The Birds of the Cayman Islands: An Annotated Checklist

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Reviews

EDITED BY R. TODD ENGSTROM

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.

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New Perspectives on the Origin and Early Evolution of Birds. Proceedings of the International Symposium in Honor of John H. Ostrom.—Jacques Gauthier and Lawrence F. Gall, Eds. 2001. Peabody Museum of Natural History, Yale University, New Haven, Connecticut. xiv + 613 pages. Paper, $49.00.—One of the rituals of the Birds-Are-Dinosaurs-Movement (BADM) is to hold periodic symposia to reaffirm the belief that birds really are dinosaurs, much as Southern Baptists hold revival meetings. The volume reviewed here is the metastasis of one of these symposia, which honors Yale paleontologist John Ostrom, celebrated for his resurrection of the hypothesis of a dinosaurian origin of birds. Just as a revival tent is not the haunt of free-thinkers, there are few authors in this book who depart from the true path and numerous papers consist of the cladogram-thumping dogma we have come to expect from the more insistent proponents of the BADM. Kevin Padian, the Elmer Gantry of the theropod crusade, is an author on no fewer than four contributions, which does nothing to diminish the impression of the whole volume as a dreary, sectarian tract from the Kingdom Hall of Hennig's Witnesses.

From the outset (p. 4), Gauthier asserts that ''one question, at least, can finally be put to rest—there can no longer be any serious doubt that birds are living dinosaurs.'' By now, of course, this is nothing novel, having been stridently trumpeted for quite a few years as one of the basic tenets of cladistic fundamentalism. I could discover no ''new perspectives'' on avian origins in this collection that are not fully in line with what was always a predetermined conclusion.

No opportunity is lost to drub the reader with the BADM agenda, however, so one must suffer through headers for different sections of the book such as ''Phylogeny of Flying Dinosaurs,'' ''Phylogeny of Living Dinosaurs,'' and ''Evolution of Feathered Dinosaurs.'' Having to suppress one's gag reflex as early as page 3, where we read about ''the considerably more lively varieties [of dinosaurs] flitting about our backyards,'' only generates queasiness for tackling what follows.

The book gets off to a dreadful start with an essay by Gauthier and de Queiroz on the name ''Aves'' and its constituents. Elsewhere (p. 541), Larry Witmer supports a succinct definition of ''the name Aves as pertaining to the group comprising the most recent common ancestor of *Archaeopteryx* and modern birds, and all its descendants,'' which is both workable and comprehensible. But that will not do for Gauthier and de Queiroz who indulge in 34 pages of abstruse, convoluted, pseudointellectual, and jargon-riddled bloviation invoking their ''PhyloCode,'' which is supposed to have as its goal ''effective communication'' (p. 8). Here is just one example: ''We agree that all organisms in the final unitary lineage segment ancestral to *Archaeopteryx* are parts of the same species'' (p. 10). Where's the communication here?

To touch on some of the contributions more likely to be of direct interest to ornithologists, Cracraft and Clarke use morphological and molecular data to derive a phylogeny in which all modern birds except paleognaths are the sister-group to the Galliformes and Anseriformes. In the following paper, Ericson et al. also use morphological and molecular data to show that the Galloanseres are not monophyletic, but then they backpedal in an addendum citing more recent molecular work supporting monophyly of the Galloanseres. As all postcranial morphological data and an excellent fossil record are in direct conflict with such a conclusion, a satisfactory resolution is still to be sought.

I do not think that future students of the origins of feathers will find the conjectural generalities in Brush's essay (p. 171) on the subject to be very useful. However, in a most welcome interjection of lucidity and logic, Nick Arnold explores how we should go about making inferences about the behavior of fossil organisms. He applies this to the origins of avian flight, concluding (p. 195) that climbing and gliding would be expected precursors of flight but that ''stretching the forelimbs laterally to improve bal-

ance during rapid ground locomotion is not usual and may not have been a preliminary stage in the origin of flight.'' Although an arboreal origin of flight ''is not very strongly supported . . . there is little positive evidence for a cursorial'' origin either.

Hopson provides an extensive analysis of phalangeal proportions in birds and theropods, finding that the birds *Archaeopteryx* and *Confuciusornis* each cluster with modern birds such as pigeons and Galliformes that forage both on the ground and in trees. Some other genera of Cretaceous birds clearly align with arboreal birds whereas others are clearly terrestrial. In hindlimb proportions, *Archaeopteryx* again clusters with pigeons as being ''equally at home on the ground or in trees'' (p. 211). Zhou and Farlow further analyze *Confuciusornis* and conclude that it was arboreal and a powered flier.

Through elaborate experimental procedures, Sokoloff et al. (p. 319) found that ''the specialized supracoracoideus morphology of modern birds is not a *sine qua non* for ground-level takeoff,'' but I would caution that this has only been shown for their subject, the European Starling (*Sturnus vulgaris*), and may not be the case for turkeys or eagles, for example. Witmer does yeoman's service, though long overdue, in debunking the notorious Triassic fossil *Protoavis* as an improperly restored, disingenuously depicted, poorly preserved composite (my wording) that merits ''little or no role in the debate on avian origins'' (p. 537).

Most of the rest of this book deals with dinosaurs or corollaries of the purported dinosaurian origin of birds, such as derivation of flight from the ground up. The hypothesis of a dinosaurian origin of birds, as everyone knows by now, is an old one that was long rejected but perhaps for insufficient reasons. Thus, when John Ostrom discovered a well-preserved new theropod that showed what seemed to be some distinctly avian characters, it was perfectly logical and legitimate to exhume and re-examine the dinosaurian hypothesis. At the time, I thought it seemed quite reasonable myself, but from my perspective 25 years later it is a hypothesis that has been rigorously scrutinized and has come up deficient.

In the meantime, however, the birds-are-dinosaurs equation has achieved cult status and has become a sociological phenomenon embodying vigorous religious and political components and strongly influenced by economics. Ornithologists reading Prum's (2002) ''Perspectives in Ornithology'' should be aware that there is much more going on here than a conflict of scientific hypotheses and methods.

The whole underpinning of the BADM is cladism, a systematic formulation elevated to a religion years ago and with adherents as fervent as any biblical zealot. Because the BADM is the most visible public manifestation of cladism, it automatically receives support from cladists outside of paleontology. On the other hand, opponents who are not members of the faith can be handily stigmatized as heretics whose views should be ignored simply because they refuse to accept the ''only'' methodology. For numerous reasons, I was never attracted to cladism, above all because my own research leads me to conclude that its fundamental assumption—that speciation proceeds by dichotomous branching—is probably wrong. Be that as it may, cladism involves only a formulaic procedure and is not infallible. It is just as easy, perhaps easier, to derive a wrong answer, maybe even purposefully, using cladistics as by any other means. Two outstanding examples are directly pertinent to the BADM: (1) the dinosaur *Mononykus* was described and classified as a bird; (2) the bird *Caudipteryx* was described and classified as a dinosaur.

The saga of *Mononykus*, much abbreviated here, is in my estimation one of the most damning developments in the whole BADM. In 1993, I was invited by an enthusiastic Luis Chiappe to come view the specimens of this new organism in New York before they were returned to Mongolia. By coincidence, Evgeny Kurochkin, Zhonghe Zhou, and Per Ericson were there at the same time. What we saw was most of the skeleton of a truly extraordinary bipedal animal with a very shortened forelimb, a mole-like humerus, and the hand reduced to a single huge claw obviously adapted for digging. Extraordinary yes—a bird, no. Kurochkin related that he himself had found a specimen like this in Mongolia and had at first been very excited by the discovery until he realized it was a dinosaur, when he lost all interest in it.

