paper first as a nice introduction to the major issues and concepts presented throughout.

The volume does not cover all issues in detail and it was not intended to be comprehensive in scope. Urban or suburban areas, exotic trees and shrubs, and new tools such as Doppler radar in the study of migrant ecology, are important topics that were not addressed in detail. Moreover, a critical analysis of the contributions of lost stopover habitat to long-term trends in abundance would have been informative. Many migratory species are decreasing over much of their range whereas others are not, and some are even increasing. Differences in the migratory behavior and stopover ecology of species that are generally increasing versus those that are decreasing would clarify the conservation importance of stopover habitat and demographic events during migration.

Notwithstanding, I recommend this volume enthusiastically to those interested in avian conservation, behavior, and life histories. The volume is an excellent introduction to the ecology of migrants, the price is right, and the compendium of references (through the mid-1990s) is useful.—JEFFREY D. BRAWN, *Illinois Natural History Survey and Department of Natural Resources and Environmental Sciences, University of Illinois, Champaign, Illinois 61820, USA. j-brawn@uiuc.edu*

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Ecology and Evolution of Darwin's Finches.—Peter R. Grant. 1999. Princeton University Press, Princeton, New Jersey. xx + 492 pp., ISBN 0-691-04866-5, Paper, $22.95; ISBN 0-691-04865-7, Cloth $69.50.—In 1986, Peter Grant brought together the results of the massive research effort he, his research collaborator and spouse, Rosemary, and his students had undertaken over the previous decade on the evolutionary ecology of Darwin's Finches. This new book is a reprint of the 1986 publication (the 16 chapters of the original are unchanged), with a new preface and afterword by the author, and a long list of new references. The Grants and their colleagues have been busy in the 13 years since the publication of the original edition. The 142 new references include 45 in which Peter or Rosemary Grant or both are a co-author!

The quality and quantity of the Grants' work with Darwin's Finches is such that the 1986 book was immediately recognized as a more than worthy successor to David Lack's *Darwin's Finches* (1947). Grant concisely explained the ecology and evolution of that famous group of island birds, on the basis of the many impressive data sets collected by the Grants and their colleagues. Grant has shown how one can study avian evolution in the field, documenting natural selection and the evolutionary response to it. Indeed, his work demonstrating generation-to-generation evolutionary change in bill characters in the medium Ground Finches (*Geospiza fortis*), has made its way into several university-level introductory biology textbooks.

Grant's general premise was that the Galapagos environment is notably harsh and fluctuating and that food is frequently limiting. That resulted in rapid evolution of traits, such as bill characters, that are related to feeding. He put forth likely scenarios for past speciation in that group of birds. He also highlighted the current situation involving interpopulational morphological differences within species, the dynamism of morphological evolution across generations, and provided fascinating instances of hybridization between sympatric species. In reviewing his original text, I can do no better than to refer the reader to the review of the first edition by McGillivray that appeared in *The Auk* in 1988.

All new information in the recent edition is contained in the 24 page afterword. This is a chapter-by-chapter update. Some chapters are essentially unchanged, with a single paragraph noting only a few additional findings. Other chapters include multipage summaries of relevant work published over the past 13 years. Those summaries are very helpful, bringing the reader up to date where necessary, and giving Grant a forum in which he reminds readers of the predictions he made in the first edition that have since been borne out by further research.

Grant singles out two topics for discussion in the afterword. Both of these have been the focus of significant research efforts since the first edition, and both are ripe for further research. The first is the continual refinement of finch phylogenies. Grant notes that the finch phylogeny in the first edition (fig. 72 on p. 259), taken from Yang and Patton (1981) and based on protein polymorphisms, has been superseded by the newer phylogeny by Petren et al. (1999) that is based on microsatellite DNA length variation at 16 loci (reproduced as fig. 103 on p. 424). Although the two phylogenies are broadly similar, the new one has revealed a deep split between two populations of the Warbler Finch (*Certhidea olivacea*), with the conclusion that this species is probably best recognized as two allopatric species, *C. olivacea* and *C. fusca*. As a consequence, there are 15, not 14, extant species of Darwin's Finches.

