results from about 12% of avian species; this means that S&M had to infer relationships for the other 88% in their classification. From the outset, it is unclear how representative this classification could be when most of the species were not studied. I removed this bias in the following analysis by examining only the taxa studied in S&A; in other words, I ignored species treated in S&M that were not studied in S&A.

Phylogenetic trees have three-dimensional properties that create difficulties in interpretation when represented on a two-dimensional page, and particularly so when the tree is translated into a linear list of taxa. Because of this, and due to the complex nature of the trees and classification presented by the authors in S&A and S&M, a brief discussion of classification will be helpful. Consider the phylogenetic tree given in Figure 1. Because all of the nodes may be rotated 180° without changing the implied relationships among the species, the two trees shown in Figure 1 are equivalent (i.e. "isomorphic"). There are many other examples of trees isomorphic to Figure 1a. Translation of a tree into a linear classification is accomplished by use of a convention. There are many conventions, ranging from alphabetical listings that submerge all relationships among taxa, to more com-

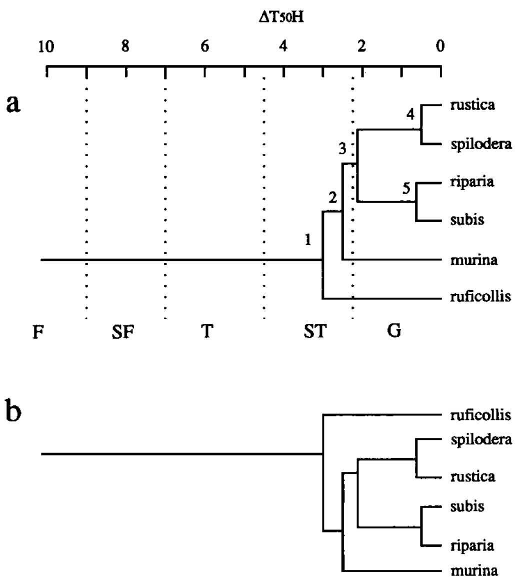

Fig. 1. Hypothetical phylogeny of six species of swallows. Tree (a) reproduced from fig. 380 of Sibley and Ahlquist (1990) with nodes numbered 1 to 5; tree (b) obtained from tree (a) by rotation around nodes 1, 4, and 5. Horizontal scale denotes degrees of difference as measured by the $\Delta T_{50}H$ criterion; dotted lines denote degree ranges for assignment of categorial ranks (G = genus, ST = subtribe, T = tribe, SF = subfamily, F = family) as given in table 19 of Sibley and Ahlquist (1990).

TABLE 1. Hypothetical classifications[a] with one genus of six swallows based on phylogeny given in Figure 1.

Fig. 1a	Fig. 1b
Genus *Hirundo*	Genus *Hirundo*
H. rustica	*H. ruficollis*
H. spilodera	*H. spilodera*
H. riparia	*H. rustica*
H. subis	*H. subis*
H. murina	*H. riparia*
H. ruficollis	*H. murina*

[a] Convention used was to consider all branching information less than about 3° Δ as polychotomous; linear order of names is by reading from top to bottom in trees shown in Figure 1.

plicated and hierarchical systems that aim to represent the phylogenies as accurately as possible.

The International Code of Zoological Nomenclature requires the assignment of species to genera, but the procedure is left to the investigator. For example, the six species shown in Figure 1a can be assigned to monophyletic genera in 10 ways; if the phylogeny is not known or nonmonophyletic groups are allowed, there are as many as 2,752 ways to classify these species (Wiley et al. 1991). Moreover, this clade of six species can be assigned to any higher-order category (genus to kingdom) and still be a valid representation of the phylogeny, as long as the groups-within-groups relationship is preserved (cf. Tables 1 and 2). Assignment of higher-order categories and the order that they and the species names appear in a list are governed by conventions—some explicit, some not.

Curiously, the conventions used by the authors for assignment of taxonomic rank and for the linear ordering of species are not given in this volume. Instead, these details are given in S&A. S&A state that higher-order ranks were assigned on the basis of $\Delta T_{50}H$ (=Δ) values (table 19, p. 254) and that Nelson's (1973 [sic] = 1974) "subordination and sequencing of units" convention was used for classification. Monroe (1989: 516) elaborated on the specifics of sequencing in earlier comments:

> We generally operated on two principles. First, if there were more than two branches at a categorical level within a higher category, then the single line that emerged from the oldest branch (=greatest delta value) was treated first. Second, if there were but two such branches . . . then the sequence used was the least disruptive to the "traditional" taxonomy. . . .

In other words, the convention used by S&M subordinates taxa using ranges of Δ values (e.g. tribe = 4.5°–7.0°) and sequences taxa of equivalent rank in a linear order that preserves sister-group relationships. The second principle in practice would seem to be

TABLE 2. Hypothetical classification[a] with three genera of six swallows based on phylogeny given in figure 380 of Sibley and Ahlquist (1990).

