

### Old Specimens and New Directions: A Comment

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Ricklefs' recent commentary on the value of the museum tradition in ornithology (Auk 97: 206–207) was enlightening, mainly because it illustrated some of the misconceptions held by many modern ecologists. Ricklefs successfully pointed out some innovative ways in which museum collections may be put to use, but his view of museums as little more than playgrounds for ecologists is disturbing.

Reading Ricklefs, one might conclude that systematists have paved the way for ecologists and can now sink gratefully into oblivion while the latter forge onward to solve the remaining mysteries of the ornithological world. The most dangerous aspect of this outlook is that ecologists themselves usually lack a background in systematic zoology, and are therefore unequipped to question the conclusions of systematists regarding the relationships of animals. Systematists can be wrong, just as ecologists can be wrong. Ricklefs' own example of the size-ratios between related species can serve to illustrate the possible repercussions of this problem.

"Hutchinson's ratio" is a frequently used aid in measuring the importance of competition in the structuring of communities: related species are said to differ by a ratio of about 1.3. This Hutchinsonian ratio cannot be properly demonstrated, however, without an accurate understanding of phylogenetic relationships. There are many examples of "taxa" composed of unrelated species or of species that are closely related but not formally recognized as such; how will an ecologist examining "congeners" for evidence of competition be able to recognize when such systematic problems are inherent in his study? An example of this is the genus *Aimophila*, which probably is actually a composite of two genera. There are several other emberizine species that appear to be congeneric with *Aimophila* but that have never been considered as such (pers. obs.). A different sort of problem is presented by the Olive Warbler (*Peucedramus taeniatus*), which hitherto has always been placed with the Parulidae but which has now been shown to be a member of an altogether different family (George 1962, Amer. Mus. Novitates 2103: 1–41; Raikow 1978, Bull. Carnegie Mus. Nat. Hist. No. 7). Anyone studying competition in what are assumed to be natural groups will arrive at mistaken conclusions if the analyses are ultimately based on someone else's faulty systematics.

The work of avian systematists is far from complete. There are still countless problems at all taxonomic levels, and these can be solved only by years of work in a variety of disciplines, including paleontology, osteology, myology, physiology, ethology, biogeography, and ecology. We should not be trapped into the mistaken belief that some of the newer and perhaps more glamorous areas of biology hold the answers to all systematic problems, because no one field contains all the necessary information. There is an acute need for careful workers in all of these areas but particularly in anatomy, which still hides a wealth of information about the phylogenies of birds.

Ricklefs' message seems to be that museum collections can be very useful to ecologists but that systematists have served their purpose and are no longer necessary. I believe that this is untrue. No discipline should be allowed to replace another, as new information from one cannot help but influence the others. It is to be hoped that future generations in all branches of avian biology will permit themselves to benefit from such influence.

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### Response: It's Time for Museums and Biology Departments to Get Back Together

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It is unfortunate that Olson and McKittrick missed the point of my commentary; they have a much stronger ally than they realize in their defense of museum collections and systematic studies as both viable and necessary to ornithology as a whole. By my commentary, I had intended only to illustrate some of the uses of collections to address problems outside the traditional museum disciplines of systematics, biogeography, and evolution. To have said, "The museum tradition in ornithology is dying," may have overstated my own sentiments somewhat; the reactions of Olson and McKittrick are understandable and

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a sign that the museum tradition is in good health. I am impressed by Olson's eloquent and compelling plea for museum science.

However my commentary was received, I did not intend to mean that museums are obsolete and useless but rather that they exert less influence now than in the past on the discipline of ornithology as a whole. I believe that this is regrettable but also that it would be the general consensus of museum curators and certainly of ornithologists generally. The trend may be seen, for example, in the proportion of published papers based primarily on museum collections (in *The Auk*, 29% in 1959, 21% in 1969, 10% in 1979). At the recent A.O.U. meetings in Fort Collins, only 6% of the 204 papers and posters dealt with systematic topics. The Report of the Panel on Ornithological Education [Balda et al. 1978, in Final report of the workshop on a national plan for ornithology (J. R. King and W. J. Bock, Eds.)] revealed that systematics, paleontology, and anatomy together comprised only 25 of the primary research areas of 244 respondents, whereas ecology and ethology accounted for 195 of these. Students appear to take after their professors. Of 893 recent dissertations, 65 dealt with systematics, paleontology, and anatomy, whereas 21% dealt with ecology and ethology.