Grant argues that effort should be focused on further elucidating the phylogeny of Darwin's Finches because important questions about their evolutionary change depend upon the best-hypothesized phylogeny for this group. For example, relating the recent phylogeny to bill characters and diet of extant species presents as most parsimonious the hypoth-

esis that ancestral finches ate arthropods and berries and that granivory evolved later. Clearly, many additional hypotheses about ancestral character states will emerge from carefully constructed phylogenies, and so the direction of evolutionary change will be deciphered. Incidentally, the finch phylogeny has been placed into a new time frame. Recalibration of the allozyme molecular clock shows that finch evolution on the islands has been occurring for at least 1.5 million (and, perhaps, as long as 3 million) years—three to seven times longer than the previous estimate of <500,000 years. Further, the geologic evidence now indicates that the number of islands in the archipelago has increased during the past 3 million years (p. 427), and the number of finch species seems to have increased in parallel.

The second area of interest discussed at length by Grant in the afterword includes some of the recent findings on the paleoecology of the Galapagos archipelago. Grant argues that we need to understand past environments in detail if we expect to understand the past and future evolution of this group of birds. Evolutionary changes and speciation in the finches have been, in Grant's estimation, highly dependent upon past climatic change. In this context, one cannot help but think of the possible negative effect that the increasing frequency of El Niño events might have on the flora and fauna of the Galapagos islands.

I was personally intrigued by the many observations of hybridization among the finches that have been made since the first edition. I recall that many people were initially surprised by the evidence of hybridization, and even more so by Grant's claim that such infrequent hybridization events could be a significant source of genetic variation in finch populations. The Grants have expanded their discussion of avian hybridization (Grant and Grant 1992), providing much-needed evidence that hybridization might be genetically nontrivial in a wide variety of bird species.

Grant ends his afterword with a warning. Loss of biological diversity anywhere on earth is a tragedy, but its loss on the Galapagos would be particularly sad for obvious historical reasons. Unfortunately, the threat is real. Despite efforts at protection, the archipelago's flora and fauna continue to display the vulnerability so characteristic of species on oceanic islands. For example, habitat devastation of the volcanic slopes on Isabela by introduced goats has erased any evidence of possible prior existence of a divergent population of the Sharp-billed Ground Finch (*G. difficilis*) and any influence they may have had on the evolution of the remaining finch species (p. 438). And, what would be the chances of the finches' survival if an avian pathogen, such as avian malaria, was accidentally introduced to the islands?

A small disappointment for me was the reproduction quality of the black-and-white nonglossy photographs, of which there are many. Without exception, each of these (at least in my copy) is noticeably "muddier" than the photograph that appeared in the original book. That may be the result of how the book was produced; I am guessing that the original text, including black-and-white photographs, was simply itself photographed for reproduction, resulting in the loss of resolution in the second edition.

Should readers of *The Auk* buy a copy of this new edition? If one already owns the 1986 book, I see little reason to do so. One might be tempted (after considering any relevant copyright laws!) to photocopy the new preface and, especially, the afterword and new reference list, from a library copy, and shove the photocopied pages in one's own copy of the 1986 book. Obviously, if Grant had decided to incorporate new findings into the text of the original book (a much larger task for him), I'd probably recommend that one purchase the new book. But he did not. This is not meant as a criticism, but simply an observation. Having said that, if one does not have a copy of the original one should, by all means, buy the new edition. And, have the university library buy a copy even if it already has the first edition. One could even argue to molecular-oriented colleagues that this book is a worthwhile read because it does, indeed, have some information about molecules in it, besides all that other "ecology and evolution stuff".—RANDALL BREITWISCH, *Department of Biology, University of Dayton, Dayton, Ohio 45469-2320, USA. breit@notes.udayton.edu*

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Untangling Ecological Complexity: The Macroscopic Perspective.—Brian A. Maurer. 1999. University of Chicago Press, Chicago, Illinois. ix + 251 pp. ISBN 0-226-51132-4. Cloth, $50.00. ISBN 0-226-51133-2. Paper, $18.00.—What patterns exist in com-