Order Hirundiformes
Suborder Hirundiformi
Parvorder Stelgidopterida
Family Stelgidopteridae
Genus *Stelgidopteryx*
S. ruficollis
Parvorder Hirundinida
Superfamily Notiocheloidea
Family Notiochelidonidae
Genus *Notiochelidon*
N. murina
Superfamily Hirundinoidea
Family Hirundinidae
Genus *Hirundo*
Subgenus [*Hirundo*]
H. [*H.*] *rustica*
H. [*H.*] *spilodera*
Subgenus [*Riparia*]
H. [*R.*] *riparia*
H. [*R.*] *subis*

[a] Generic limits arbitrarily set at $\Delta T_{50}H = 2.0°$; higher-order categories were arbitrary but dichotomous. Convention used by Sibley and Monroe (1990) followed in subordination and sequencing.

TABLE 3. Hypothetical classification[a] with four genera of six swallows based on phylogeny given in figure 380 of Sibley and Ahlquist (1990).

Family Hirundinidae
Subfamily Hirundininae
Tribe Hirundinini
Subtribe Stelgidopterina
Genus *Stelgidopteryx*
S. ruficollis
Subtribe Notiochelidonina
Genus *Notiochelidon*
N. murina
Subtribe Hirundina
Genus *Riparia*
R. subis
R. riparia
Genus *Hirundo*
H. spilodera
H. rustica

[a] Genera and species not studied by Sibley and Ahlquist (1990) are left out of this classification. See Table 2 for conventions; categorical ranks set using Δ limits given in table 19 of Sibley and Ahlquist (1990).

very problematic given that there are many "traditional" arrangements to choose from. This point will be discussed later.

More sophisticated conventions have long been available (e.g. Wiley 1981), and the requirement that categorical rank be based on time of origin (p. 253) has been abandoned by most modern systematists (Wiley et al. 1991); however, these are not the source of the problems with the classification.

For example, the phylogenetic tree derived from DNA-DNA hybridization data for swallows (fig. 380 in S&A) is reproduced in Figure 1, along with the Δ degree ranges for categorial ranks (table 19 in S&A). The classification obtained from this tree using the conventions discussed above is shown in Table 3. Note that, although Figures 1a and 1b appear to be different, their classification under this convention is the same because the branch lengths (i.e. Δ values) remain the same regardless of rotation of nodes. Here, three branches fall within the Δ limits for subtribe (2.2°–4.5°) and, therefore, the sequence of taxa by their accepted convention will be Stelgidopterina, Notiochelidonina, Hirundina.

The classification given by S&M (p. 572–581), however, is different (Table 4). This may represent simply another valid sequence of taxa allowed by the convention, because the linear ordering of sister taxa (e.g. *rustica* and *spilodera*) is arbitrary. Testing congruence of classifications is simple and exact using Venn diagrams (see Wiley et al. 1991). Figure 2a represents the groups-within-groups relationship of species as given in S&A and shown in Figure 1 and Table 3; Figure 2b represents the classification given in S&M and shown in Table 4. If the classifications are derived from the same phylogeny, they are logically consistent (Hull 1964), and there will be no intersections

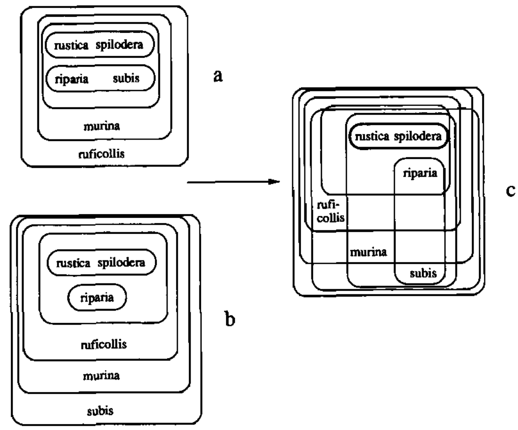

Fig. 2. Venn diagrams of phylogeny and classification of six species of swallows. (a) Venn diagram of phylogeny (Sibley and Ahlquist 1990) shown in figure 1a; (b) Venn diagram of classification (Sibley and Monroe 1990) given in Table 4; (c) Venn diagram of union of the phylogeny and classification.

(i.e. overlapping lines) in the union of Venn diagrams. Therefore, it is evident (Fig. 2c) that the classification of Hirundinidae given in S&M is logically inconsistent with the phylogeny presented in figure 380 of S&A. It instead represents some other phylogeny—one that is *not* based on DNA-DNA hybridization data. Moreover, it represents an unknown phylogeny and, therefore, is only an arrangement, not a classification. The only way that the S&A phylogeny and the S&M classification can be reconciled is if all branching information is ignored below about 3.0° Δ. This will create a polychotomy of six species that can be ordered in 2,752 ways; one of them is given by S&M.

There are vast disagreements between the phylog-

TABLE 4. Classification of six swallows[a] with five genera by Sibley and Monroe (1990: 572–581).

Family Hirundinidae
Subfamily Hirundininae
Genus *Progne*
P. subis
Genus *Notiochelidon*
N. murina
Genus *Stelgidopteryx*
S. ruficollis
Genus *Riparia*
R. riparia
Genus *Hirundo*
H. rustica
H. spilodera[b]

[a] Genera and species not studied by Sibley and Ahlquist (1990) left out of this classification.