But Chiappe and Mark Norell insisted that they could construct a cladogram in which this latest Cretaceous vertebrate was placed within Aves. And so it was published in *Nature* (Perle et al. 1993) under the preoccupied name *Mononychus* (later changed to *Mononykus*). Then the hype began. Reconstructions of *Mononykus*, covered with imaginary feathers, of course, appeared all through the print media and even made the cover of *Time* magazine. Eventually, Zhou (1995), among others, tried to reason that *Mononykus* was not a bird. That provoked a predictable response (Chiappe et al. 1997)—no challenge to the BADM ever goes unanswered—consisting almost entirely of a tedious, sanctimonious deposition on the inadequacies of Zhou's methodology. Now, however, Sereno (p. 69) has redone all the cladistics and concluded that *Mononykus* and its relatives in the Alvarezsauridae belong among dinosaurs of the Ornithomimosauria and are not birds. And Chiappe is forced to concur (p. 125). But there are no banners or whistles now, no press releases, no *Time* covers, no apologies to Zhou, and not a word in *Nature*. The propaganda machine is in reverse and if the BADM had its way the public would never find out that all the hoopla over *Mononykus* was just a lot of buncombe about a weird dinosaur.

Caudipteryx, from the renowned early Cretaceous lake deposits in Liaoning, northern China, presents

the opposite case. The first specimen was preserved with unquestionable feathers positioned such as to be undeniably associated with the skeleton. It was, expectedly, described as a dinosaur (Ji et al. 1998). When I and a number of my skeptical colleagues saw the original specimen we found it of even greater interest than *Mononykus*, because to us *Caudipteryx* was clearly a flightless bird, meaning that flightlessness must have evolved very early in avian history and in a completely different lineage from any other known flightless birds.

Dissenters from the BADM line on *Caudipteryx* are lambasted by Padian (p. 486), who never says who the dissenters are or where they made their assertions. He makes the accusation that dissenting views were advanced without the unnamed dissenters having seen the specimens, which is certainly untrue in some or all cases, and then assails those nameless heretics as unscientific noncladists motivated only by politics ''to keep the issue alive in the press.'' Subsequently, however, Maryanska et al. (2002) subjected the Oviraptorosauria, in which they include *Caudipteryx*, to an exhaustive cladistic analysis including definitions following the PhyloCode, a three-page list of characters, and four pages of character matrices (but no illustrations). The result is the bleakest sort of scientific writing, one step removed from binary code, but the authors conclude that *Caudipteryx* and the Oviraptorosauria are not dinosaurs at all, but flightless birds. The study is seemingly unassailable from the standpoint of strict cladistic orthodoxy, but is still likely to elicit criticism from someone in the BADM because it eliminates the only example of a ''dinosaur'' with real feathers. Also, if *Oviraptor* and its relatives are chalked up on the bird side of the slate, many widely heralded bird-like traits of dinosaurs, including egg-brooding, go with them. Not good for the BADM.

The *Mononykus* and *Caudipteryx* stories are revealing. Unscientific noncladists could look at those taxa and see that the first was a dinosaur and the second was a bird. Their original describers, promulgating the BADM and using ''scientific'' cladism, came to the exact opposite conclusion, which was then shown by the same technique to be wrong. Granted, these are all only ''phylogenetic hypotheses'' that are subject to falsification, but the same applies to the theropod origin of birds. If some of the arch-promoters of the BADM cannot be relied upon to tell a bird from a dinosaur and vice versa when they apply cladistics, why should ornithologists unquestioningly accept the theropod origin of birds from the same people?

If *Caudipteryx* is not a feathered dinosaur, what about all those other supposed feathered dinosaurs from China that the public has recently been bombarded with? To be succinct, there are none. The whole story is essentially a hoax. Numerous specimens of various theropod dinosaurs from the Liaoning Lake deposits are preserved with associated carbonized filaments often positioned so as to appear to be integumentary structures. None of this ''dino-fuzz'' exhibits the structure of a pennaceous feather. Furthermore, there reportedly are in the same deposits various other organisms, unrelated to birds or theropods, that sport those same filaments. If so, the information has been suppressed.

The BADM has been putting imaginary feathers on dinosaurs for more than 20 years (Battaglia 1979), but real fossils with feathers were crucial to making the bird–dinosaur connection. So when the filament-adorned dinosaur fossils turned up in China there was little hesitation about hyping them as feathered dinosaurs. Not surprisingly, an entirely conjectural origin of feathers from filaments was hastily supplied (Prum 1999). Feathers are preserved in the fossil record in a unique manner that is easily recognizable with scanning electron microscopy (Davis and Briggs 1995), but that was not done for the Chinese fossils before they were so enthusiastically presented as feathered dinosaurs.

Meanwhile, theropods are being depicted and modelled everywhere clad in feathers. Even in what is supposed to be a serious scientific discussion of the anatomy of the hand of *Deinonychus*, the phalanges are shown (Gishlick p. 314) bearing asymmetrical remiges! Young *Tyrannosaurus* have been depicted covered with down (Sloan 1999). There is not one shred of evidence for any of this ridiculous make-believe about feathered dinosaurs that will withstand scrutiny.

But that does not keep Gauthier and de Queiroz (pp. 12–13, fig. 1) from constructing an unfathomable fairytale concerning the presence and structure of feathers superimposed upon a cladogram of ''select theropod dinosaurs,'' and deliberately clouding and confusing matters by suggesting that there are various definitions of a feather. Thus, if feathers are defined as ''hollow-based filaments derived from follicles,'' basal Aves, according to Gauthier and de Queiroz, would include *Carnotaurus*, *Spinosaurus*, and *Allosaurus*. To begin with, ''dino-fuzz'' has never been shown to be hollow or follicular. Furthermore, the only integument preserved with any of the preceding dinosaurs is the skin of *Carnotaurus* (Bonaparte et al. 1990), which consists of ''non-imbricating scales similar to those which are known from herbivorous dinosaurs'' (Czerkas and Czerkas 1997: 155). If feathers are defined as ''remiges + rectrices'' then Gauthier and de Queiroz would have basal birds include *Sinosauropteryx*, *Tyrannosaurus*, *Pelecanimimus*, *Ornitholestes*, and *Caudipteryx*. Except for *Caudipteryx*, which, as we have seen, is a bird, there is no evidence for feathers of any sort, say nothing of remiges and rectrices, in any of those taxa. Then, if feathers are defined as ''flight feathers,'' Aves would be composed of *Sinornithosaurus* and *Archaeopteryx* onward. Disregarding the fact that *Sinornithosaurus* has not been proven to have any feathers, let alone

flight feathers, what is supposed to be the difference between ''flight feathers'' and ''remiges + rectrices''? They are absolutely synonymous throughout ornithological literature. Furthermore, no one has ever previously defined feathers as being only remiges and rectrices or flight feathers. Thus, Gauthier and de Queiroz's discussion of feather-based definitions of Aves is nothing more than a Humpty-Dumptyesque tissue of twaddle.

Ornithologists should exercise caution in accepting anything written about avian evolution by theropodists for the simple reason that few of them really know very much about birds, ornithology, or avian anatomy. That ignorance manifests itself in diverse fashion. Gauthier and de Queiroz (p. 17) tell us that tinamous were unknown to Merrem in 1813, whereas the genus *Tinamus* and the species *T. soui* was described in 1783 and three additional species of tinamous were named by Gmelin in 1789. Arnold (p. 201) says that ''some birds, such as gulls, lose the external hallux entirely,'' yet all gulls have an external hallux, although it is very reduced in the two species of kittiwakes. Hopson's list (pp. 230–235) of birds sampled in his study places *Pluvialis* in the Glareolidae and contains no fewer than 15 misspelled names of taxa that were not caught by author or editors.

