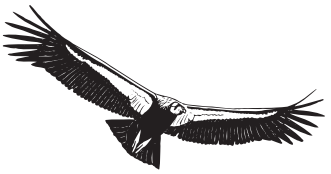

BOOK REVIEWS

The Condor 113(4):924–925

Effects of Climate Change on Birds.—Anders Pape Møller, Wolfgang Fieldler, and Peter Berthold, editors. 2010. Oxford University Press, New York. 321 pp. + 9 color plates. ISBN-978-0-19-956975-5. $117.00 (hard cover).

Certainly timely in light of present climatic trends, this book sets out to assemble useful summaries of the full breadth of climate-change implications for birds in a single volume. It is organized into sections treating the basics of climate, methods for studying climate-change effects, and biological consequences of climate change for birds. Indeed, this breadth is the book's chief virtue—the diversity of overviews of such diverse dimensions of climate-change implications for birds is impressive and highly useful in a single volume, circumventing the tracking down of individual overviews or research articles.

This volume, nonetheless, is irregular and unbalanced in its quality and depth. The climate introduction is thorough, written in terms that are useful and accessible to biologists, yet without sacrificing detail and rigor. The methods chapters, however, are much less comprehensive, being for the most part partial overviews rather than useful summaries of methods that can be applied to questions of climate change. For instance, the chapter on long-term data sets is weak, providing no new climate-change-related insights and being very Europe-centered in its outlook. Moreover, the vast resources held in scientific (museum) collections are undervalued, as are the large-scale efforts underway to organize, integrate, improve, and provide access to these data resources led by VertNet (http://vertnet.org) and the Global Biodiversity Information Facility (http://www.gbif.org). The capture–mark–recapture chapter provides only a very general overview and would have benefited greatly from a simple case study to illustrate its points. The chapters on quantitative genetics, time-series analysis, and population modeling all emphasize general explanations of the methods but fail to bring alive their direct applicability to climate-change questions. The chapter on habitat-suitability modeling (usually referred to as ecological-niche modeling) is comprehensive and more effective, and it makes the tie to climate-change inferences much more clearly, although a conceptual framework identifying the specific distributional areas and niche types being estimated would have made it still more effective. Overall, then, the methods section of the book is largely underdeveloped and not very helpful for those seeking to gain insight into avenues toward deeper understanding of climate change's consequences for birds.

The section on biological consequences, however, is quite a bit more useful. Chapters treat changes in the timing and direction of migration, phenology, and success of breeding, food availability, genetics, sexual selection, populations, interactions with parasites, interactions with predators and prey, range margins, and communities. A final chapter reviews conservation implications. These chapters cover much of the range of potential consequences and present some very effective examples; my particular favorites were the examples in the chapter on food availability. The chapter on sexual selection was daringly speculative yet cast appropriately in the end, thus providing a useful overview of a nascent field.

In summary, this book has both high highs and low lows. The challenge of assembling a book-format summary of such a fast-evolving field is not trivial, and the editors are much to be congratulated for taking up this challenge. The book succeeds in providing an effective overview of the consequences of climate change and the state of knowledge across a suite of quite diverse fields, yet it comes up short in presenting methods effectively and accessibly so as to encourage others to apply them. It is simultaneously more specific and applicable yet less comprehensive and authoritative than the previous major review in the field (T. E. Lovejoy and L. Hannah, eds., 2005, *Climate Change and Biodiversity*, Yale University Press, New Haven, CT). The price is a bit hefty for a relatively slender volume, though I suspect at least that many institutions will choose to purchase it.—A. TOWNSEND PETERSON, Biodiversity Institute, University of Kansas, Lawrence, KS 66045. E-mail: town@ku.edu.

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Feathers, The Evolution of a Natural Miracle.—Thor Hanson. 2011. Basic Books, New York. 336 pp., 65 figures. ISBN- 978-0-465-02013-3. $25.99 (hard cover); ISBN 978-0-465-02346-2 (e-book).

Thor Hanson, a field biologist who is already an award-winning nature writer, has now written a scholarly and enjoyable book for the lay reader on all aspects of feathers. (We have to excuse him for his unfortunate choice of a subtitle—by definition, evolution is natural, but miracles are not—and take it to imply only that feathers are a source of fascination and mystery as well as of historical and scientific interest.) The reason that the book merits review in the *Condor* is that Hanson has worked hard to summarize the science behind our current understanding of the form and function of feathers, their development, and their evolution. He contacted leading researchers and he covered all the aspects of feathers treated by Frank Gill in his authoritative textbook. Here he mixes that summary with interesting accounts of his own field experiences, such as observing feeding vultures in Africa, studying the winter ecology of kinglets in Maine, spotting birds of paradise in Australia, and retrieving a lost murre in his home state of Washington. He also describes various small experiments with birds and adds information from

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sources such as curators of anthropological collections, fly-fishermen, and fashion designers. All this is sprinkled with winsome quotes whose sources range from Shakespeare to Mother Goose.

