dation (exploitation) are cornerstones of current theoretical and empirical work in ecology. In his *Annual Review* paper Larkin noted that the world's fisheries provide evidence on a major scale of the effects of removing species from natural communities, "experiments" that for moral or financial reasons no ecologist can perform. Despite the examples of enormous compensatory responses by similar forms or changes in community structure due to exploitation of species, and despite the accessibility of small freshwater systems as sources of relevant data, fisheries biologists have generally ignored the role of interspecific competition.

This book, as was its predecessor, will be a useful reference for investigators concerned with fish. Fish offer many unique opportunities for the study (especially experimental) of ecological processes, and a large literature already exists on the natural history of fish that those of a more theoretical persuasion could mine. For my own part, I hope that this book is not so much a harbinger of the future as a record of the foundations from which a more ecological treatment of the structure of fish communities can emerge. Such a change would prove most profitable in the long run, not only for those interested in basic ecological theory but for those charged with the intelligent management of the world's fisheries as well.

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Migration

The Evolutionary Ecology of Animal Migration. R. R. BAKER. Holmes and Meier, New York, 1978. xxii, 1012 pp., illus. $85.

Migrants include animals as different as the fragile aphids and zooplankton and the massive tuna and blue whale. With migration patterns as varied as the sizes and locomotory capacities of the organisms displaying them, it is hardly surprising that, as Baker indicates in his preface, a diversity of viewpoints and terminologies have arisen among zoologists regarding the phenomenon of migration. Not for almost half a century has anyone attempted a perspective on the entire subject without taxonomic restriction. Such a perspective is what Baker has attempted here.

What we get is a book that runs on for some 922 double-columned pages of text in which it appears that no effort has been spared to increase the length in every way possible. Long explanations of trivial and often anecdotal examples and unnecessarily detailed elementary natural history are found throughout. The illustrations are accompanied by legends that often run to several columns of circuitous explanation. The logic of many of the illustrations escaped me. Some, such as the various photographs of pinnipeds and gorillas, were evidently included simply because of their elegance. There is also (so help me) a photograph of a moving van in the section on human migration. The failure to apply a strict standard of relevance and succinctness has no doubt substantially contributed to the price of the book.

This tome is divided into three parts. The first is an extensive discussion of the definition of migration, with an array of subdefinitions of its various components. Some of these do not follow standard usage, and indeed they include behaviors, such as exploration of a habitat beyond a local familiar area, that most zoologists would regard as having little to do with migration. But since the various definitions and redefinitions are used throughout the book it behooves the reader to learn them at the start. This is a considerable burden and is perhaps too much to ask, especially of students looking for a survey of the field. I found Baker's primary definition of migration as "the act of moving from one spatial unit to another" too broad, especially since it includes what he calls "accidental" migration (migration "due to a failure in the normal station-keeping mechanism of an animal"), on which natural selection is unlikely to act. Some definitions in this section I did find useful, such as the concept of the direction ratio as the percentage of individuals moving in each of the four main sectors of the compass.

Part 2 of the book is Baker's attempt at the development of a migration model. This effort turns out to be a fairly conventional one based on optimality theory, apparently arrived at independently of various other theoreticians using similar concepts. The optimal adaptation model is applied to an array of examples throughout the remainder of the book. The problem is that no unitary theory is likely to hold for all migrants unless it is so general that it becomes essentially unfalsifiable. This is the basis of Lewontin's recent critiques of optimality theory and the uncritical adaptationist view of evolution; these critiques are particularly apt here. A further weakness of Baker's model is its failure to relate migration in any significant way to other aspects of the life histories of the animals concerned. Nor does Baker seem to understand the nature of constraints imposed by genetic and environmental variances and covariances. Where he does venture into life histories, he confuses issues, as is indicated by his obvious misunderstanding of Fisherian reproductive value. He seems not to realize that the use of reproductive value in island biogeography represented a special case of a more general theory; its relation to migration does not represent an "extrapolation" from island-migration to mainland-migration strategies, as he states. Baker further fails to distinguish between within- and among-species variation in fecundity with respect to colonization. Finally, he misrepresents what other authors, including this one, have said with respect to both reproductive value and life history traits.

The final section of the book, running to over 800 pages, is a survey of migration in various groups presented in the context of the optimality model. What is surprising is that although the book bears a 1978 publication date the literature citations virtually cease with 1972. There are some exceptions, but not many, and these seem to be work by friends or associates of the author's. The survey is thus woefully out of date, since the subsequent years have seen a great deal of activity in the study of migration patterns and their life history correlates. A listing of absent investigators would read like a who's who in current migration biology. There are also some odd omissions in the pre-1972 literature cited. David Lack's major papers on radar tracking of birds are cited, but those on the evolution and ecology of migration are not. None of C. J. Krebs's papers on *Microtus* appear, nor is there any reference to Boris Uvarov in the section on insects. Other examples abound. There are some strong sections, such as the one on bats, which suffers less than most from the lack of recent references, and the more dated but still useful one on pinnipeds, where Baker has managed to pull together data from a number of disparate sources into a comprehensive review and summary of the migration patterns of many species. Herpetofauna, however, are barely mentioned. The sections on human movements I found out of place, weak, and unconvincing, especially the thesis that human migrations are adaptations in the evolutionary sense.

Research on migration has been displaying exponential growth in the last few years. Clearly a review and summary of progress and an indication of fruitful new directions would be extremely useful. Regrettably Baker's book, for all its length, is unsatisfactory on both counts.

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