And what are we to make of Prum's observation (2002:4) that ''some dromaeosaurs and birds even show a prominently bowed ulna . . . a feature that zooarcheologists still use to identify avian ulnae in human middens''? Does this mean that a bowed ulna is a synapomorphy of birds and dromaeosaurs? If not, why bring it up? How would these zooarcheologists or Prum identify the ulnae of shearwaters, gulls, or even an ostrich, to name but a few, using the ''prominently bowed'' criterion?

It is clear that raising any question whatever about the theropod origin of birds is unacceptable to those in the BADM. Prum (2002:5) ironically refers to the ''unrelenting criticism'' of the theory, when in reality the voices of criticism have for the most part been drowned out by the incessant *petarade* of propaganda from the BADM. Prum's own essay is little more than naked proselytizing, designed to cajole the heathen onto the path of enlightenment. Like a harassed politician, Padian (p. 485) blames the media for helping to keep controversy alive and bemoans the fact that the BADM agenda is diminished by what he regards as an inappropriate attempt on the part of reporters to achieve balance and fairness.

It is often emphasized in publications of the BADM that its opponents are unscientific. Padian has maintained that the truth has been revealed and that contrary views should be suppressed. Prum (2002:13) exhorts ornithologists to ''abandon debate on the theropod origin of birds.'' In my view, that is the most unscientific posture of all. What are these people afraid of? If the evidence for a theropod origin of birds is so overwhelming, why can it not stand on its own merits without active suppression of contrary views, without proselytizing the noncombatants, and without a vigorous propaganda campaign in the popular press? I do not regard it as a valid criticism that opponents of BADM have not identified a better ancestor for birds than theropods. If conflicting evidence suggests that birds did not come from theropods, then we should accept the possibility that we do not have all the answers and continue to look for the true origins. When an alternative ancestor is found, we can be certain that the proponents of the BADM will not be involved because they have already removed themselves from the search. Healthy skepticism is the most powerful tool of science and should be cherished as a welcome anodyne to the complacency of certitude.—Storrs L. Olson, *Division of Birds, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560. E-mail: olson.storrs@nmnh.si.edu*

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Evolution, Ecology, Conservation, and Management of Hawaiian birds: A Vanishing Avifauna.—J. M. Scott, S. Conant, and C. van Riper III, Eds. 2001. Studies in Avian Biology no. 22. Cooper Ornithological Society, Allen Press Inc., Lawrence, Kansas. 428 pp., 35 contributed papers, overall introduction plus introductions to each of 6 sections, 3 color plates, 14 drawings, numerous tables, figures, and maps. ISBN: 1-891276-25-5 (cloth) $48.50; ISBN: 1-891276-18-2 (paper) $29.00, includes postage and handling.—Every biologist interested in Hawaiian birds will want to own a copy of this book. It reviews major areas of the state of knowledge of Hawaiian birds at the end of the twentieth century, summarizes the results of older studies, and reports the results of previously unpublished work. Most of the papers were delivered at a symposium of the Cooper Ornithological Society in Hilo in April of 1997. Here they have been expanded and supplemented with eight additional papers. The book is dedicated to Dean Amadon, Paul H. Baldwin, and David Woodside, whose work on Hawaiian birds beginning in the 1930s laid the foundation for the recent renaissance of studies reported here. Excellent drawings by Douglas Pratt and Patrick Ching make the book more attractive. The introduction contains a full checklist of the status of all resident, breeding, and visiting birds recorded on the islands and lists which residents are endangered (or threatened) and which are alien. The large body of published literature on Hawaiian birds is presented as a composite literature-cited section at the end of the book.

Douglas Pratt's striking frontispiece painting of the descending flight of the extinct Hawai'i Oo (*Moho nobilis*) says without words what the rest of the book says in great detail. The birds of the Hawaiian Islands, the most isolated archipelago in the world, provide exceptional case histories of dispersal and evolution of new species where geographic distributions and population sizes are necessarily limited. Unfortunately the birds of the Hawaiian Islands also provide examples of the various ways that human activities can cause extinctions. Alien species now outnumber native species in most lowland habitats. The fascinating story of the Hawaiian avifauna is actually a tragedy because, even with the increased conservation actions of recent years, extinctions of native birds continue. With the possible exception of the Hawaiian Goose or Nene (*Branta sandvicensis*), none of the 29 native Hawaiian birds on the federal list of threatened and endangered species is increasing in number. In fact, after an intensive search from 1994 to 1996 for 13 forest species now on the list, Reynolds and Snetsinger concluded that six of them are probably extinct. Several more probably cannot be saved because they are so rare. In their chapter on limiting factors, van Riper and Scott show that even in cases in which we are confident that we know the causes of population declines and recovery seems feasible, current actions are not commensurate with the scale and complexity of the problems. Clearly research alone will not solve the problem. The voting public will have to demand that more resources be devoted to conservation. The Hawaiian avifauna's current situation has evolved into an additional lesson: that land management is driven more by social and political forces than by scientific understanding. In the final chapter of the book, Steiner addresses the urgent need for a public education program that could in turn produce more government support for conservation, especially at the state level, not only to prevent those further extinctions that are not inevitable, but to guard against the future establishment of even more potentially damaging alien animals and plants.

The editors point out in the introduction that the current status of Hawaii's birds can not be fully understood without the perspective of the fossil record. When the birds known only as fossils are added to those with historic records, the total comes to 109 species unique to the islands. Many of those became extinct during the period of Polynesian occupation, from approximately the sixth to the eighteenth centuries, including honeycreepers, a honeyeater, owls, hawks, large-billed finches, and flightless geese, rails, and ibises. Additional extinctions after European contact in 1778 have reduced the native avifauna to at most 35 species.

The first section of the book, ''Historical Perspectives,'' contains two analytical papers. Curnutt and Pimm estimate the number of rails, parrots, pigeons, and doves that may have once occurred in the entire central Pacific region. Moulton and coauthors summarize published records of the 140 attempted introductions of nonindigenous birds to Hawaii. They find that success rates for columbiforms are related to the history of previous introductions elsewhere, that introduction effort matters for galliforms, and that the successful establishments of passeriforms are related to the sizes of their geographic ranges elsewhere.

In the introduction to the second section, ''Systematics,'' Helen James estimates that only 20 colonizing species were the original sources of the endemic avifauna. Their establishment led to radiations of rails, thrushes, honeyeaters, owls, crows, ibises and waterfowl, and some single differentiated species, as well as to the well-known radiation of the drepanidines (Hawaiian finches or honeycreepers). The survivors consist of various passerines, a hawk, a goose, an owl, and some small waterbirds, most of which are currently threatened with extinction or endangered.

Fleischer and McIntosh present phylogenetic relationships based on molecular data for extant Hawaiian taxa and their potential Old World and New World mainland relatives. They find evidence that the closest relatives of about half of the Hawaiian lineages are most closely related to North American

taxa. They estimate that the evolution of the Hawaiian endemics has occurred within the last 5 million years, more recently than previous estimates, approximately the age of the current set of main islands. In a separate paper, Fleischer and coworkers report that the Po-ouli (*Melamprosops phaeosoma*), discovered in 1973 on Maui, is in fact a honeycreeper, albeit quite distinct from others. Rhymer finds that the Laysan Duck (*Anas laysanensis*) is more distinct genetically from the Hawaiian Duck or Kaloa Maoli (*A. wyvilliana*) and the Mallard (*A. platyrhynchos*) than the latter two are from each other. Pratt and Pratt do not trust phylogenies based on molecular or cranial osteological data. They prefer the biological species concept to the phylogenetic species concept for the construction of phylogenies. In a separate paper, H. Douglas Pratt, whose results differ from those of other workers, offers his phylogenetic analysis for drepanidines, based entirely on phenotypic characters. The current AOU Check-List follows an earlier analysis by Pratt.

