and distributed through workshops held either at the university campuses or throughout the states. Teachers who had low budgets and could not afford textbooks welcomed these pamphlets and used them as resources in their classrooms. Besides Comstock and Jackman's publications, other important contributions included *A First Lesson in Natural History* by Elizabeth Carey Agassiz in 1879 and published by the Boston Society of Natural History and Liberty Hyde Bailey's (Cornell University) *The Nature-Study Idea* in 1909.

This book is not a quick read because of the amount of detail presented; however, I found the descriptions to be enjoyable in part once I discovered two interesting points: 1) the efforts of science teacher educators have not changed much in the past 100 years and 2) women played an incredibly important role in developing and promoting science education through nature study. I was surprised to learn that educational issues of 100 years ago are actually quite similar with those of today (creating policy to standardize curricula, exploring ways to make instruction more learner-centered, introducing urban students to rural issues and vice versa, and preparing students for future education through transferable skills). In addition, I had never realized that women were important proponents of progressive science education in the U.S. When we hear the names Agassiz, Comstock, and Dewey, we often think of male scientists; however, Elizabeth Cary Agassiz (the founder of Radcliffe College), Anna Botsford Comstock (professor at Cornell University), and Alice Chipman Dewey (University of Chicago Laboratory School) all played critical roles in our country's educational history. Through nature study some women found new opportunities as environmental educators in informal settings (zoological and botanical parks, summer camps, after-school gardening programs, etc.), outside of the traditional role of school teachers. Kolstedt's in-depth knowledge on the role that women played in promoting nature study is not surprising, considering that her past publications have highlighted the contributions that women scientists have made. That being said, there are probably other insights in this book that readers will find fascinating, based on their own interests.—*Meena M. Balgopal, School of Education, Colorado State University, Fort Collins, Colorado 80525-1588, USA.*

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Effects of Climate Change on Birds. Edited by Anders Pape Møller, Wolfgang Fiedler, and Peter Berthold. 2010. Oxford University Press, New York, USA. 344 pages. $117.00 (hardcover), $62.95 (paperback). ISBN: 978-0199569748 (hardcover), 978-0199569755 (paperback).

Climate scientists from across the globe predict vast changes during the next century in the planet's temperatures, precipitation, storm intensities, fire regimes, hydrologic cycles, and atmospheric, water, and soil chemistries. The changes will be global, but their effects will be felt locally everywhere. To find a scientifically and socially engaging bellwether of these events, we need to look only through the lens of avian biology. Birds are found from pole to pole; their movements connect continents. They are loud, colorful symbols of the changing of the seasons, and the body of work describing how changes to our climate are altering their evolution and ecology is growing nearly as quickly as the changes are occurring.

Anders Møller, Wolfgang Fiedler, and Peter Berthold have put together a compilation of review papers on climate change as seen through that ornithological lens. In a text written for ecological professionals and graduate student study, the authors show the breadth of ways that birds illustrate the implications of climate change for wildlife, lay out numerous needs to improve our predictive abilities, and provide some brief descriptions of the quantitative tools that might be used to answer those needs.

The size of the editors' objective, shown by their lofty title, is herculean if not tantalusian. Certainly, understanding the impact of modern climate change on organisms, avian or otherwise, is of the highest priority for those interested in preserving the planet's biodiversity. There is a deep need for accurate models to predict these impacts in any applied field that deals with the natural world. The problem, the "effects of climate change", is anything but discretely defined as a field of study, however. In point of fact, it might be more tractable to study the aspects of avian biology that *aren't* affected by climate. Climate is the major selective and driving force on nearly every aspect of the collective avian phenotype. Studying the effects of climate change on birds is, and this book agrees, often presented as a discrete investigation. This is likely because the climate change problem represents a

discretely stated challenge to bird conservation. In truth, however, the study of how changes in the environment affect the collective avian phenotype already has a name—a couple in fact—avian ecology and avian evolution.

What the authors attempt to do in the face of these almost limitless possibilities is outline the best-documented mechanistic pathways by which modern changes in climate have altered bird biology. The fields that their chapters touch on are impressively diverse, from migration biology to trophic interactions, from distribution and community ecology to reproductive success and population change, and from a quantitative genetics perspective on adaptation to anticipated changes in the strength and direction of sexual selection.

The topics are so diverse that the book might be used best as a graduate textbook in ornithology, i.e., an applied case study in how to study the ecology and evolution of birds. The book's third section, which outlines some quantitative tools for those interested in studying the effects of climate change (e.g., time-series analyses, mark-recapture methods, quantitative genetics, population modeling, and habitat suitability modeling), could be viewed very successfully as a short, quantitative primer for graduate students starting off in avian ecology or evolution.

I would have liked the editors to have discussed some of the questions that are likely a little more central and specific to climate change biology. How limited are birds by the current speed of global changes relative to those experienced by modern lineages during their evolutionary histories? What is the limit of avian plasticity vs. evolutionary adaptation in the ability of birds to adjust to a different planet? Multiple authors touch on the need to answer these questions, but as B. C. Sheldon writes in Chapter 12, "The primary determinant of what can be studied . . . remains the decisions about what traits would be measured, in what species, and in which locations, taken by biologists and funding bodies decades ago . . . at present it remains an important, if at times frustrating [constraint]" (p. 150).

In the one chapter (Chapter 2: Climate Change) where the authors discuss topics that could not easily be found in an applied text on avian ecology and evolution, the editors miss an opportunity to provide a strong climate-science background for those interested in ornithological research. The chapter struggles to present complex meteorological and climatological patterns to a non-specialist audience, using far too much lingo and assumed knowledge to be helpful to most general avian biologists, and is too frustratingly devoid of citations to be useful for those looking for a central review of the literature most relevant to animal adaptation and conservation.

The broadness of the book overall, combined with the constraints on addressing our current inability to predict future changes precisely, gave me the nagging impression that the book had been written too early, that the field is not yet mature enough for a comprehensive treaty on the effects of climate change on birds. Despite this, the book has the potential to set a place-mark in the field's evolution, as it does a good job of touching on the major developments to date. Further, there is a concerted effort to pair European with North American investigators to at least compare, if not generalize, current patterns, and the editors do not shirk away from letting their authors disagree with each other across the chapters, thereby honestly portraying some of the field's current disputes (e.g., how important are phenological mismatches in determining seasonal fecundity?). The book also is rife with potential effects that remain untested, and as such, it may be one of those treatises that is referred to again and again by investigators as they move the field forward.

Short on conclusions and long on questions and hypotheses, Møller and his colleagues present a book that provides little in the way of definitive answers, but they also provide a solid foundation for understanding the conversation to date—a foundation that may become a pivot point to change the direction of the field and the questions asked by future investigators as we move toward a more predictive science.—*Brian J. Olsen, Climate Change Institute, University of Maine, 5751 Murray Hall, Orono, Maine 04469, USA.*