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Feathered Dinosaurs: The Origin of Birds

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Feathered Dinosaurs: The Origin of Birds.—John Long and Peter Schouten. 2008. Oxford University Press, New York. 205 pp. ISBN 978-0-19-537266-3. $39.95 (cloth).

Feathered Dinosaurs: The Origin of Birds is a lavishly and impressively illustrated book that deals with the impact of the recent discovery of a number of remarkably preserved fossils from Liaoning Province of northeastern China—fossils that display not only the skeletons but uniquely fossilized integumentary structures, including feathers, in some specimens. Most of the book is devoted to Schouten's imaginative and brilliantly colored illustrations, although the early chapters by Long provide context for the illustrations. Chapter 1, "Dinosaurs, Darwin, and Fossils," provides a synopsis of the long and often controversial history of dinosaur paleontology, concluding with a short but concise overview of modern cladistic methods widely used to decipher and interpret evolutionary interrelationships of extinct organisms. Chapters 2–9 are short (1 to 3 pages) descriptions of the (mostly) carnivorous theropod dinosaur groups considered by many paleontologists to not only have had close evolutionary relationships to birds but, by extension, to possibly even have been feathered. The dinosaur groups highlighted include the iconic tyrannosaurs (chapter 2), the fleet-footed ornithomimids (chapter 3), the generally small and agile coelurosaurs (e.g., *Compsognathus*) (chapter 4), the enigmatic therizinosaurs (chapter 5), the bizarre and very birdlike oviraptorosaurs (chapter 6), the dromaeosaurs ("raptors") made famous in "Jurassic Park" (chapter 7), the relatively big-brained troodontids (chapter 8), and last the early true birds (chapter 9). The rest of the book, from page 28 on, is a series of large and colorful illustrations of representative "feathered dinosaurs." Each of Schouten's plates is accompanied a brief "artist's note" explaining his thought process in preparing the illustrations, as well as a succinct paragraph by Long discussing known details about each species.

Over the last decade, widely reported descriptions of "feathered" or "protofeathered" dinosaurs from Early Cretaceous deposits have admittedly invigorated dinosaur researchers and powerfully inspired the public's interest. These unique fossils provide compelling data that will ultimately allow paleontologists to interpret and reevaluate multiple aspects of the evolutionary history of birds and dinosaurs. That said, my impression is that the authors have, in many cases, simply overstated the case for feathers across a broad range of theropod dinosaurs, conjuring plumage on everything from the grand icon of dinosaurian ferocity, *Tyrannosaurus*, to the group of ornithomimid ("bird mimic") dinosaurs for which evidence of feathers is not only lacking but for which examples of well-preserved skin clearly show a naked integument (as for the most basal ornithomimid, *Pelecanimimus*). In reality, among the Chinese fossils, feathers are associated unequivocally with only a handful of species, and the book's assertion that feathers were widespread among other dinosaurian groups and species remains controversial. Having examined first-hand a number of the specimens described in the book, I remain on the fence. While some of the fossils inarguably have feathers (e.g., *Confuciusornis, Microraptor, Caudipteryx*), others are open to interpretation. The simple filamentous integumentary fibers preserved on some of the Chinese fossils (e.g., *Sinosauropteryx*, a meter-long compsognathid, and *Dilong paradoxus*, a primitive tyrranosaurid) bear little resemblance to feathers. The case has been repeatedly made that these so-called "protofeathers" lack distinct feather structure (calamus, rachis, barbs) and are morphologically consistent with the preservation of degraded collagen fibers from a range of extant and fossil vertebrates (Lingham-Soliar 2003, 2007). Despite this, the artist's note for *Sinosauropteryx* states, "the exquisite fossil of this dinosaur leaves no question about the presence of feathers" (p. 83).

As tempting as it is allow one's imagination free rein to guide the reconstructions and draw sweeping conclusions about the relationships between dinosaurs and birds, it is critical for scientists to maintain a healthy skepticism and avoid dogmatic or fanciful interpretations of the data. On the other hand, I'd find the sort of "imagineering" seen in this book more acceptable if it were made clear that there are perspectives other than those of the authors. The authors' comment in the preface that they "make no apologies about using our imaginations to the fullest in presenting what we hope are the most accurate life-like portraits of these exotic bygone creatures" troubles me less than the fact that they fail to reference or clearly mention any interpretation that might tend to conflict with their own.

The specific audience for which this book was written is another conundrum—is it "preaching to the choir" of dinosaur–bird

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adherents? Is it a coffee-table book for the lay reader? Is it aimed at ornithologists? I wasn't able to figure this out. The illustrations are colorful, large, and attractive, though the fact that the prints are interrupted by the seam between two adjacent pages is a bit distracting. The attempt to make nearly all the illustrated dinosaurs unmistakably birdlike is obvious and clearly stated in the figure captions. In some cases the artist festoons the dinosaurs with contour and primary feathers and parrotlike beaks that would leave a novice no doubts regarding a direct relationship leading from theropod to bird (the oviraptorosaurs on pages 123–129 are a prime example). There are several inaccuracies in the text. For example, the authors' description of the fossil of *Pelecanimimus* states that the fossil is "only known from the skull and neck region" (p. 57) when in fact much more of the animal is preserved (it lacks only the hind quarters) and, significantly, pieces of featherless mummified skin are beautifully preserved with the forelimbs and other parts of the body (Perez-Moreno et al. 1994).

Though I enjoyed its look, this fanciful book contains some serious flaws. The notion that birds are the direct descendents of theropod dinosaurs has gained an increasingly powerful foothold within the paleontological community, and while an evolutionary connection is clear, the exact nature of that relationship remains a work in progress. Not everyone working in this field is convinced of the evolutionary linearity from advanced theropod to bird (e.g., see Feduccia et al. 2005, 2007). The fact that the oldest known bird, the Late Jurassic *Archaeopteryx*, predates the Chinese fossils (and all other putative theropods "ancestral to" birds) by tens of millions of years remains a nagging and unresolved problem regardless of claims to the contrary. The direct evidence—the fossils themselves—at best allows a series of snapshots of avian evolution, and while the Chinese specimens are intriguing, the evolutionary history of birds will no doubt be more fully revealed as more fossils see the light of day. Unfortunately, *Feathered Dinosaurs: The Origin of Birds*, lacks sufficient balance and restraint for me to give it a stronger recommendation.—NICHOLAS R. GEIST, Department of Biology, Sonoma State University, Rohnert Park, CA 94928. E-mail: geist@sonoma.edu.

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