In the section on ''Status and Trends,'' Ainley and coauthors describe a 17 year program of banding fledgling Townsend's Shearwaters (*Puffinus auricularis newelli*) attracted to lights on Kauai. They use a Leslie matrix model to compare the demographic importances of different sources of mortality and conclude that reduced lighting and more predator control in breeding areas will be required to stabilize the population. Udvardy and Engilis use banding recoveries from the holarctic Northern Pintail (*Anas acuta*) to show its widespread wintering distribution on many islands in the Pacific Ocean, as well as in Hawaii. After having reviewed the results of the Hawaiian Forest Bird Surveys of the 1970s and 1980s, plus the reports of Banko in the 1980s, Reynolds and Snetsinger designed the Hawaii Rare Bird Search, a two-year concerted attempt to search previous sites in remote areas of four major islands for the 13 rarest Hawaiian forest birds. Six were not found at all, but one undetected species (Olomao [*Myadestes lanaiensis*]) may persist in an area to which they could not get access. Baker's intensive search on Maui for the Poouli located only three individuals in 1997.

Sheila Conant introduces the ecology section with a history of the extensive studies and surveys sponsored by the U.S. Forest Service, U.S. Fish and Wildlife Service, and Hawaii Department of Land and Natural Resources. The seven excellent papers in that section address subjects like responses of particular species to variation in food availability, habitat characteristics, the importance of cavities in large old trees to the endangered Hawai'i Akepa (*Loxops coccineus coccineus*). Clever comparisons of demographic and fitness characters of two populations of that species that differ in population density allow Hart to conclude that the differences are not due to external threats like disease or predation.

Van Riper and Scott begin the next section with a summary of the history of the six most frequently cited environmental factors limiting bird populations on the islands: (1) habitat changes, (2) human predation (hunting), (3) predation by introduced predators, (4) avian competition, (5) avian parasites and diseases, and (6) abiotic factors (e.g. hurricanes). Of those factors, the one for which they find the least evidence as a limiting factor is interspecific competition, although alien species clearly serve as reservoirs for diseases that kill native species. The major habitat changes occurred in the past, but alien herbivores continue to destroy native vegetation. Today predation and habitat modification by introduced species at all elevations and disease below 1,200 m dominate interpretations of limiting factors. Avian malaria (*Plasmodium relictum*) and avian pox virus (*Poxvirus avium*), carried among birds by an introduced mosquito (*Culex cinquefasciatus*) that is elevation limited, continue to decimate bird populations. The need is urgent for additional reserves at high elevations on Maui and Hawaii. In those areas, and at other special sites, control of feral cattle (*Bos taurus*), pigs (*Sus scrofa*), goats (*Capra hircus*), rats (*Rattus* spp.), feral dogs (*Canis familiaris*), and the small Indian mongoose (*Herpestes auropunctatus*) will be necessary. Feral cats (*Felis catus*) must be controlled at seabird colonies. Jarvi and coauthors summarize the evidence that the major declines in honeycreepers below 1,200 m in elevation in the last 100 years were due to disease and that, at some low-elevation locations, natural selection for less virulent strains of the diseases is occurring. Shehata and coauthors used DNA-based diagnostics as well as blood smears to estimate malarial prevalence in birds in urban Honolulu and found that one honeycreeper, the Oahu Amakihi (*Hemignathus flavus*), seems to have evolved genetic resistance to malaria. Fancy and Snetsinger remind the reader that factors other than disease and predation should still be considered. Loope and coauthors warn that current measures to prevent the establishment of additional alien species are far from adequate.

The sixth and final section of the book contains a fine chapter by Banko and coauthors that summarizes the history of recovery and management efforts and current recovery strategies. Three famous examples of efforts to save single species are the cases of the Hawaiian Goose or Nene, Hawaiian Crow or 'Alala (*Corvus hawaiiensis*), and the Palila (*Loxoides bailleui*). Kuehler and coauthors describe the cooperative efforts since 1993 of The Peregrine Fund, the U.S. Fish and Wildlife Service, and the 'Alala Partnership to implement intensive restoration techniques for particular species at two captive propagation facilities. Their ''rear and release'' strategy involves collection of eggs from the wild, artificial incubation and hand-rearing of chicks, and release to the wild. Examples of programs for management of entire communities are the Hakalau Forest National Wildlife Refuge on Hawaii and the Haleakala National Park on Maui. About $1

million per year are currently going into the research and management of Hawaiian birds. That may sound like a lot, but the state of Hawaii contributes an estimated one-half of one percent of its state budget. Steiner (p. 382) says that ''federal management funds for which the state could compete if it had matching dollars go begging or go elsewhere.'' This book documents that research on Hawaiian birds is currently at the forefront of paleontology, evolutionary biology, ecology, genetics, epidemiology, and conservation biology. The next step is to get the management up to that same level of excellence.—FRANCES C. JAMES, *Department of Biological Science, Florida State University, Conradi Building, Tallahassee, Florida 32306, USA. E-mail: james@bio.fsu.edu*

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Important Bird Areas in Kenya.—Leon Bennun and Peter Njoroge. 1999. The East Africa Natural History Society, Nairobi, Kenya. ISBN 9966-9921-1-1. Available from Natural History Book Service, 2–3 Wills Road, Totnes, Devon30TQ9 5XN, United Kingdom £18.—The BirdLife International global partnership is well-known for producing well-documented, scientific assessments of the status of birds (e.g. Collar et al. 1994, Birdlife International 2000) and of sites important for birds (e.g. Grimmett and Jones 1989, Evans 1994). *Important Bird Areas in Kenya* not only lives up to that tradition but in many ways, surpasses past efforts.

One is immediately struck, upon handling the book, by the quality of its production and the obvious care that was taken in its design and layout to convey the important information contained within in the most effective manner. Colored tabs at the bottom of each page, for example, highlight the page numbers, chapter names, appendices, and various indices. An almost amazing five indices are included to allow one to quickly find sites based on scientific and common names of birds found at the sites, names of other animals and plants, site names, and site codes. Tables throughout the book are designed well and contain massive amounts of information.

Perhaps the most outstanding feature of the book is the introductory chapters (60 pages of them). Whereas most important bird area (IBA) books provide excellent overview and background as well as some analysis based on the IBA inventory, *Important Bird Areas in Kenya* has some of the most detailed, well-written, and well-referenced chapters that we have yet seen. The discussion of how birds can be used to set overall biodiversity priorities is compelling and deserves to be read by anyone interested in biodiversity conservation. Sections explaining site-selection criteria, biological rationale, and the site-selection process are impressive and give great credibility to the results. For those interested in understanding the IBA concept and process, not just in Kenya but anywhere in the world, these sections are a must-read. Another excellent feature is a discussion of the gaps in coverage of certain high-priority species, why those gaps occurred, and how those gaps may be rectified as more information is garnered in future years. A chapter on wildlife conservation policy and the institutional framework for conservation in Kenya provides an in-depth overview of interest not only to those working on conservation in Africa, but because of descriptions of international conventions, also potentially to conservationists from any country. The only real shortcomings we noted in the introductory materials were some repetition of information among chapters and an oddly abbreviated section (just one page) on conservation issues within Kenya.

The bulk of the book is made up of the 60 IBA site accounts that each contain a wealth of information about the location and geography of the site, the birds of importance at the site, other wildlife of importance at the site, and the conservation issues at the site. Simple but well-presented one-page maps are provided for most sites as well. Line drawings of a bird species associated with the site accompany each site account though most are somewhat crude. Each site account also contains a summary table that lists the species present that are globally threatened, range-restricted, biome restricted, or congregatory, along with a thumbnail statement about the habitat associations and abundance of these species. The sections of the site accounts dealing with conservation issues provide well-researched summaries of the specific conservation challenges at each site, along with practical suggestions for actions that can be taken, both at the local level and by the government.