[b] Given as *Petrochelidon spilodera* in Sibley and Ahlquist (1990: fig. 380).

eny of S&A and the classification of S&M, and I will present several examples to illustrate how little they agree. I chose all of these at random with the exception of the Phalacrocoracidae, which I looked at first.

For the phalacrocoracids, the phylogeny based on DNA-DNA hybridization data (fig. 366 in S&A) does not resemble the phylogeny I hypothesized based on morphology (Siegel-Causey 1988) in any way. For example, I found that Pelagic and European cormorants (*Stictocarbo pelagicus* and *Phalacrocorax carbo*) were members of two distinct lineages, which I considered to be subfamilies. S&A found them instead to be polychotomous along with a few species from Northern and Southern hemispheres. Surprisingly, the classification given in S&M does not follow the phylogeny of S&A, but instead exactly follows the phylogeny I hypothesized. The only disagreement is in assessment of higher-order categories: S&M follow the long-standing tradition of placing all species in a single genus, *Phalacrocorax*. This is justified by the statement that "limited DNA-DNA hybridization data do not support such a diversity of relationships within the family" (p. 299). I am not sure what is meant by "diversity of relationships," but S&M may be referring to the greatest node value they found for their study group of cormorants and shags being lower than what they selected for subfamily (viz. 3.8° vs. 7°–9°).

By contrast, S&M felt much less constrained about generic status of ardeids (the lineage immediately adjacent to Phalacrocoracidae; see fig. 366 of S&A), because they also found for this group a greatest node value of 3.8°, yet retained 20 genera in the classification (S&M, p. 302–308). I am aware of no substantial differences in generation time or reproductive biology between these two groups that would permit correcting identical Δ values to maintain this asymmetry. While discussing ardeids, note that this classification also is logically inconsistent with the phylogeny, that *Egretta caerula* is listed in *Hydranessa* in figure 366 of S&A but in *Egretta* in figure 158, and that *Gorsachius leuconotus* is used as a tracer species in the melting curves given in figure 157 but does not appear in either of the trees given later (figs. 340, 366).

The classification of Galliformes (p. 5–22 in S&M) does not relate to the phylogeny given in S&A (fig. 357). First of all, the classification is not dichotomous. Based on their Δ values, cracids and megapodes are listed as suborders of Galliformes. Next in the sequence comes the parvorder Phasianida, which by their ranking convention places them as a subgroup of the Megapodiidae. This cannot be right because figure 357 of S&A shows the Craci and Megapodii to be the sister group to the Phasianida. Are phasianids a third suborder of Galliformes? It is much more likely that S&M meant "Order Megapodiiformes" rather than "Order Galliformes" for the clade comprising Craci and Megapodii, and that this is simply another of the numerous lapses to be found in this volume. There are further incongruities.

If the subordination convention of S&M is used correctly, the superfamily Phasianoidea comprises four families, yet S&M recognize only one. No rotation of nodes, however adroit, can produce the order of genera given. For example, *Alectoris* and *Francolinus* are at the front of the sequence of genera given in S&M, yet they encompass the most terminal branching (i.e. the Δ values are lowest) of the species studied in S&A. Placing them at the beginning (as in Peters 1934) destroys all sister-group relationships shown in the phylogeny of S&A that are demanded by the conventions. The only way that the classification can be logically consistent with the phylogeny given in figure 357 is if all branch points less than 11.1° (i.e. family level and lower) are considered polychotomous.

The classification of the Turdinae (S&M, p. 507–522) is logically inconsistent with the phylogeny presented in S&A (fig. 379); the only way the classification could be derived from the phylogeny is if all branching below about 8.0° Δ (i.e. subfamily from table 19 in S&A) is ignored. *Monticola* and *Myiophonus* come before *Zoothera* and they before *Sialia*; this is impossible under any scheme that preserves sister-group relationships proposed by S&A, unless S&M consider their phylogeny to be irrelevant and the relationships polychotomous. The classification in S&M, however, follows for the most part that given in Deignan et al. (1964); is this the source of the sequence?

The classification of the Cuculiformes (S&M, p. 96–105) is logically inconsistent with the phylogeny presented in S&A (fig. 360); the only way the classification could be derived from the phylogeny is if all branching below about 9.8° Δ (i.e. family from table 19 in S&A) is ignored. In the classification (S&M, p. 96–102) *Cuculus* comes before *Cacomantis*, and *Cacomantis* before *Chrysococcyx* and *Eudynamys* (spelled *Eudynamis* [sic] in fig. 360); this is impossible if the authors followed the phylogeny presented in S&A. The classification in S&M, however, follows for the most part that given in Peters (1940; is this the source of the sequence?

The classification of the Hirundininae (S&M, p. 572–581) is logically inconsistent with the phylogeny presented in S&A (fig. 380); the only way the classification could be derived from the phylogeny is if all branching below about 3.0° Δ (i.e. subtribe) is ignored. The generic assignments given in S&A differ from those presented in S&M; the sequence of species given in S&M generally follows Mayr and Greenway (1960), but it is otherwise unique.

