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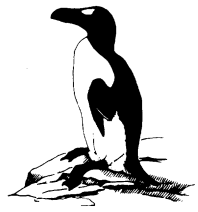

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OVERVIEWS

NEW SPECIES AND NEW SPECIES LIMITS IN BIRDS

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IN THIS ISSUE OF *THE AUK*, two papers provide a fascinating illustration of the state of studies of avian biodiversity. First, Whitney and Alvarez (1998) describe a new species of *Herpsilochmus* antwren from Peru and Ecuador. Second, Isler, Isler, and Whitney (1998) present an interesting application of vocal characters to delimiting species. This pair of papers provides material for reflection on the true dimensions of world avian diversity and its study.

Slightly more than 50 years ago, Ernst Mayr (1946) stated "The total figure of 8,616 [bird] species [in the world] is . . . probably within five per cent, and certainly within ten per cent, of the final figure . . . I doubt that in the entire world even as many as 100 new species remain to be discovered." A steady stream of descriptions of species new to science from diverse regions of the world nevertheless suggests that the supply is not yet exhausted. The Andes and adjacent regions of South America have proved to be a reliable source, as have Asia, southeastern South America, Africa, and even the Philippines and Mexico. The period 1941 to 1997 yielded at least 163 valid species descriptions, with no sign of exhausting the supply (Amadon and Short 1992). In fact, my estimates for a 1990s rate actually suggest an increase over rates from the 1970s and 1980s (Fig. 1), probably as a result of increased awareness of the importance of song characters in identifying new species (Parker 1991). Thus, Mayr's prophecy of an end to scientific description of birds has not yet come to be.

The description by Whitney and Alvarez (1998) of a new species of *Herpsilochmus* antwren is an excellent example of the continuing nature of ornithological exploration and description. Working in areas not terribly remote (one locality for the species was on the southern edge of the city of Iquitos, Peru!), Whitney recognized the song of the new species by its close similarity to that of *H. stictocephalus*, a species endemic to the Guianan Shield of northeastern South America, and he correctly inferred that a population so broadly disjunct would have to represent a species new to science. This combination of increased use of vocal characters with a growing corps of birders and ornithologists with birding experience in many sectors of the continent has led to, and certainly will continue to produce, many such exciting discoveries.

Beyond simple description of new taxa, much work remains in clarifying species limits among taxa already described. The biological species concept (BSC) advocated by Mayr and colleagues (Mayr 1942), which recognized the existence of numerous subspecific units, created many "species" that included well-marked geographic variants, which for lack of an adequate specimen base were thought to intergrade or interbreed. For example, the Least Pygmy-Owl (*Glaucidium minutissimum*) was considered a single species with numerous subspecies; careful study and consideration of vocal characters, however, indicated that the

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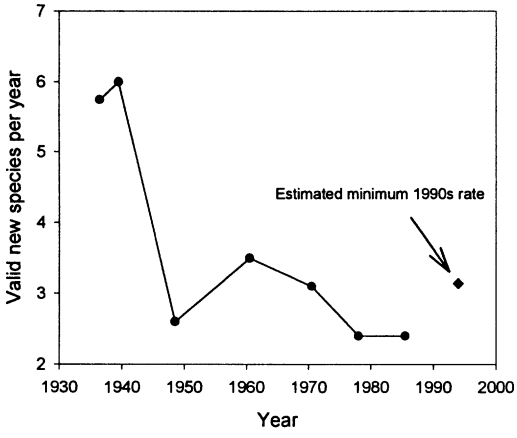

FIG. 1. Temporal trends in rates of description of apparently valid species of birds new to science. Rates up to 1990 are from Amadon and Short (1992); rate after 1990 was estimated from new descriptions available to the author.

complex actually consists of four full species distributed in different areas of the New World tropics (Howell and Robbins 1995). In many cases, even without new specimens or new character sets, simple reconsideration of specimen material has lead to recognition of additional species—Wetmore (1941) described two new subspecies from the Los Tuxtlas massif of southeastern Veracruz, both of which have recently been elevated to full species status. Many other examples are available, each effectively hiding avian diversity from scientific discovery and analysis. Hence, in addition to description of new taxa, understanding of those already described is changing drastically the picture of avian diversity across the world.