Relative to much of the African continent, the avifauna of Kenya is rather well known, but there are nonetheless gaps in knowledge for particular species and regions of the country. Clearly a lot of research was done to make sure this book presents a balanced perspective on the relative importance of sites throughout the country. Although many readers will be familiar with some of the IBAs that already receive protection as national parks and reserves (such as Lake Naivasha, the Aberdare Mountains, Mt. Kenya, Masai Mara, Samburu and Buffalo Springs, Meru, Tsavo East and West, Amboseli), many of the unprotected sites that face the most critical threats will be relatively unknown to most readers. Some examples include the Dida Galgalu Desert in northern Kenya (where William's Lark is found), the Machakos Valleys (Hinde's Babbler), the Tana River Delta (a coastal site with large concentrations of congregatory watgerbirds), the Yala Swamp Complex (the largest papyrus

swamp in the Kenyan section of Lake Victoria), and Ol Donyo Sabache (an isolated basalt mountain that is one of the most important sites in Kenya for birds of prey). As an example of some of the information included, we learn that the Kinangop Grasslands, which is mainly private land, is probably the world stronghold for the globally threatened Sharpe's Longclaw. It is believed that deforestation of the nearby forests has resulted in a warmer, dryer climate with less frequent frosts, which now makes crop cultivation more attractive in the area. This, along with higher population density, smaller average landholdings, and higher stocking rates has led to a rapid loss and fragmentation of the grasslands critical for this species. As a result of increased awareness of those issues, a ''Friends of the Kinangop Plateau'' group has been formed to address those conservation concerns. Ecological and economic studies are being initiated to determine what land-use regimes are compatible with Longclaw conservation, and what economic opportunity costs these entail. Opportunities are being sought to purchase Longclaw habitat and identify potential reserves on common land.

As with any book we did find a few shortcomings in the presentation. The level of detail provided for each site varies quite a bit, which is understandable given the gaps in knowledge. That is partially made up for, however, by the fact that specific information needs are often spelled out throughout the book. These insights can serve as a research agenda that will be useful for students and land managers for years. It might have been useful to summarize the most important research needs in an appendix. The site maps would have benefited by having a small inset map of the country showing the location of the IBA. Without that we found it necessary to constantly refer back to the only summary map in the book that showed the location of all the IBAs, and that was on page 6—not the most convenient location to quickly thumb to. It would have been helpful to have a summary map on the inside front or back cover for easy reference. It also would have saved time if, for example, there were hatch marks on the edges of the map (alpha-numeric or latitude-longitude) with a reference code for each site so that it would be easier to find them at a glance, rather than have to visually scan the map until we found the number of the IBA of interest. The heading of each site account mentions the province and district where the site is located, which will be helpful spatial information for those familiar with the country, but there is no map showing the locations of the provinces and districts. Could those boundaries have been overlaid on the summary map? These complaints are minor, however, and we should emphasize that overall one is struck by how thoughtfully the information has been summarized and cross-referenced in the appendices and indices. It really was quite easy to find the information we were looking for.

In summary, this publication is a significant contribution to the ornithological literature. It should certainly be in the library of anyone interested in African ornithology, biodiversity conservation, or the IBA program. Because the book provides lists of sites where many of the rarest species in the country are found, along with basic site maps and tables that provide information on basic habitat preferences of these species, it is possible that the book may find a secondary audience among the birding community as a supplemental tool for bird finding. Overall, we believe that *Important Bird Areas in Kenya* has set a new benchmark for IBA guides and similar publications, and it deserves to be widely read.—JEFFREY WELLS, *National Audubon Society, 159 Sapsucker Woods Rd., Ithaca, New York 14850, USA. E-mail: jwells@audubon.org; and* DANIEL K. NIVEN, *National Audubon Society, 545 Almshouse Road, Ivyland, Pennsylvania 18974, USA. E-mail: dniven@audobon.org.*

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The Auk 119(4):1209–1210, 2002

Guide to the Birds of Fiji and Western Polynesia.—Dick Watling. 2001. Environment Consultants Fiji Ltd., Suva, Fiji. 272 pp., 16 color plates, text figures. ISBN 982-9047-01-6; Hard cover; $30.00. (Order by e-mail from *watling@is.com.fj* or available online www.environmentfiji.com or www.pacificbirds.com.).—In 1978, a youthful Dick Watling published (through Millwood Press, Wellington, New Zealand) a useful large-format book (21.5 × 29.5 × 2 cm, 1,116 g) called *Birds of Fiji, Tonga and Samoa.* Now a more seasoned Dick Watling has published a field guide (16 × 22 × 2.3 cm, 602 g) to birds of the same region. The field guide also covers the depauperate birdlife of several more isolated island groups (Niue, Tuvalu,

and Tokelau) that, unlike in Fiji, Tonga, or Samoa, have no surviving endemic species of birds.

Dick Watling knows these birds well, especially in Fiji where he lives. The extensive introductory material (pp. 10–62) is presented in four sections—how to use the book, country profiles, ornithology of the region, and conservation. The 172 species accounts are divided into land and freshwater birds (94 species), seabirds (53 species), and shorebirds (25 species). These accounts are excellent summaries of what is known for each species about their local and English names, identification, flight, voice, habits, distribution, conservation status, and often other attributes. After the species accounts are sections on unconfirmed or erroneous records, and birdwatching in the region, followed by a glossary, indices, and checklists.

It may be instructive to continue comparing the new field guide with the earlier, larger book. Conservation is a much more informed and pervasive theme in the field guide. Watling's observations and opinions are articulated in a thoughtful, straight-forward way. I congratulate him for covering the emerging prehistoric record of birds in those islands, which clearly shows that human-caused extinctions began with the earliest settlers 3,000 years ago. Both books feature color plates by Chloë Talbot-Kelly. The individual images are mostly the same, but some have been moved from one plate to another. Occasionally a new painting of a particular bird has been added to the field guide, such as for *Pachycephala jacquinoti* (Tongan Whistler) on plate 9, and several species of seabirds and shorebirds. Still, 19 species of seabirds, 11 species of shorebirds, and 10 species of landbirds that have species accounts are not illustrated. Fortunately, that includes only one native, resident species of landbird.

Although the new book will be appreciated by anyone in the field, scientists will be frustrated that it has no bibliography. Watling mentions much of what has been learned about the region's birds over the past 20 years, but without literature citations. His previous book listed 237 publications; updating that would have been an important service to scholars. The plate captions also would be much more helpful in the field guide had they included scientific names, which they did in Watling (1978). Some other criticisms, less important than the literature lacuna, include a small sprinkling of misspelled scientific names, run-together sentences, and poor punctuation, this exacerbated by the small, thin print that makes the book challenging to read, especially under field conditions. Even in the comfort of my well-lit office, Watling's fine field guide will always be memorable as my first book that was truly uncomfortable to read without glasses, this being only partly a testimony to my declining vision.

Several of Watling's judgements on the biology of Fijian birds deserve comment. His claim that the extinct *Nesoclopeus poecilopterus* (Bar-winged Rail) was volant seems doubtful. I examined the wing of that rail in the British Museum and found it to be typical of that in flightless species. Following the current world-wide splitting trend in insular birds, Watling recognizes the White-breasted Wood-swallow from Fiji as the endemic *Artamus mentalis* rather than as a race of the widespread *A. leucorhynchus*, and the Red-headed Parrot-finch from Fiji as distinct (*Erythrura pealii*) from that of Samoa (*E. cyaneovirens*). Except to list-oriented birdwatchers and conservationists looking for endemics, I see no benefit in such species-level splitting of populations from their allopatric but highly similar and undoubtedly monophyletic relatives. For *A. mentalis*, he also suggests that colonization and speciation occurred since human arrival only three millennia ago; although there is no fossil record of Fijian *Artamus* to test that notion, several millennia seem like quite a short period of time for speciation in a highly volant bird. Last, I see nothing to warrant recognition of the monotypic genus *Xanthotis* for the Kadavu Honeyeater (*X. provocator*), which clearly is a geographic representative of the much more widespread *Foulehaio carunculata* (Wattled Honeyeater).