There are even more bizarre examples of inconsistency. The phylogeny of Caprimulgidae given in S&A (fig. 362) shows that *Caprimulgus* is polyphyletic (see Fig. 3); species of this genus appear both at the beginning and the end of this branching sequence. The authors are quite clear that they accept only monophyletic groups (S&A, p. 253) in their phylogeny and classification, so this finding demands a drastic realignment of the genus, or reanalysis of the sequence of species from *Caprimulgus fossii* to *C. cayennensis* in order to reconcile this otherwise polyphyletic grade. What they did instead (S&M, p. 187–192) was to reconstitute the genus *Caprimulgus* by moving *Nyctidromus* and *Phalaenoptilus* out of the sequence obtained from S&A, and placing them instead at the front of the Caprimulginae (Fig. 3), which results in a sequence similar to that in Peters (1940). Most enigmatically, *Podager nacunda* is moved to another subfamily, the Chordeilinae.

The only way that the classification of caprimulgids based on the DNA-DNA hybridization results makes sense is to ignore all branching information less than about 8.2° Δ (i.e. subfamily) and to consider the phylogeny shown in figure 362 of S&A as a polychotomy. Figure 3b shows the topological manipulations necessary to produce a linear sequence of taxon names as presented in S&M. This "tree" is *not* isomorphic to Figure 3a. In fact, it cannot even be represented in two dimensions, line crossings being required to fit everything in.

I claim no special knowledge of nighthawks and poorwills—in fact, I am fairly sure I have never even seen the Nacunda Nighthawk (*P. nacunda*)—and experts with this group may find that this arrangement (i.e. that of Peters 1940) makes eminent sense. It is an arrangement, however, that cannot be logically derived from the phylogeny given in S&A. If S&M do not trust the results given in S&A, why should we?

There are problems with nomenclature in addition to the ones discussed above. *Coturnix australis* in figure 27 of S&A is given as *Synoicus* in figure 357 of S&A and is considered a subspecies of *Coturnix ypsilophora* in S&M (p. 15). *Halcyon sancta* is indicated as a tracer species in figure 360 of S&A, yet no figure for its comparative melting curves is given (a situation that occurs quite often), nor does it appear as a driver species in any figure there. Could this species in fact be *Todirhamphus sanctus*, the Sacred Kingfisher? There is no way of knowing because there are no synonomies listed with the description (S&M, p. 91). It is pointless to give more examples because there are so many. It seems likely that the UPGMA trees (S&A, figs. 353–385) were prepared at a different time or by a different person than the FITCH trees (figs. 325–352) or the melting curves (figs. 18–324) and that S&M used different sources at different times when compiling the classification.

The authors claim that this classification is "the first to be based on a single, objective criterion" (S&M, p. xix) and, thus, a departure from those that came before. I found instead that this classification follows the DNA-DNA hybridization phylogeny only very loosely and inconsistently, and it was compiled by methods mysterious to me and certainly not in the manner S&M described. Because it is not logically based on a phylogeny (or one that is different from that presented in S&A and, thus, unknown), it is not a classification but an arrangement. It is an arrangement no more valid than ordering the names alphabetically, or than one derived from numerology of the binomial. Rather than being a scientific and objective description of the phylogeny of birds, it is just another listing of species and, thus, irrelevant to any serious study of avian biology.

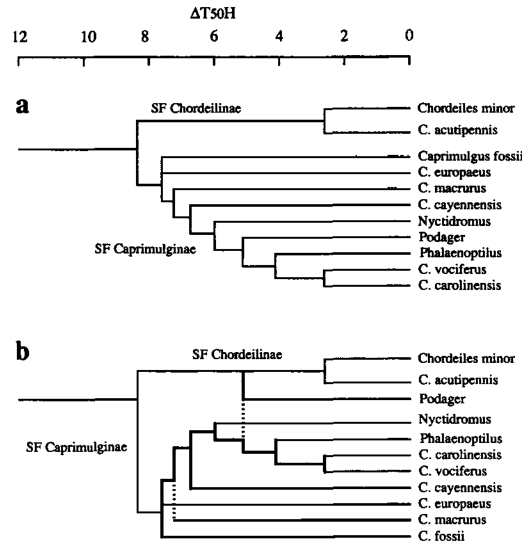

Fig. 3. Hypothetical phylogenies of Caprimulgidae. Tree (a) is reproduced from figure 362 of Sibley and Ahlquist (1990); "tree" (b) obtained from tree (a) by manipulating nodes to arrange branches from top to bottom in order given in S&M. Note that the node including *Podargus* must be stretched to attach to node including *Chordeiles.*

Many ornithologists are unaware of the incredible revolution that systematics has undergone—a revolution based not on techniques for gathering data, but one that has made systematics into a science, which allows replication of results, formulation and testing of hypotheses, and logical procedures that are not tainted by tautology, special knowledge, or received wisdom. Back in the days of Ridgway and Coues, there were very few people interested in birds who had scientific backgrounds and the time or resources to study ornithology full time. Classifications emanated from specialists and were approved by a consensus of authorities; species relationships rose and fell based not on science but by fiat. With the rise of modern systematics, authoritarian pronouncements are needed no longer because systematic research on a particular taxon can be tested and replicated.

