**Phylogenetic Systematics as the Basis of Comparative Biology.**—V. A. Funk and D. R. Brooks. 1990. Washington, D.C., Smithsonian Inst. Press. i + 45 pp., 102 text figures. ISBN 0-87474-375-3. $7.95.—Just a few years ago virtually all discussions about the evolution of ecology and behavior took as their theme adaptive change within populations. Little attention was directed toward patterns of historical change among species. This has all changed substantially. In recent years we have witnessed a proliferation of papers using phylogenetic hypotheses as the basis for inferring ecological or behavioral character-state transformations within clades of closely related species or across higher taxa.

This small monograph attempts a broad review of many of the phylogenetic methods that can be applied to the analysis of a wide panoply of questions in comparative biology. Although these methods will be fairly well known to contemporary systematists, evolutionary biologists, especialy those concerned with behavior and ecology, may be unfamiliar with most of them and therefore should find this a useful introduction.

This volume is not a guide to the mechanics of phylogenetic systematics, or cladistics, but rather an argument and demonstration of its use in comparative biology. This is all well and good because there are now numerous books and papers that describe cladistic methods. Instead, Funk and Brooks focus on two aspects of comparing historical pattern, assuming that the relevant phylogenetic relationships have already been determined: (1) assessing the congruence of one cladistic hypothesis with another, and (2) mapping traits of interest on a given cladogram. They briefly discuss consensus analysis, which the investigator uses to compare cladistic patterns shown by two or more phylogenetic hypotheses. The major kinds of consensus trees are described and illustrated. Unfortunately, they equate strict consensus trees—which recognize only those cladistic elements that are shared by all trees in the sample—with "Nelson" trees. This is a common error in the systematic literature, as Page (1989, Cladistics 5: 177) has noted. More significantly, Funk and Brooks spend only the briefest of time with component analysis (G. Nelson and N. Platnick 1981, Systematics and Biogeography: Cladistics and Vicariance, New York, Columbia Univ. Press), which is a powerful method for examining shared patterns among cladograms, particularly those with numerous ambiguous elements. This is especially the case in biogeography, where taxa may be distributed in more than one area, or in host-parasite patterns where parasites may be distributed over different hosts. R. D. M. Page (1989, privately distributed) has released an excellent computer program, Component, that implements component analysis as well as computes various types of consensus trees (for a description, see Page 1988, Syst. Zool. 37: 254).

Most of the authors' attention is paid to the "mapping technique, and they devote the lion's share of space in the methods section to this. Mapping could take one of two forms. The simplest, which is discussed little in this paper, would code character-states for, say, ecological or behavioral characters and then optimize them on a tree that was generated using other data. Once this is done, historical patterns of ecological or behavioral change could then be inferred. A second way of mapping can be applied to comparisons of historical patterns of areas of endemism (area-cladograms) for different clades, or to relationships of hosts relative to those of their parasites. The relationships specified by two or more cladograms can be converted to data matrices using some form of binary or linear coding, pooled, and then analyzed cladistically. Alternatively, the matrix for one cladogram could be optimized on the branching pattern of a second cladogram.

Following this methodological introduction, the reader is taken through discussions of the analysis of historical constraints, hybridization, biogeography, speciation, and historical ecology, the latter including coevolution and ecological and behavioral diversification. The above-mentioned methods are applied using both theoretical and real-world examples. Many of the latter are fairly well known, having been discussed in other publications, but they exemplify the points the authors are trying to make and should therefore be informative for nonsystematists.

Of these topics, biogeography, speciation, and historical ecology receive most of the attention. In searching for commonality in biogeographic patterns across clades, Funk and Brooks first apply Adams and strict consensus trees to the area-relationships implied by two sets of cladistic studies, one for fishes and the other for birds. They also take the cladistic relationships, code them, and then apply parsimony procedures. This exercise is purely descriptive rather than analytical, for the results of the consensus and parsimony analysis are not compared; this is unfortunate because they do not yield the same answer in the case of the complex fish data. It is also too bad that the solutions for the fish data provided by component analysis, which have been discussed extensively in the literature, are not mentioned.

The section on speciation is disappointing. It starts with pure confusion over species. They suggest there are two "common" ways of looking at species, one evolutionary and the other taxonomic. To them, the evolutionary view is equivalent to Wiley's evolutionary species concept in which species are defined as lineages having their own evolutionary tendencies and historical fate. A taxonomic species (p. 25) is a "group of pheneticly [*sic*] distinct individuals but, actually, it can be anything a taxonomist says it is." This caricature of species concepts will surely be perplexing to practicing systematists, especially cladists. Funk and Brooks adopt the evolutionary view of species, but address not at all the obvious problem of its

being nonoperational. The fact is, one must use character analysis to individuate species, and it is not a matter of whim as their statement implies. Systematists have been debating species concepts more and more recently, but none of this ferment is recognized here.