These data reflect in part the tremendous growth in field and laboratory approaches to ornithological research rather than an absolute decline in museum activities. In fact, systematics, biogeography, and evolution are vigorous fields faced with a wide range of new concepts and questions and armed with remarkable new techniques. Several heated controversies (cladistics vs. phenetics, phyletic gradualism vs. punctuated equilibrium, vicariance vs. nonvicariance in biogeography, allopatric speciation vs. a host of new models, molecular determinism vs. molecular clocks, faunal turnover vs. faunal stasis on islands) reveal the central importance of the historical, geographical, and phylogenetic perspective of the museum-trained individual.

I have two basic concerns over the relationship between museums and the development of academic disciplines more generally. The first is the nature of the museum staff. The Report of the Panel on Systematic Collections held as the highest priority ". . . to ensure that trained systematists are employed as curators of collections." They recognized that museums increasingly are turning to individuals whose primary interests lie outside the collection itself, often in ecology, ethology, or molecular evolution, and that the maintenance and growth of collections are liable to suffer as a result. Olson expresses the same concern in his commentary. This trend away from the pure systematist follows in part upon the decreasing numbers of such individuals and in part upon the desire of many museums to adopt the more "modern" laboratory and field approaches to evolutionary studies. I see merits to both sides of this argument.

The changes that are transforming some museum departments cannot be praised or condemned without considering the relationship of systematics and collections to the development of biology as a whole, which is the second of my concerns. The traditional functions of museums—taxonomy and the study of distribution—were the wellspring of many of the subdisciplines of biology. This is no longer true. On the contrary, the disciplines of genetics, molecular biology, and development are turning their attention to problems in evolution that have not been resolved by traditional approaches. Whether they will succeed or not remains to be seen, but it is only natural that institutions and students both should be drawn by the success that these new approaches have enjoyed.

I do not believe that the integration of phenomenological problems discovered in one discipline and the techniques and concepts that have emerged within another can work unless individuals bridging the gap between them have firm foundations on both sides. For this reason, I generally favor current trends in museum staffing but worry about the decline of systematic and natural history training in our university curricula.

If there is such a problem at this time, it has grown to some degree from the failure of museum people to convince others that their insights are valuable to biology more generally, especially when the converse attitude is making itself strongly felt. Alpha taxonomy is too introspective to capture the general interest of biologists today. The relationships among higher taxa and lessons of the fossil record post many fascinating challenges, but unless systematists and paleontologists persuade ecologists and others that their insights are important to understanding, for example, local and regional patterns of diversity, they will not recruit others to their discipline.

Because I am convinced that present-day ecological systems can be properly interpreted only in the context of their geographical, historical, and evolutionary roots, I believe that ecologists have much to learn from collections and from the perspectives of systematists. I also suspect that this insight will spread through the appropriate subdisciplines of biology, and thereby enlist their support for the museum tradition, only to the extent that ecology, ethology, and evolutionary biology are practiced successfully from within museums. We inherit the great precedents of Grinnell, Chapman, Wetmore, and Mayr, who viewed their specimens as samples of natural populations. It is appropriate and necessary that specimens

also be appreciated as samples of selected complexes of genetic traits, of the expression of epigenetic pathways, and of the interaction between populations in biological communities.

While museums need trained taxonomists to curate their collections, they also need the intellectual support of the biological sciences and the financial support of grant agencies and foundations to accomplish this. Perhaps the current intermediate stage of broadening the research base of the museum is necessary to the eventual strengthening of its traditional roles of providing systematically collected and organized samples of the diversity of life, and of stimulating the training of individuals who will maintain this tradition and apply it intelligently to the challenges posed by all subdisciplines of the natural sciences.