My conclusions are independent of any philosophical or methodological disagreement I may have with the phylogenetic results presented in S&A. Furthermore, I recognize how much effort must have been expended to accumulate and organize the incredible amount of information presented in S&M. Nonetheless, if these joint volumes are truly the vanguard of a new objective avian taxonomy, then as a minimum they will be able to withstand tests of logical consistency and scientific replication. Regrettably, neither volume succeeds. The phylogeny cannot be fully reconstructed from the data and methods described (Lanyon 1992), and the classification cannot be derived from the phylogeny, however generated.

This book could be dismissed as another flawed attempt to provide the comprehensive classification of birds, except that the authoritarian legacy still is strong in ornithology and has consequences far beyond the covers of this book. In 1991, the AOU Check-list Committee, chaired by Monroe, decided in favor of using the linear sequence presented in S&M as a "working hypothesis" (Banks 1991) for the classification of North American birds. This decision was reversed in February 1992 (R. L. Banks, J. V. Remsen pers. comm.). The AOU Check-list Committee may wish to choose among arrangements—including that by Wetmore, by S&M, or from some other source—in how they list North American species of birds, but in doing so, they are not evaluating or testing hypotheses. No arrangement, including the S&M sequence of species, is the logical outcome of a hypotheticodeductive process.

The authors caution the reader that "only the dendrograms and the melting curves provide the pattern of branching inferred from the DNA comparisons; the classification reflects this pattern, but does not reproduce it in detail" (S&A, p. 255). The classifications may reflect the phylogenetic pattern at some higher level, but they are so divergent otherwise that it is not clear to me how much confidence the authors have in their own results. There has been some enthusiastic support for this work, but I wonder if it is based more on the ideal of an objectively based classification than on a careful assessment of the S&M classification and its relationship with the phylogeny proposed by S&A. Some reviewers (e.g. Krajewski 1991, O'Hara 1991) suggested that, despite the numerous deficiencies found within S&A, it would become the focal point for future discussions and research, a heuristic for education and excitement. In my opinion, this volume offers no such potential and is instead a reminder of what we must leave behind.—DOUGLAS SIEGEL-CAUSEY, *Museum of Natural History and Department of Systematics and Ecology, University of Kansas, Lawrence, Kansas 66045, USA.*

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Masterpieces of Bird Art: 700 Years of Ornithological Illustration.—Roger F. Pasquier and John Farrand, Jr. 1991. Abbeville Press, New York. 261 pp., 191 color plates, 67 halftone illustrations. ISBN 1-55859-134-6. Cloth, $85.00.—As each year goes by I come to appreciate the art of bird illustration more. In my teens, I could appreciate the field-guide plates of Peterson, but my literal sensibilities were offended by the flamboyance of Audubon, and I rather priggishly dismissed his work as "not realistic." Today I include Audubon's plates of the Ivory-billed Woodpecker and Baltimore (Northern) Oriole among my absolute favorites. I now realize that Audubon is but one of an array of masters who have made their mark painting birds for the express purpose of illustrating ornithological books. This splendid realm of ornithological illustration has now been lavishly monographed by Pasquier and Farrand.

Clearly, no expense was spared in the planning and production of *Masterpieces of Bird Art*. This is a lovely art book with a substantive text. The authors did their homework; it is obvious that they understand and love their subject. Still, this is more a coffee-table work than an esoteric library tome, mainly because of its size, weight, format and abundance of well-reproduced color illustrations. Trim size is 11 × 13 inches and, with the heavy paper stock (better for the illustrations), the book is quite hefty. It is packed with illustrations—only a handful of pages contain exclusively text (these are filled largely with facing-page notes). Thus, it is a book that grabs the eye and keeps one eagerly flipping from section to section, taking in the beautiful reproductions.

A foreword (by R. T. Peterson) and introduction are followed by four chapters, which treat the development of the art from handmade illustrations and woodcuts (chapter 1), to engravings (chapter 2), lithographs (chapter 3), and finally "the modern age" (after the turn of the century, but especially after World War I). We read about technique, style, the patrons, and the artists themselves, but primarily we see the evolutions (and revolutions) in the field, from the simple but natural depictions of European birds in the illuminated margins of the handmade religious volumes of the 13th century to the compositionally complex creations of Eckelberry, Liljefors, and Gilbert. One wishes there was more text—it seems that the authors could willingly have told us much more, but were limited by the constraints of design and production.

I learned a lot from the book. I saw, for the first time, the free and poignant beauty of Lars Jonsson's watercolors. One is also able to glimpse the latest work of William T. Cooper, which is otherwise all but locked up in the grand but impossibly priced volumes of Forshaw and Cooper's ongoing monographic treatment of the Coraciiformes. A comparison of Cooper's early parrots with his hornbills and bee-eaters shows that a very good artist can become a true master. There are real gems scattered among the artwork depicted. I have little complaint with the selections made by the authors. They made the best of what must have been a difficult task, indeed, to choose from among the range of art that has been produced over the centuries.