The contribution by Isler et al. (1998) is an explicit attempt to provide an operational tool for deciding species limits based on a single character suite in difficult groups—the present example being the "typical" antbirds (Thamnophilidae). The idea, however, is far from novel. Of the many prior examples available, a particularly spectacular one is that of Krabbe and Schulenberg (1997), in which species limits among 10 Ecuadorean species of the frighteningly difficult tapaculo genus *Scytalopus* were defined, and three new species described. Moreover, Isler et al.'s (1998) criteria for diagnosing species are certainly overly rigid and will not prove applicable generally, even in other thamnophilid taxa. Still, the idea of a consistent methodology for deciding species limits that can be applied across many taxa has long been appealing (e.g. Lanyon 1978). These attempts at consistent measures for application to the complexities of the process of speciation, while attractive, nevertheless have not always proven as useful as originally hoped.

The complication is the contrast between operational and theoretical approaches to species questions. That is, the definition of *what is* a species may differ from *how one decides* the status of a particular set of populations (Wiley and Mayden in press). For example, the BSC requires reproductive isolation, but very few decisions regarding species limits under the biological species rubric have been based directly on studies of reproductive compatibility (AOU 1983). Rather, most are based on interpretations of degree of morphological differentiation, or of distinctiveness of display or song behavior. Among the alternatives to the BSC, the phylogenetic species concept, which focuses on diagnosability and monophyly, is explicitly intended to be operational (Zink and McKitrick 1995), but it offers little theoretical justification. A fascinating alternative is the evolutionary species concept (ESC), which presents a theoretical definition of species (a lineage of ancestral descendant populations that maintains its identity from other such lineages and has its own evolutionary tendencies and historical fate), but leaves the "discovery method" to the particular taxonomist applying it (Wiley 1978). The ESC merits much more attention than it has received in ornithology, because it has a firm theoretical foundation and a healthy attitude toward operational considerations. Speaking generally, a species concept can exist without an operational approach to its application, but an operational approach should by necessity be tied to a particular species concept.

Treatment of alternative species concepts, however, has proven conflictive, difficult, and even unpleasant in ornithology (see McKitrick and Zink 1988, Amadon and Short 1992, Zink and McKitrick 1995), which may have led Isler et al. (1998) and Whitney and Alvarez (1998) to develop their contributions without explicit reference to any particular species concept. In fact, whether the criteria of Isler et al. (1998) refer to a biological species approach ("we assume that . . . vocal characters have a role in maintenance of species integrity") or a phylo-

genetic species approach ("vocalizations . . . were analyzed to identify diagnosable vocal characters") is unclear. Short of proposing a new species concept, Isler et al. (1998) may simply have been avoiding the morass of avian alpha taxonomy and its messy interface of species concepts and theory. The tools they have developed would be much more useful and potentially important if placed in a firm context of the species concepts currently under discussion in the field.

The problem is that ornithology has no broad-spectrum view of diversity in the class. The Peters' check-list was assembled over more than 50 years and is highly heterogeneous taxonomically (Bock 1990); the Morony et al. (1975) list is without documentation of synonymies and distributions; and the Sibley and Monroe (1990) compilation is highly uneven from region to region (Peterson and Stotz 1992). Very few geographic areas can count on a broad consideration of bird taxonomy that simultaneously places all species present in a consistent taxonomic context. This fault makes the consideration, comparison, and evaluation of alternative species concepts, or even documentation of patterns of avian biodiversity, extremely difficult.

Theoretical issues aside, the real issues are how many bird species are there, where are they concentrated, which regions are highly unique avifaunistically, and what are the best strategies for conserving them? As the papers by Isler et al. (1998) and Whitney and Alvarez (1998) illustrate vividly, the challenges facing this effort are considerable, breaking down into four main categories: (1) *Basic exploration*—Inventory and study of avifaunas of remote areas are necessary to complete the picture of bird diversity in areas that have not been sampled or studied sufficiently worldwide. (2) *Specimens*—Building the world reference collection for bird diversity is critical, providing the "library" of avian diversity. Because new character suites are continually being recognized and added to systematists' repertoires (e.g. vocalizations, molecular characters, ectoparasites), this reference collection is in need of continual updating and building in both temporal and spatial dimensions. (3) *Alpha systematics*—Significant research efforts in the field of basic description and reevaluation of species taxa of birds are critical to completing the catalog of avian diversity. (4) *Synthesis*—Finally, synthetic studies using this catalog will demonstrate the utility and importance of a consistent and well-documented taxonomy in biodiversity studies.

Progress on these four fronts would provide a significant advance for the understanding of world avian diversity. In sum, the Isler et al. (1998) and Whitney and Alvarez (1998) papers present a provocative illustration of a major challenge for ornithology: documenting completely and consistently the diversity of birds worldwide. Although the approaches espoused and developed are not the final answers, they do provide ideas for future advances. Most important is that these issues are being treated at all, rather than lapsing into the complacency of thinking that bird diversity is already well documented.

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