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REVIEW

The Princeton Field Guide to Dinosaurs, by Gregory S. Paul. 2010. Princeton University Press, Princeton, New Jersey. ISBN-13 978-0-691-13720-9. $35 hardcover. 320 pages.

Have some dinosaurs hanging around the backyard feeder that you have been unable to identify? Don't know where to find those exotic dinosaurs that you want to add to your dino-watching life list? Would you like to know more about the life history of *Triceratops*? Brimming with line drawings, paintings, and colored sketches, the *Princeton Field Guide to Dinosaurs* might be just the reference you need.

Gregory S. Paul, the field guide's author and illustrator, brings to his work an artist's perspective and attention to detail, and has influenced countless other artists, scientists, and members of the general public. Well known since the 1970s for his depictions of dinosaurs as active, warm-blooded animals and of certain dinosaurs with feathers before the discovery of feathered non-avian dinosaurs, Paul has lent his skills to illustrations in hundreds of scientific papers, books, television programs, and even the movie *Jurassic Park*. He has also authored several popular books and articles on a variety of dinosaurian topics.

A result of seemingly years of research and illustration, the *Princeton Field Guide to Dinosaurs* begins with a nearly 60-page general discussion of dinosaurian paleontology, anatomy, physiology, behavior, evolution, and the origin of birds. The bulk of the book is then devoted to accounts of over 700 species for which adequate skeletal remains exist; the author attempts to summarize what is known and theorized about each species' anatomical characteristics, geological formation and distribution, size, habitat, and habits.

Regarding early avian evolution, Paul hammers home the now widely disseminated theropod-to-bird theory of avian evolution (theropods are a group of bipedal saurischian dinosaurs which includes *Tyrannosaurus rex*). While still a very contentious topic, the avian-origins debate has settled down in recent years. The great deal of evidence available is suggestive of a dinosaurian ancestry: it is now known that some theropods exhibited brooding and nest-building behaviors similar to those of birds and that several possessed feathers. Many researchers now refer to birds and their flying ancestors as avian dinosaurs and all others as non-avian. Though evidence has mounted in favor of the theropod-to-bird theory it is still very difficult to completely reject the opposing basal (non-dinosaurian) archosaur-to-bird theory.

A prominent hypothesis in Paul's treatment of avian evolution is the idea that some dinosaurian taxa were secondarily flightless descendants of the first birds. The author points out that the large sternal plates, uncinate processes (rib struts that strengthen the rib cage), stiffened tails, and other adaptations to flight seen in birds are also present in most deinonychosaurs, a group of theropods that includes *Oviraptor*, *Troodont*, and the legendary *Velociraptor*. The author posits that due to the presence of these traits, this group may have evolved from a group of *Archaeopteryx*-like proto-birds which had the ability to fly. Deinonychosaurs, the author argues, became earthbound once more after a few millennia and to become a successful dinosaurian group. This is not the first time this idea has been disseminated (see Paul's *Dinosaurs of the Air*, 2002, for a thorough treatise of the subject), but it is certainly not very well known. Flightlessness has evolved countless times in birds (e.g., ratites, penguins, auks, Dodo), so the theory is plausible, however the theory remains largely unsupported by the fossil record.

A variety of other recent discoveries and conjectures have also been incorporated into the book. The plumage coloration for *Anchiornis huxleyi*, (gray or black with white

bands on arm and leg feathers and a reddish-brown crest) was determined last year through scanning electron microscopy and is sketched in colored pencil. A new (and slightly controversial) hypothesis based on study of ceratopsian skulls considers *Torosaurus* and *Nedoceratops* to be growth stages of *Triceratops horridus*, and is illustrated through a series of white-on-black skeletal reconstructions.

While a field guide to dinosaurs is a fascinatingly and wonderfully great concept, this text's formatting did not meet my expectations. Compared to many field guides of extant avian dinosaurs, sections of Paul's work are jumbled, intermediate taxonomic ranks are difficult to find, and it is often difficult to match illustrations with their corresponding species descriptions. Since the Linnaean system of classification breaks down when describing interrelated groups over hundreds of millions of years, some system could have been established in the text to make the classification more manageable. A few errors throughout the book, such as inaccurate citations of the pages on which illustrations are found, and the crowded feel of the text, lead one to believe that it was rushed to the printer or was constrained by a page limit.

Most of the illustrations are exquisite prints of paintings or highly detailed black-and-white skeletal figures, but others are not of a quality one would expect from the author/illustrator. The guide includes colored pencil sketches and many of these have been blown up to a size resulting in low-resolution images.

The target audience for this piece is hard to place. The field guide is slightly too technical and hard to follow for the average lay person and a little too simplified for all but the most amateur of paleontologists. I believe that it is intended for use by those members of the general public with a budding interest in dinosaurs. The guide's illustrations are a wonderful addition to one's understanding of dinosaurs, but I do not recommend the *Princeton Field Guide to Dinosaurs* as an introduction to dinosaur diversity simply because the supporting information is so difficult to follow.

While no other book provides detailed species level accounts of this many dinosaurs, there are several other excellent dinosaur books on the market. *Dinosaurs: The Most Complete, Up-to-Date Encyclopedia for Dinosaur Lovers of All Ages* by Thomas R. Holtz, Jr., with illustrations by Luis V. Rey, is slightly older (it came out in 2007), but it is very well organized and illustrated. *Dinosaurs* is decidedly written for a general audience and I found it to be more accessible than the *Princeton Field Guide to Dinosaurs*.

Despite some flaws, the *Princeton Field Guide to Dinosaurs* is a great book and is still one of the most comprehensive pieces of dinosaur literature available to general audiences in recent memory. For only $35, the work is of great value. I recommend a read of the *Princeton Field Guide to Dinosaurs* to anyone who has a passion for non-avian dinosaurs and the budding paleontologist in your family.

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