In spite of my criticisms, Dick Watling's new book is outstanding. Since 1985, I have spent over nine months surveying living and extinct birds on 56 different islands in Fiji, Tonga, and Samoa. I will never go back to the islands without his field guide. More importantly, I would encourage all who travel to Fiji or Western Polynesia to take along an extra copy or two of Watling (or buy them in Fiji) to give away. Any islander who appreciates birds would love to own this book. A grant from New Zealand Overseas Development Assistance already has funded its distribution to schools through the region. That is genuine progress in promoting science and environmental awareness among island youth. Dick Watling should be very proud.—DAVID W. STEADMAN, *Florida Museum of Natural History, University of Florida, Gainesville, Florida 32611-7800, USA. E-mail: steadman@flmnh.ufl.edu*

The Auk 119(4):1210–1211, 2002

Avian Incubation: Behaviour, Environment, and Evolution.—Edited by D. Charles Deeming. 2002. Oxford University Press, Oxford, United Kingdom. xiv + 421 pp, numerous figures and tables, two color plates. ISBN 0-19-850810-7. Cloth, $85.00.—This book presents an up-to-date, exhaustively researched (~1,600+ references) overview of how birds care for their eggs and maintain them at high temperatures. The book has 22 chapters, 7 of which are authored or coauthored by the editor, the rest in-

cluding 27 additional authors from the United States, United Kingdom, Canada, Australia, Israel, and The Netherlands. Following an introduction on the evolution of incubation (Deeming), the chapters fit nicely into five topics, the first dealing with structural aspects of incubation and including incubation sites (M. H. Hansell and Deeming), egg characteristics (Deeming), and use of egg components by the developing embryo (Deeming). Chapters on behavioral aspects of incubation include hormonal control (C. M. Vleck), incubation rhythms (Deeming), and parent–embryo interactions (R. B. Brua). Heat is the central theme of the book, and it is covered in chapters on the brood patch (R. W. Lea and H. Klandorf), egg temperature (J. S. Turner), nest microclimate (A. Ar and Y. Sidis), and egg turning (Deeming). Many special situations concerning incubation are dealt with in chapters on the effects of nest microbes on incubation (G. K. Baggott and K. Graeme-Cook), the underground nests of megapodes (D. T. Booth and D. N. Jones), the smallest incubators, the hummingbirds (W. A. Calder III), models of intermittent incubation (F. R. Hainsworth and M. A. Voss), incubation in extreme environments (C. Carey), and the tactics of brood parasites (S. G. Sealey, D. G. McMaster, and B. D. Peer). Finally, ecological and life-history aspects of incubation are treated in chapters on the initiation of incubation behavior and hatching synchrony (P. N. Hébert), egg coloration (T. J. Underwood and S. G. Sealy), energetics of incubation (J. M. Tinbergen and J. B. Williams), and the incubation costs of reproduction (J. M. Reid, P. Monaghan, and R. G. Nager). A brief chapter by D. C. Deeming on areas for future research concludes the book.

The eggs of birds have long been a focus of research, from early studies of vertebrate embryology, summarized decades ago by Alexis Romanoff, to more recent work on physical gas exchange across the eggshell by the late Hermann Rahn and his associates. There has also been the considerable practical matter of maximizing the hatchability of the eggs of domestic fowl in convection incubators, the tradition from which the editor of this book has come. Regardless of how wonderfully convenient the avian egg has been for many areas of biological research, it nonetheless challenges the parent bird to keep the embryo inside at an optimal temperature. That requires a suitable combination of incubation site, nest construction, and application of heat, keeping in mind such constraints as safety of the nest and the parent's own maintenance. *Avian Incubation* admirably brings together highly readable and well-illustrated accounts of those issues, covering research on both domesticated birds and a wide variety of wild birds. It should serve as the starting point for all future studies of incubation, and the sections on ''future research'' at the end of most of the chapters emphasize that there is much more to learn.

From my perspective as an ecologist and evolutionary biologist, I am interested in the extent to which variation in incubation period is determined by the incubating behavior of parents as opposed to intrinsic attributes of embryos, and the fitness consequences of variation in incubation behavior and embryo development. By its nature, an edited book such as *Avian Incubation* has less synthesis between chapters to address such questions than I would have liked. Nonetheless, the overall coverage is broad and thoughtful, and several of the chapters explicitly integrate aspects of incubation through modeling. What impresses me most from reading this book is that the answers to many questions about incubation as a component of life histories demand an understanding of the complexities of the incubation process. For example, unlike a convection incubator, which warms eggs evenly, contact incubation establishes sharp gradients of temperature within the egg, which are greater across large eggs than small eggs. As a consequence, when the parent leaves the nest the initial phase of cooling is dominated by redistribution of heat within the egg rather than loss through the egg surface (Turner). That has implications for the maintenance of embryo temperature and the rhythm of incubation by adults (Hainsworth and Voss), and may explain why recess length increases as only the 0.4 power of egg or clutch mass rather than the expected two-thirds surface rule (Deeming). Also, I was intrigued to learn that gas conductance of Mandarin duck eggs increases during the incubation period as colonies of *Bacillus* bacteria break down the outer egg cuticle (Baggott and Graeme-Cook). What if birds use microbes to help adjust gas conductance (Carey) in parallel with the oxygen uptake and carbon dioxide production of the developing embryo? It would be a nice example of biological engineering!

Incubation and its place in the life history of birds is highly amenable to theoretical, experimental, and comparative analysis, as this book makes abundantly clear. I hope that *Avian Incubation* will inspire young investigators to continue the wonderful tradition of egg and incubation research.—ROBERT E. RICKLEFS, *Department of Biology, University of Missouri-St. Louis, 8001 Natural Bridge Road, St. Louis, Missouri 63121-4499, USA. E-mail: ricklefs@umsl.edu*

The Auk 119(4):1211–1213, 2002

Who Killed the Great Auk?—Jeremy Gaskell. 2000. Oxford University Press, Oxford, U.K. xi + 227 pp., 1 color plate, 48 text figures. ISBN 0-19-856478-

3. Hard cover, $40.00.—A quirky title on a magnificent jacket cover and for the most part an interesting read shape the dimensions of *Who Killed the Great Auk?* The poignant, ethereal images of the penguins of the North Atlantic on the jacket crafted by Errol Fuller, artist and author of *The Great Auk* (1999), almost compel one to cradle this book. Using the Great Auk (*Pinguinus impennis*) as the medium, Gaskell weaves lore, legend, and human involvement with the species' fate into an historical and geographic essay with implications for extinction, conservation, ignorance, over-harvesting, ethics, environmental responsibility, and legislation to mention some.

While at times a bit ponderous and tangential, Gaskell demonstrates that the hind-casting of historical exploration and analysis like that of archaeology and paleontology often reward the researcher with new perspectives and on occasion deep understanding—lessons for the present. Such exercises hone the wit of skepticism and heighten motivation to uncover unknown clues and ignored, overlooked, and even unappreciated writings of those who worked during previous centuries. Gaskell does a fair bit of uncovering.

Gaskell squarely blames the Great Auk's extinction on the feather collecting crews in Newfoundland who wantonly slaughtered the flightless birds and others in the absence of effective and enforced legislation. As human conditions change, traditions and codes of conduct change with them. So do attitudes and perspectives. As might been the case for European settlers during the 1700s, Gaskell compares an extended stay on Funk Island with a prison sentence. Such situations might well have created circumstances where the most basic instincts for survival came into play. Gaskell's titling of a chapter on Newfoundland—''Uncouth Regions''—is both inappropriate and uncouth. As pointed out, the devastation of seabirds and other avifauna during the eighteenth and nineteenth centuries was a widespread North American and European activity. It is historically surprising that so little is known about the Great Auk in Europe and in the Northeast Atlantic in general (see Lyngs 1994). There are many discoveries yet to be made.

