COMMENTARY

Old Specimens and New Directions: the Museum Tradition in Contemporary Ornithology[1]

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The museum tradition in ornithology is dying. The three million or so skins, skeletons, and anatomical specimens in collections in the United States have largely served their intended purpose in the pursuit of taxonomic and biogeographical investigations. New material is being acquired at the lowest rate of this century. Systematics and other museum-related endeavors have been overshadowed by ecology, ethology, and physiology in plowing new ground and attracting students. One cannot deny that important taxonomic problems remain unresolved, particularly at higher levels of classification, or that the distributions of species in many parts of the world are poorly known, or that collections have been and will continue to be useful as historical records in documenting the effects of environmental abuse as they are expressed in range contractions, extinction, and the levels of mercury in feathers. But neither can one deny that the tide has turned and that museum science is ebbing.

However anachronistic and obsolete museum collections may have become, I am dismayed by their waning influence on my generation. The specimens in museums contain information relevant to ecology, behavior, and physiology that is available nowhere else. Perhaps more important, the perspective on diversity and biogeography that can be absorbed only by rummaging through drawer after drawer of skins should not be lost to ecologists. I do not wish to defend museum practices or to advocate expansion of collections. I have never prepared a museum skin nor taken formal training in taxonomy or systematics. But as an ecologist, I urge students especially not to turn their backs on the wellspring of their discipline. Let me make this point here by two examples of the value of bird skins to studies of population and community ecology.

In some species, the plumage of individuals in their first year differs from that of older individuals. It has long been recognized that the ratio of adults to immatures in samples of such species provides an unbiased estimate of annual adult mortality when certain reasonably unrestrictive assumptions are met. This technique has found application only infrequently, notably in F. A. Pitelka's systematic study of jays of the genus *Aphelocoma* and in D. W. Snow's geographical study of demography in the Blue Tit (*Parus caeruleus*). With Susan White, I have examined 10,000 specimens of the genus *Turdus* from the New World, among which first-year birds are distinguished by the juvenal secondary coverts they retain until their first postnuptial molt. The ratios of adults to immatures in these samples indicate that population turnover is greatest in both North and South Temperate regions, intermediate in the lowland tropics, and least in montane localities in the tropics. Although biases are possible in such collections, the relevant plumage trait is too trivial to incur discrimination by shooters, and, where banding data are available for the North American Robin (*Turdus migratorius*), estimates of mortality provided by

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them and by ratios of adults to immatures in collections agree closely. Over and above our demographic analysis, collected juveniles, sets of eggs, and data concerning reproductive condition recorded on labels in some museums enabled us to characterize the annual cycles and patterns of molt of many of the species.

Many ecologists, including myself, have recently become interested in the proposition that morphological measurements obtained from museum specimens may provide estimates of ecological similarity among species. The idea is as old as Darwinism—structure and function are cast in the mold of ecological relationships—but it was given added status when G. E. Hutchinson pointed out that the sizes of individuals of related species, and presumably, therefore, potential competitors, differ by a more-or-less constant factor. The existence and interpretation of this pattern have been debated, but the increasing availability of multivariate statistical techniques has prompted such promising analyses as those of J. Karr and F. C. James, who drew parallels between morphological and ecological traits in birds of the humid tropics and temperate North America, and of M. L. Cody and H. Mooney, who made similar comparisons among birds of Mediterranean shrub habitats.

This is not the proper forum to debate the merits of morphological approaches to the study of annual cycles, population dynamics, and community organization. Indeed, it is too early for ecologists to concur on a prognosis. Whatever success "museum ecology" might enjoy in the future shall derive equally from the tremendous amount of information in collections—orders of magnitude more than the amount accessible in field studies with reasonable effort—and from the mapping of morphological observations onto ecological space. Clearly, the relationship between the two kinds of data must be determined by direct observation in selected situations, for example by comparing banding returns and proportions of immatures in the same populations or by correlating the positions of species in ecological and morphological space. Such studies may turn out to be disappointing, but the effort has not yet been made and the rewards potentially are great.

Beyond the value of museum collections as a resource for ecologists, specimens remain a source of insight and inspiration. One has to be impressed by the examples of taxonomic diversity and geographical variation in every cabinet, as they either suggest novel research problems or add to the context within which one thinks about ecological and evolutionary issues. Furthermore, as ecologists become more sympathetic to the idea that ecological relationships measured within small localities may derive in part from regional and historical phenomena, such traditional museum topics as geographical distribution, routes of dispersal, species formation, and evolutionary history will become more important to their thinking.

Museums do not hold all the answers to contemporary questions in ecology. The value of their collections will depend largely upon the outcome of studies that measure the validity of equating morphological and ecological information. My own experience argues strongly that the maintenance of collections, including the training of students in curatorship and systematics, goes beyond an archival function and should play an active role in the development of other disciplines of ornithology.