The fifteen chapters of the main part of the book are divided into five sections: Evolution, Fluff, Flight, Fancy, and Function. In the evolution section, Hanson describes the controversy between Richard Owen and Thomas Huxley over interpretations of the first specimen of *Archaeopteryx* after it arrived in London in the 1860s. He visited the only specimen of *Archaeopteryx* in North America, the one at the Wyoming Dinosaur Center in Thermopolis, Wyoming, and his interpretation of this specimen follows that of its director of excavations, Greg Willson. Similarly, Hanson's account of how feathers grow follows the popular model of Richard Prum, whom Hanson visited at Yale University. Prum believes that his developmental model, according to which down developed before feathers, has been tested because its predictions of stages mesh nicely with the integument of some theropod dinosaurs. To bolster the chapter on dinosaur fossils from the Yixian Formation in northeastern China, Hanson contacted paleontologist Xing Xu at the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing. Xu described the highlights of a series of remarkable theropods discovered since 1990: from the sloth-like *Beipiaosaurus*, with its "dino-fuzz" integument, to the clearly arboreal *Microraptor*, with its modern-type asymmetrical flight feathers on its wings, legs, and even its feet, and most recently *Anchiornis*, the first feathered dinosaur to predate *Archaeopteryx*, if only by 10 million years. Hanson considers himself to be somewhat of a skeptic, so he also contacted ornithologist Alan Feduccia, who is not convinced by Prum's ideas. Feduccia emphasized that airfoils as lightweight and flexible as feathers are most likely to have evolved in an aerodynamic context. Feduccia also thinks that the dinosaurs like *Caudipteryx* and *Microraptor* that have modern-type feathers are not theropods at all but rather misidentified birds.

In the section on fluff, Hanson describes the insulative capacity of down and the magnitude of the down industry worldwide. A companion chapter discusses the complex set of cooling strategies used by birds. The section on fancy describes Alfred Russel Wallace's fascination with birds of paradise and Darwin's concept of sexual selection. It has an interesting account of the ostrich-plume trade before World War I, largely driven by fashion in ladies' hats. With the chapters on flight, Hanson describes Huxley's purported advocacy of the origin of birds from terrestrial dinosaurs, although few paleontologists still agree with John Ostrom that flight originated without any help from gravity. Now Xu suggests that arboreal dinosaurs, as represented by *Microraptor* and *Anchiornis*, took the final step in the origin of flight. Others prefer the model developed by Ken Dial called wing-assisted incline running. Hanson concludes with many others that Feduccia's objections to the theropod origin of birds have been overcome. He agrees with Prum and Xu that the role of future work should be only to add further details to their secure framework about the origin of birds, feathers, and flight.

Perhaps it is too much to expect the science of such a book to go beyond the level of majority opinion. If Hanson had taken an even more critical approach, he would have been able to say that Prum's developmental model has not really been tested with the finding of undivided integumentary appendages in dinosaurs. Confirmation of the predictions of a theory is not a test unless the predictions help discriminate among alternative hypotheses. Lots of incorrect theories make good predictions. Then Hanson could have given at least equal attention to Maderson's rival model of the development of feathers from scales. Maderson views feathers not as hierarchically branched structures but rather as sheets of keratinocytes that are full of holes because of the loss of intercellular adhesivity. Feathers have alpha-keratogenic pulp caps that are lost through preening. Hanson does cite Maderson et al. (Journal of Morphology 270:1166–1208, 2009) in his bibliography, but I could not find any discussion of any of Maderson's important papers. Hanson could also have noted that Thomas Huxley, who is so often incorrectly credited with proposing that birds evolved from bipedal dinosaurs, actually was talking about their similarity to ratites, an obvious case of convergence. Huxley thought that birds were the closest living relatives of dinosaurs, but only because they had a common ancestor. He did not think that *Archaeopteryx* was a "missing link" between birds and dinosaurs, and he did not put birds within Dinosauria (Annals and Magazine of Natural History, 4th series, 2:66–75, 1868; L. M. Witmer in H.-P. Schultze and L. Trueb [eds.], pp. 427–466, *Origins of the Higher Groups of Tetrapods*, Cornell Univ. Press). I don't blame Hanson for not having delved more deeply into this subject. I just wish that ornithologists would evaluate alternative theories on the full weight of their evidence and stop misquoting Huxley. And I do have to disagree with Prum and Xu that the origin of birds, flight, and feathers is a settled issue.—FRANCES C. JAMES, Department of Biological Science, Florida State University, Tallahassee, FL 32306. E-mail: james@bio.fsu.edu.