My major complaint is with the publisher—Abbeville. As an ornithologist, I am frustrated by the design that seems to devalue text in order to follow a layout plan that does not always work for me. Because of the varied placement of art, captions, text, and white space, I found it difficult to sit down and read the book's narrative text. Such are the vagaries of books produced and "packaged" for a market by commercial presses. My final (minor) complaint pertains to the odd selection for the front cover of the dust jacket—an over-enlarged detail of one of Cooper's less-inspired parrot works. Certainly, this could not have been the authors' choice.

But let me return briefly to the treasures this book holds: Fuertes' White-throated Jay and Emerald Toucanet show stunning interplay of bird and verdant foliage. Keuleman's hornbills are lovingly portrayed as graceful and dignified. And Alexandre-François Desportes' study of a Black Currasow, painted in the early 18th century, comes alive like no other bird depiction of that period.

The text is clean and well written, and I found only a few errors of fact or typography in the text and myriad captions that accompany the art. I can recommend it to general readers—who could fail to appreciate these wonderful productions created over the centuries? It is also a must for libraries with collections of ornithological books. Lastly, and not surprisingly, it would make a splendid gift.—BRUCE M. BEEHLER, *Wildlife Conservation International & Conservation International, % Division of Birds, MRC 116, Smithsonian Institution, Washington, D.C. 20560, USA.*

The Auk 109(4):945–947, 1992

Descriptions of Thirty-two New Species of Birds from the Hawaiian Islands: Part I. Non-Passeriformes—Storrs L. Olson and Helen F. James; **Part II. Passeriformes**—Helen F. James and Storrs L. Olson. 1991. The American Ornithologists' Union, Washington, D.C., Ornithological Monographs No. 45, 88 pp., 34 text figures and tables. No. 46, 88 pp., 49 text figures and tables. Bound as a set, ISBN 0-935868-54-2, $25.00.—Perhaps the great appeal of paleontological studies is that they inspire visions of past worlds richer and more interesting than our own. Yet, no matter how fascinating, these fossil creatures and their environments manifest a remoteness measured by more than geological time. But what if bones tell the story of a world that ought to still exist? In their long-awaited, twin monographs describing 32 species of subfossil birds from the Hawaiian Islands and commenting on the remains of perhaps as many as 22 other species, the authors more than double in size the recent endemic avifauna for this subtropical, oceanic archipelago.

The discovery of so many recently extinct Hawaiian birds came as something of a surprise. For years, common knowledge had it that the volcanic landscape of these islands lacked depositional environments that might preserve vertebrate remains. In hindsight, it is difficult to see how this notion developed, for the right conditions do exist in sand dunes, limestone sink holes, lava tubes, and dozens of archaeological sites, some of them previously excavated. From beneath an old lava flow came the bones of the first fossil bird reported for Hawaii, a goose, *Geochen rhuax,* accidentally dug up in 1929 in the course of a public works project. Genuine exploration for bird fossils in Hawaii began in the early 1970s when Joan Aidem, walking the wind-blasted dunes along the rugged north shore of Molokai Island, found, among the mineralized stem casts of strand shrubs and the bleached shells from extinct land snails, the bones of numerous birds, including a nearly complete skeleton of a large goose with tiny wings and keelless sternum. Since then, many other sites, particularly on Kauai, Oahu, Molokai, and Maui, have been discovered, of which the authors name 17 important ones. Although tens of thousands of bones have been collected independently by many individuals and by the authors, virtually all the material has been deposited at the Bernice P. Bishop Museum in Honolulu and at the Smithsonian Institution, where Olson and James have studied and described all taxa from these collections.

Published in a single volume, the two monographs present descriptions of nonpasseriform and passeriform taxa, respectively. The first monograph begins with an Introduction describing the history of avian paleontology in Hawaii and implications for interpreting the modern avifauna in light of such heavy prehistoric loss of species. Table 1 is a handy historical listing of all endemic avian taxa. The section Recapitulation of Fossil Localities summarizes information for the major sites. The authors then launch into species descriptions in the next section, Systematic Paleontology. A short Discussion follows. The second monograph is more simply organized, with brief Introduction and Methods sections, the Species Descriptions, and a Discussion. Tables listing the presence or absence of each species known historically or as fossils on each island are presented in the discussion sections of both monographs. Specimens described in the text are illustrated by photographs, most of which are excellent. In naming their birds, the authors at times wander off the beaten path of descriptive or dedicatory etymology. A palindrome appears in *Aidemedia,* a genus named for Joan Aidem. *Circus dossenus*: "Latin, *dossenus* a clown or jester, without which one cannot have a circus; especially applicable here because the species initially fooled us as to its generic placement" (p. 65). And there are others.

What did the authors find? Many species of seabirds still nest on the main Hawaiian Islands, and some are well represented by the fossil record, as are a few species now extinct in Hawaii, but extant elsewhere in the Pacific. The only extinct, endemic seabird discovered so far, a small gadfly petrel, is described.

One of the three Hawaiian birds previously described from fossils is a flightless ibis (*Apteribis glenos*) from the dunes of Molokai. Abundant material from lava tubes on Maui show that at least one other species (*A. brevis*) inhabited that island. Tremendous variation in size among the Maui ibises prevented easy determination of the number of species present, an issue left unresolved.

