

## Book Review: *The Origin and Evolution of Birds*

by William E. Davis, Jr.

*The Origin and Evolution of Birds* by Alan Feduccia. 1996. New Haven: Yale University Press. 420 pages with about 500 black-and-white photographs and drawings. \$55 (hardcover).

Just about everyone is familiar with *Archaeopteryx*—the “urvogel” or “original” bird. But discoveries over the past few decades have vastly increased the paleontological evidence relating to the origin and evolution of birds. As often happens with scientific discoveries, this evidence, rather than making possible a unified and widely accepted view of avian evolution, has spawned ongoing controversies and conflicting interpretations. Actually, paleontology has always contained contentious elements—the Marsh/Cope controversies of the late nineteenth century are proverbial—and it appears that avian paleontology is carrying on this tradition. This book is loaded with information on the subject, and Feduccia has done a marvelous job of organizing this information, as well as describing the controversies that differences in methodology have inspired. Moreover, Feduccia articulates his own interpretations cogently.

The book is divided into eight chapters, the first of which, “Feathered Reptiles,” describes the distinctive attributes of birds, particularly their morphological and physiological adaptations for flying, foraging, and perching. Feduccia then describes at length both the various specimens of *Archaeopteryx* from late Jurassic limestones, and the more recently discovered bird fossils from the late Jurassic and early Cretaceous of China. The second chapter, “Descent of Birds,” details the different methodologies employed in attempting to work out evolutionary patterns in birds, especially the newer numerical taxonomic schools, the “Cladists.” This chapter also introduces some jargonesque terminology such as *plesiomorphy*, *synapomorphy*, and *symplesiomorphy* and offers some rather complicated descriptions and arguments. This part of the book is heavy going.

Other chapters deal with the beginning of avian flight, the evolution of flightlessness in birds, the divers and seabirds of the Cretaceous, flamingos, ducks, long-legged waders, birds of prey, and the rise of land birds.

The controversy over whether birds evolved flight from the ground up (running, leaping, and finally flying in evolutionary sequence) or from the top down (the “arboreal” theory with an evolutionary sequence of parachuting, gliding, and finally powered flight) is explored, as is the hot-blooded/cold-blooded dinosaurs controversy. The major controversy over the descent of birds from dinosaurs or from earlier dinosaur ancestors is thoroughly elaborated. Feduccia postulates that most birds, along with the dinosaurs, became extinct at

the end of the Cretaceous, and that an explosive evolutionary radiation of birds occurred in the early Tertiary. Biochemical systematics (e.g., DNA hybridization) is discussed whenever appropriate throughout the text.

The book is profusely illustrated with diagrams, photographs (I particularly like the photographs of fossil birds), pen-and-ink drawings (previously published) by George Miksch Sutton, and half-tone paintings by John P. O'Neill. I found the book fascinating and informative, although much of it consists of analysis and argument about fossil evidence and different techniques in avian systematics, and this rigorous content may not be to everyone's liking. There is enough jargon to cause discomfort, but Feduccia writes well and is even-handed in his arguments, and hence avoids a polemical tone. The book underscores the difficulties in reconstructing evolutionary history when the fossil evidence is sparse and fragmentary, and where evolutionary relations are often masked by convergence (unrelated or distantly related organisms evolving similar features in response to similar selective pressures, as in the case of New World vultures and hawks).

Should you buy this book? It may prove too complex and technical for many people's taste, and a glossary of the many technical terms would have made it more user-friendly. But it is by far the best overview of avian evolution yet produced, an important reference book, and a thoughtful and provocative exposition of what is known about the origin and evolution of birds. If you are interested in dinosaurs, birds, and evolution, you probably should have a copy of this book, even if you view it primarily as a reference source.

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