Different modes of speciation (sympatric, allopatric, parapatric) are illustrated with some interesting examples from Andean plants. Their conclusions would have been strengthened, however, if they could have shown that these patterns for individual plant groups do or do not exhibit biogeographic congruence with other groups having endemics in the same areas. Consequently, one cannot make strong inferences about the occurrence of peripatric (peripheral) isolation vs. vicariance of those peripheral isolates without information on congruence.

The study of historical ecology owes much to Brooks' work on host/parasite associations (see especially D. R. Brooks and D. A. McLennan 1991, Phylogeny, Ecology, and Behavior, Chicago, Univ. Chicago Press). So it is not surprising that the section on historical ecology relies heavily on examples from parasite systematics in which host and parasite cladograms are compared by some of the methods already discussed. Perhaps the most conceptually interesting aspect of this section is how cladistic analyses can be used to compare patterns of taxonomic diversification with those of ecological and behavioral diversification. Traditional neo-Darwinism is imbued with a healthy dose of ecological determinism in which ecological change is seen as "driving" evolutionary change. But when one maps ecological change onto cladograms, it is often discovered that speciation events are not always accompanied by ecological innovation. There are a number of methodological issues here, namely whether the investigator is actually recording all possible ecological change. But if this observation is general, then it suggests substantial phylogenetic constraint on ecological evolution and calls the importance of ecological determinism into question.

In summary, this publication is not a critical analysis but an exposition of how cladistic hypotheses can be applied to various problems in comparative (historical) biology. Ecologists and behaviorists will profit from reading it, and it should stimulate their thinking, but before applying these methods to their own work, they should also take a critical and extended look at the relevant primary literature.—JOEL CRACRAFT.

**Annotated Check-list of the Birds of East Africa.**—Lester L. Short, Jennifer F. M. Horne, and Cecilia Muringo-Gichuki. 1990. Los Angeles, California, Proc. Western Found. Vertebrate Zool. Vol. 4(3): 61–246. 26 half-tone habitat photographs, 3 maps. ISSN 0511-7550. $20.00.—This annotated list of the 1,320 species of birds recorded from Kenya, Tanzania, and Uganda offers an up-to-date taxonomic, nomenclatural, and biogeographic perspective on the East African avifauna. The authors consider this checklist to be a tool for the comparative geographic study of continental avifaunas, and I have little doubt that this will be an important reference work for just this kind of research. I have used it already for biogeographic comparisons between African and southern Asian avifaunas, and their checklist served this purpose well.

A brief introduction outlines the authors' taxonomic perspective, delineates protocol for choice of English names (in some cases, new ones are coined), and discusses habitat alteration and conservation priorities. Make no mistake—this is a checklist and not a regional ornithogeography. All but 5 of its 185 pages are devoted to the annotated taxonomic list. The more than 1,300 species accounts that follow are enlivened by photographs of the varied Kenyan habitats that give the reader a fair introduction to the range of environments in East Africa. A detailed line map is presented for each of the three nations included, with provinces and protected areas delineated.

Perhaps its most important contribution is the collation of new viewpoints on the systematics and taxonomy of African and Old World birds. This checklist incorporates the insights provided by the first three volumes of "The Birds of Africa" (C. H. Fry, S. Keith, E. K. Urban, and L. H. Brown 1982–1988, New York, Academic Press), new sequences provided in the as-yet-unpublished revision of the American Museum of Natural History's "Reference List of Birds of the World" (formerly Morony, Bock, and Farrand; revision being authored by Bock and Gulledge), and information contained in the most recently published volumes of Peters' checklist. The authors also consulted and synthesized many papers on African birds that were published in the 1980s. This is not to say the list is a mere compilation, for the authors have made their own choices and decisions, and have deviated from the published view when their own experience supported such action. It should be noted that there is little mention of the work of Sibley and Ahlquist, and the reader is given the impression that the new arrangements and designations suggested by that body of work have not been employed here. In addition, it is apparent that the present work was conducted without consultation with the East African Natural History Society, whose checklist committee is currently preparing a revision of its annotated list of East African birds. It will be interesting to see how the two compare.

This is a reference work that must be on the shelf of any ornithologist interested in the distribution and taxonomy of Afrotropical birds. The more than five pages of citations are a useful source of recent work in these fields, and the commentary provided in the