Joan Aidem's fossil goose from Molokai has since proved to belong to a small radiation of very strange, gooselike anatids with vestigial wings, massive hindlimbs, and short, heavy beaks presumably adapted for herbivory. Classified into three distinctive genera, each of the four species inhabited only one or two islands. Affinities of three other gooselike birds, including *Geochen,* are undetermined. The only true geese endemic to Hawaii are the Nene (*Branta sandwicensis*) and a new, larger, more-or-less flightless, second species (*B. hylobadistes*) described from fossil material on Maui.

Two species of flightless rails survived into historic times in Hawaii. Ten others apparently did not. Five of the prehistoric species are described in the monograph, with notes on another five. All are assigned to the genus *Porzana,* and one, the sparrow-sized *P. menehune,* is the smallest species of rail known.

Last among the nonpasserines is an important guild of raptors, including an eagle indistinguishable osteologically from the Bald and White-tailed eagles (*Haliaeetus leucocephalus* and *H. albicilla*); a harrier convergent on the genus *Accipiter* in having short wings matched with long legs, presumably for catching small passerines in forests; and, sharing the same bird-catching adaptations, a genus of four owl species, *Grallistrix.* The owls bear special significance as fossils, because their pellets as well were found, yielding the associated remains of Hawaiian finches. In fact, owls roosting in caves probably deposited as castings the myriad of tiny passerine bones excavated at these sites. The extant Hawaiian Hawk turned up in the Molokai dunes, a range extension for that species, but the native Short-eared Owl is entirely absent from deposits prior to human settlement, suggesting a recent advent to Hawaii.

The second volume, on passerines, describes two new, large ravens differing from the smaller, surviving Alala: one raven with a high, arched bill and another with a long, straight bill. The authors do not discuss fossil findings for Muscicapidae, Myiagridae, or Meliphagidae.

The remainder of the monograph on Passeriformes presents an astonishing array of new Hawaiian finches (Fringillidae: Drepanidini). This group is already famous for its many species and great morphological diversity: a showcase example of adaptive radiation. The authors introduce four new genera and 14 new species of finches, and note the discovery of many others represented by material inadequate for taxonomic description. Eight of the new species possessed finchlike bills. That finch-billed forms may have suffered greater rates of extinction is supported also by the relictual distribution of species known historically. One extinct finch, *Chloridops regiskongi*, as its humorous name alludes, may have had the most massive beak of any finch. New species with other than finchlike bills include: a sickle-billed species; a genus of two species with long, broad bills; a genus of three species with bills adapted to gaping; and a new *Ciridops*.

All the taxa described in the monographs originate from depositional environments less than 8,000 years old, many probably much younger. Why did so many species become extinct in such a short time? The authors contend that virtually all species were present in 300 A.D., when the first Polynesian stepped off his canoe onto a Hawaiian shore. Subsequent colonization of the islands by these aboriginal voyagers meant big changes for the birds. The meatier species may have been hunted to extinction. *Rattus exulans* may have wiped out ground-nesting species, especially in the lowlands. But more importantly, the growing human population cleared for subsistence agriculture much of the lowland and midelevation forests, leading to further extinctions through loss of habitat. Still, it is very difficult to imagine so many species, particularly the finches, vanishing under land management by the Polynesians. Vast tracts of rain forest remained virtually unchanged by the Hawaiians, as did dry and mesic communities on 'a'a lava flows too rocky to cultivate. Could some species have survived until historic times, only to disappear before being discovered alive by Western naturalists? The most active period of ornithological exploration of Hawaii began 100 years after Captain Cook sighted the islands. Many new species were found to have relictual populations then, and these disappeared within a few years of their discovery. Changes wrought by the new settlers, particularly the introduction of *Felis catus* and *Rattus rattus* (two notorious exterminators of insular birds), and avian pathogens and disease vectors may have already been in effect for decades. We will never have a complete list of birds that survived into the historic period.

The authors are to be congratulated for their work. The perspective given by their findings to ornithological studies in Hawaii has been profound. We in the Islands look forward to more paleontological work, both to improve understanding of unnamed material and described species and to explore islands which are still poorly known. For example, no sites with a representative sample of avian palaeofauna have been found on the Island of Hawaii, largest of the group. Such studies are urgently needed, as potential fossil sites disappear annually with rapid development in the 50th State.—Thane K. Pratt, *U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland 20708, USA.*

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Australian Waterbirds: A Field Guide.—Richard Kingsford. 1991. Kangaroo Press, Kenthurst, New South Wales, Australia. 128 pp., 90 color photographs. ISBN 0-86417-330-X. No price given.—The title of this book is misleading, since the book excludes many common Australian waterbird species and fails to fulfill many functions of a field guide. It largely deals with inland, freshwater species, and excludes, for example, many shorebirds, because, as the author states, "I have been deliberately selective with the shorebirds because there are lots of species which are difficult to identify." Surely, a field guide should particularly strive to aid observers in the identification of difficult species. Ninety species are included in this guide, and each species is described in a single paragraph accompanied by a photograph. Information on breeding biology, size, dimorphism, and distribution are presented diagrammatically with coded symbols, as are the preferred habitat and food preferences of each species.