For centuries and millennia before European incursions, aboriginal peoples also killed Great Auks on Funk Island and elsewhere in eastern North America (Montevecchi and Tuck 1987) and Greenland (Melgaard 1988). Their values were likely different. Today, a research visit to Funk Island is a privileged luxury afforded to but a few (Montevecchi 1994).

As have others, Gaskell uses comparative studies of Razorbills (*Alca torda*) and other alcids to speculate about the behavioral ecology of Great Auks. However, compelling comparisons that can also be made with similarly sized and highly social Adelie (*Pygoscelis adeliae*) and Gentoo (*P. papua*) penguins were not grasped.

The ultimate finality associated with the killing of ''last known'' pair of Great Auks on Eldey Island in 1844 pales in comparison to the act's irrelevance in the species' extinction. Once the population of those very social, highly aggregative, colonially breeding animals was pushed below minimum viable levels, likely before 1800 (Montevecchi and Kirk 1996), the species' fate was sealed. Clearly, the killing of Great Auks cascaded them into the inevitable extinction that followed. As numbers diminished, Great Auks essentially took on the role of highly prized trophy birds for museum curators and for private collectors. Monetary rewards fueled the search for trophies and ensured a relentless pursuit of the remaining individuals of the once robust population. Although the auk's final ignominious eradication was played out through the hands of Icelandic fishermen and the finances of Danish Museum men, some lost and lonely surviving individuals wandered North Atlantic waters well after 1844.

Tragedy often sows the seeds of affirmation. As Gaskell details, the Great Auk's extinction catalyzed in Newfoundland the first conservation legislation in North America and more widely in the British Empire in 1845 (*An Act for the Protection of the Breeding Wild Fowl in this Colony*).

This book is a good read for those with interests in history, ornithology, geography, and their interplay through changing human understanding and misunderstanding. The book will likely find a wide readership in public and university libraries.

So who killed the Great Auk? Lots of people did. The pressing problem as is clear with our interactions with marine ecosystems is that we are still doing so in other ways. Who will save this magnificent creature's legacy and protect the oceans where it once roamed? Jeremy Gaskell is making his contribution.—W. A. Montevecchi, *Biopsychology Programme, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X9, Canada. E-mail: mont@mun.ca*

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The Auk 119(4):1213–1214, 2002

The Birds of the Cayman Islands: An Annotated Checklist.—Patricia E. Bradley. 2000. British Ornithologists' Union Checklist No. 19, British Ornithologists' Union, Tring, United Kingdom. 253 pp., 71 color plates, 8 figures, 9 tables, 10 appendices. ISBN 0907446-23-X. Cloth, $65.00.—The three islands in the Cayman group–Grand Cayman, Cayman Brac, and Little Cayman—form a semi-isolated archipelago in the western Caribbean roughly equidistant from Cuba and Jamaica. Those low-lying islands together have an area of 263 km^2, and compared to their larger neighbors they support a correspondingly depauperate avifauna of 69 extant breeding species, including only 16 passerines. Many groups characteristic of the Greater Antilles such as the todies and *Saurothera* cuckoos are currently absent from the Cayman Islands, and most of the species that breed on the archipelago are widely distributed elsewhere in the West Indies, though a number are represented by subspecies endemic to one or more of the Cayman Islands.

Given the relatively small fauna of the Caymans, one might think that compiling a checklist of the avian species present would be a simple task. Instead, this sophisticated treatment of the Caymans' avian fauna surpasses the scope it its title to highlight the wealth of information now available for even comparatively simple island systems. The core of the book is 143 pages of comprehensive species accounts for all taxa that have been reported from the islands. Those accounts are more detailed than those in a typical annotated checklist, and include comprehensive information on the range, status, and abundance of each species on each of the three islands, including dates and locations of sightings and of breeding activity. For each species, specimens from the Cayman Islands housed in 16 major museum collections are also listed. This checklist summarizes information from all previous ornithological work on the islands and provides a valuable synopsis of information on topics such as habitat distributions, migration dates, and breeding phenologies that will be of interest to a wide ornithological audience.

The 56 page introduction is equally thorough, and provides informative synopses of the history of ornithological exploration and the natural history of the Cayman Islands. This introduction is divided into 12 sections, each of which is essentially a standalone chapter. One section discusses the likely biogeographic relationships among taxa resident on the Cayman Islands and allied populations elsewhere. The resident Cayman Islands species seem to have colonized the archipelago from a number of sources, of which Cuba is not surprisingly the most prevalent. Cayman taxa with particularly enigmatic distributions include the Caribbean Elaenia (*Elaenia martinica*), which is also found on offshore islands in the Yucatan and in the Lesser Antilles but which is absent from the other islands in the Greater Antilles; and the Vitelline Warbler (*Dendroica vitellina*), a species that closely resembles the Prairie Warbler (*D. discolor*) and which occurs only on the three Cayman Islands and on the tiny and highly isolated Swan Island off the eastern coast of Honduras.

Another section that I found particularly intriguing summarizes previous paleontological work on the islands and discusses changes in species composition associated with the increasingly mesic conditions of the early Holocene. Extinct Cayman Islands taxa include a robust-billed finch probably allied to the Cuban Bullfinch (*Melopyrha nigra*), as well as the endemic Cayman Thrush (*Turdus ravidus*) and an endemic subspecies of the Jamaican Oriole (*Icterus leucopteryx*) that persisted into the twentieth century. The combined evidence from the paleontological record and observations of species turnover during historical times suggests that those islands have had a high lability in land bird species composition. That pattern is somewhat difficult to reconcile with the large number (17) of land bird subspecies endemic to the Cayman islands, most of which presumably represent populations that have persisted long enough to differentiate morphologically from conspecific populations on other islands.

Additional sections discuss the conservation status of the Caymans' avifauna. Development pressure is high on all three islands, but especially on Grand Cayman, where much of the dry forest habitat has been degraded and much of the mangrove wetlands are slated for development. Habitat alteration on Grand Cayman presumably contributed to the extinction of the Cayman Thrush and Jamaican Oriole. Less habitat conversion has occurred on Little Cayman and on Cayman Brac, the latter of which supports both an endemic race of the Cuban Parrot (*Amazona leucocephala hesterna*) and colonies of several colonially breeding seabirds, including the largest Red-footed Booby (*Sula sula*) colony in the West Indies. The Cayman Islands were not occupied by humans during pre-Columbian times, and the two smaller islands currently have low population densities. Habitat preservation efforts targeting those

smaller, relatively pristine islands would seem to be particularly timely.

The various sections of the introduction are illustrated with a number of well-drawn maps and figures, and the book includes 71 color plates comprising vegetation maps, photographs of typical habitats and land forms, and high quality photographs of many of the resident bird species. Ten appendices provide useful tables on topics such as species distributions in the Caymans and elsewhere, and on dates of occurrence for migratory taxa.