Inland habitat for waterbirds is divided into six zones, from dry land to deep water, and the sequence of species in the book follows habitat preference. This has the disadvantage that it often places similar species in different parts of the book, so that comparisons among similar species is difficult. For example, the Plumed Whistling-Duck (*Dendrocygna eytoni*) is considered primarily a dry-land species and, thus, is presented early in the book (p. 20) while the Wandering Whistling-Duck (*D. arcuata*) is considered an inhabitant of water and, thus, presented later (p. 72). Since I am used to a taxonomic arrangement of species, I find an arrangement beginning with cranes and ending with grebes and terns disconcerting.

The species accounts are generally interesting, but some of the information presented is suspect. I was surprised to find phrases such as "found throughout the world" applied to Eurasian Coot (*Fulica atra*), Whiskered Tern (*Chlidonias hybrida*), Great Crested Grebe (*Podiceps cristatus*), and Little Egret (*Egretta garzetta*), which do not occur in the Western Hemisphere. A stronger editorial hand should have eliminated the misplaced modifiers (e.g. Mute Swans [*Cygnus olor*] "so known because they do not call when they fly unlike other swans").

There is little in this book to recommend it to the serious amateur or professional ornithologist, except perhaps for the information in the appendices. These include a list of ornithological organizations and societies (with addresses), a list of scientific and natural-history journals (unfortunately, not cross-indexed to the organizations which produce them), and a comprehensive listing (more than 500 entries) of "Places to See Waterbirds in Australia."

This is primarily a book which "should help people who know relatively little about waterbirds." The novice should find the photographs, which are generally excellent, helpful for identification purposes, at least for the more common and conspicuous species, and the text provides much useful information. The introduction discusses conservation and habitat preservation, note taking, and optical equipment—all useful for the novice. The book is field-guide size—small enough to easily fit in a pocket or glove compartment of the car. Because of the limitations of this guide, however, the novice would probably be better off buying one of the standard, more comprehensive field guides for Australian birds.—WILLIAM E. DAVIS, JR., *127 East Street, Foxboro, Massachusetts 02035, USA.*

Announcements

The Auk 109(4):948–949, 1992

Editorial Staff Changes.—Bruce M. Beehler, who has been the Associate Editor for Book Reviews, asked to be relieved of his responsibilities. He has provided exemplary service to the AOU and to the readers of the *Auk*. I appreciated his willingness to stay on for the year that I have served as Editor.

Initially, Frank A. Pitelka volunteered to take over these responsibilities, but determined later that he would not be able to serve. However, another able replacement has been found. I am pleased to report that Robert M. Zink has agreed to become the Associate Editor for Book Reviews. Publications for review can be sent to him at the following address: Bell Museum of Natural History, 100 Ecology Building, University of Minnesota, St. Paul, Minnesota 55108, USA.

In addition, Timothy C. Lamey has served as the Managing Editor for the *Auk* during the past year. He has resigned to take a postdoctoral position at The University of Manitoba. I appreciate his contributions to the *Auk*. Neil J. Buckley has been hired as the Managing Editor and is actively working on the journal.—EDITOR.

F. M. Chapman Research Grants for 1992.—The Frank M. Chapman Memorial Fund gives grants in aid of Ornithological research, as well as postdoctoral fellowships. While there is no restriction on who may apply, the Committee particularly welcomes and favors applications from graduate students; projects in game management and the medical sciences are seldom funded. Applications are reviewed once a year and must be submitted no later than 15 January, with all supporting material. Application forms may be obtained from the Frank M. Chapman Memorial Fund Committee, Department of Ornithology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024-5192.

One postdoctoral fellowship was awarded for 1992: **Evgeny N. Kuruchkin**, Early evolution of birds. Two postdoctoral fellowship renewals were awarded: **C. Craig Farquhar**, Systematics, biogeography and ecology of *Buteo polyosoma* and *B. poecilochrous*; and **Jeffrey G. Groth**, Reproductive isolation and genetic relationships in the North American Red Crossbill (*Loxia curvirostra*).

Four collection study grants for the 1992–1992 year were awarded to: **M. Ralph Browning**, for work on Examination of different species; **Carla Dove**, for work on Study of the Crested Caracara; **Klaus Duffner**, for work on Geographical variation and taxonomy of sylphs; **Floyd Hayes**, for work on Patterns and processes of bird distribution in Paraguay; **Christopher W. Thompson**, for work on Phylogenetic distribution of presupplemental molt in Passeriformes;

Chapman grants for 1992, totalling $45,456, with a mean of $710, were awarded to: **Aliza Baltz**, Deception in Budgerigars (*Melopsittacus undulatus*); **Timothy Bergin**, Effect of nest predation on nest site selection of coexisting avian species; **Victoria Birt-Friesen**, Population divergence and speciation within the genus *Sula*; **David Blaszkiewicz**, A comparison of Killdeer nesting success between two habitat types; **Nancy L. Buschhaus**, Proximate mechanisms of multiple mating in female Eastern Bluebirds (*Sialia sialis*); **Alicia Cepaitis**, Effects of prey size on risk-sensitive foraging in Gray Jays; **Robert Terry Chesser**, The