I referred to this book frequently during a recent research trip to the three Caymans Islands, although this is not a field guide per se. My only major complaint is that I had a difficult time finding a copy for sale in the United States, and no copies were available from booksellers in the Cayman Islands. This book deserves to be made more widely available by the publisher, and I hope that its thorough treatment of the Cayman avifauna will be emulated in future BOU checklist volumes for other commonwealth islands in the West Indies.—Irby J. Lovette, *Evolutionary Biology Program, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850, USA. E-mail: ijl2@cornell.edu*

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Voices of the New World Owls, 4th edition revised.—J. W. Hardy, Ben B. Coffey, Jr., and George Reynard, revised by Terry Taylor. 1999. ARA-16, ARA Records, P.O. Box 12347, Gainesville, Florida 32604-0347, USA. $13, tape cassette.—The vocalizations of owls have always provided one of the few windows through which biologists and naturalists can study the lives of these enigmatic, nocturnal birds. Recently, vocalizations have played an important role in taxonomic studies of owls, because sibling species are often essentially alike in plumage. Despite the importance of those vocalizations to both owls and biologists alike, the study of owl vocalizations has lagged behind that of diurnal birds, in part because it is so difficult to discover which bird is making the sounds (or even if it is a bird), let alone discover the context in which the sounds are being made.

J. W. Hardy and his collaborators have been at the forefront of the study of the voices of nightbirds for over 20 years. Starting with the release of *Voices of New World Nightbirds* in 1980, their recordings have helped countless other ornithologists and naturalists in their studies as well. This latest recording features the songs and calls of 71 species of New World owls, a significant increase over the 46 species included on the 1980 edition of *Voices of New World Nightbirds* and 57 on the 1989 edition. Although some of the increase can be attributed to the tremendous amount of field work done and new recordings made in Central and South America over the last two decades, it is also the product of recent taxonomic decisions, which have created a plethora of new owl species, especially in the *Otus* and *Glaucidium* genera. The taxonomy of those genera is still in a state of flux, a condition noted several times in the text that accompanies the cassette. The authors have followed Sibley and Monroe (*Distribution of Birds of the World,* Yale University Press, 1990) and the American Ornithologists' Union *Check-List of the Birds of North America, Seventh Edition* (1998) and other recent sources for their taxonomic treatment, though in at least one case (the Northern Pygmy-Owl [*Glaucidium gnoma*]) they openly state their opposition to the AOU's decision not to split that taxon. The authors do create a new English name for one species, the Chocó Screech-Owl (*Otus centralis*).

Although I am quite a keen owl enthusiast, I do not often get the opportunity to hear Neotropical species, so it is a real treat to compare the songs of species such as the Balsas Screech-Owl (*Otus seductus*) with those of familiar local species such as the Western Screech-Owl (*O. kennicottii*), or to hear the unique descending trill of the Chocó Screech-Owl. I have used earlier editions to identify owls heard in Costa Rica and Venezuela; this is a collection of sounds largely unavailable on any other commercially produced recording. One of the welcome additions to this revision is the single-note song of the Northern Pygmy-Owl, the form heard across most of its range north of the Mexican border. This is one of the only examples of that song available on a commercial tape; other compilations have only provided the two-note song given by birds from Arizona south. There are even recordings of the type specimens of two species, the Cloud-forest (*Glaucidium nubicola*) and Subtropical (*G. parkeri*) pygmy-owls.

The text accompanying the cassette is printed on a long, narrow sheet of paper designed to be folded up into the cassette box. The print is unforgivably tiny, especially for middle-aged eyes like mine—I had to digitally scan the sheet and enlarge it to read the text for this review. I can not imagine anyone being able to read it under low-light conditions at night and most people will need a good magnifying glass to read it comfortably. That is especially serious for a text that does comment extensively on taxonomic and biological matters and will likely be cited widely. Perhaps the next edition could be accompanied by a small booklet, an obvious choice if the recording is updated to compact disc technology. The text includes a short introduction and a series of species accounts. Each of the latter includes a sentence on distribution and habitat and the location, date and

recorder for each of the examples presented. I could find only one typographical error, the misspelling of *guatemalae* in the Chocó Screech-Owl account. *Otus albogularis* is announced and printed as the ''White-throated Owl,'' though all my references, including Monroe and Sibley (*A World Checklist of Birds,* Yale University Press,1993), cite it as the White-throated Screech-Owl, which is consistent will all other New World *Otus*.

Corrections have been made to previous editions, notably the removal of a Boreal Owl (*Aegolius acadicus*) song from the Northern Hawk Owl (*Surnia ulula*) section. There is very little room for improvement as far as the number of species covered goes, because only four species (Galapagos Barn-Owl [*Tyto punctatissima*], Keopcke's Screech-Owl [*Otus koepckeae*], Cloud-forest Screech-Owl [*Otus marshalli*], and Long-whiskered Owlet [*Xenoglaux loweryi*]) are not included in this collection simply because there are no available recordings. There is a great deal of room for improvement on the inclusion of vocalizations other than the primary song of each species. Alarm and contact calls are provided in many cases, but are mysteriously lacking in others, especially in species from North America most likely to be encountered by bird enthusiasts.

This bias towards lesser-known Neotropical owls is clear when one looks at the number of examples devoted towards each species. Most other northern species have only one or two examples of calls, but tropical species get much fuller treatment. The Tamaulipas Pygmy-Owl (*Glaucidium sanchezi*), for instance, a species with a rather restricted range, has five examples of primary song, all quite similar to my ear—one or two would have been quite adequate. The Snowy Owl (*Nyctea scandiaca*) is given only a few calls (all recorded in Sweden) and no primary song (hoots) at all. The Boreal Owl is only given one example of the primary song, although recordings of other common calls (often the calls heard most often in response to tape playback) are widely available. A similar comment could be made regarding the Northern Saw-whet Owl (*Aegolius acadicus*), where the contact whine call, perhaps the most often misidentified owl vocalization in North America, is not included. The Northern Hawk Owl song provided (a captive bird from Germany) is rarely heard (if ever) in North America; contact and alarm calls would have been a nice addition there. The distinctive wing claps of Long-eared (*Asio otus*) and Short-eared (*A. flammeus*) owls, though not technically vocalizations, would have been helpful as well. Although I can understand that few of the Neotropical species have recordings available elsewhere, and therefore it would be appropriate to provide as many examples as possible here, it would also have been simple to include more vocalizations of northern species. The recordings are available and there are several minutes of blank tape at the end of each side.

The tape has some shortcomings in quality as well. Many of the recordings are naturally noisy because they were made by biologists or birders under adverse conditions and are often the only recordings ever made of those vocalizations. In most cases, those background noises simply add to the ambience of exciting field biology—the squishing footsteps on the jungle floor, the cacophony of tropical insects, the chirping of frogs. Several cuts however, have annoying clicks and whirs of recording equipment, giving the tape an amateurish quality that could have easily been edited out.

After reviewing this recording, I am left with the feeling that the authors seem unclear as to what their objective is—an all-inclusive field guide to owl sounds, or a research tool for Neotropical ornithologists? The inclusion of distribution and habitat notes in the text would suggest the former, but the weight given to Neotropical species suggests the latter. I feel that with a little more care and effort,the next edition could achieve both ends, but for now most owl enthusiasts will have to put up with a limited number of different calls from their local species. The text could have also benefited from a more consistent approach to commentary on differences between species. Separating the 23 species of *Otus* and the 16 species of *Glaucidium* presented is a daunting task to the neophyte owler, and although occasional mention is made pointing out differences with similar species, that could be expanded to improve the field-guide aspect of this tape. Similarly, the fact that the song of the Unspotted Saw-whet Owl (*Aegolius ridgwayi*) is lower pitched than that of the Northern Saw-whet Owl could be mentioned, rather than simply say they are distinguishable.

Despite its shortcomings, this tape should be in the possession of all ornithologists and birders who are interested in the owls of the New World. Hopefully it will continue to inspire field biologists to venture out into the dark and make exciting discoveries in the mysterious world of owls. The songs and calls missing from the tape should only spur users on to make their own recordings of those vocalizations so that they might be included on upcoming editions.—Richard J. Cannings, *Bird Studies Canada, Site 11, Comp. 96, RR#1, Naramata, British Columbia V0H 1N0, Canada. E-mail: dickcannings@shaw.ca*