



## BOOK REVIEWS

### PREFACE

The current volume of the Journal of Paleontological Techniques is the first number of a new, yearly series dedicated to the publication of book reviews. We aim to publish reviews every year in February or March, of books that were published the year before, and which cover any aspect related to paleontology.

Deadline for the submissions will be December 15, but proposals will have to be discussed with the editors beforehand, in order to avoid duplicate reviews on the same books. We also invite publishers to notify us about upcoming books, which we will be happy to advertise among our readers and followers on social media.

The current volume includes three book reviews by Christine Böhmer, Femke Holwerda, and Emanuel Tschopp. The discussed books are about prehistoric mammals, dinosaurs, and the study of species in a paleontological context.

### PREFÁCIO [in Portuguese]

O presente volume do Journal of Paleontological Techniques representa o primeiro número de uma série dedicada à publicação de resenhas críticas de livros. Teremos como objectivo a publicação anual de resenhas críticas em Fevereiro ou Março de livros que foram publicados no ano precedente e que cubram aspectos relacionados com paleontologia.

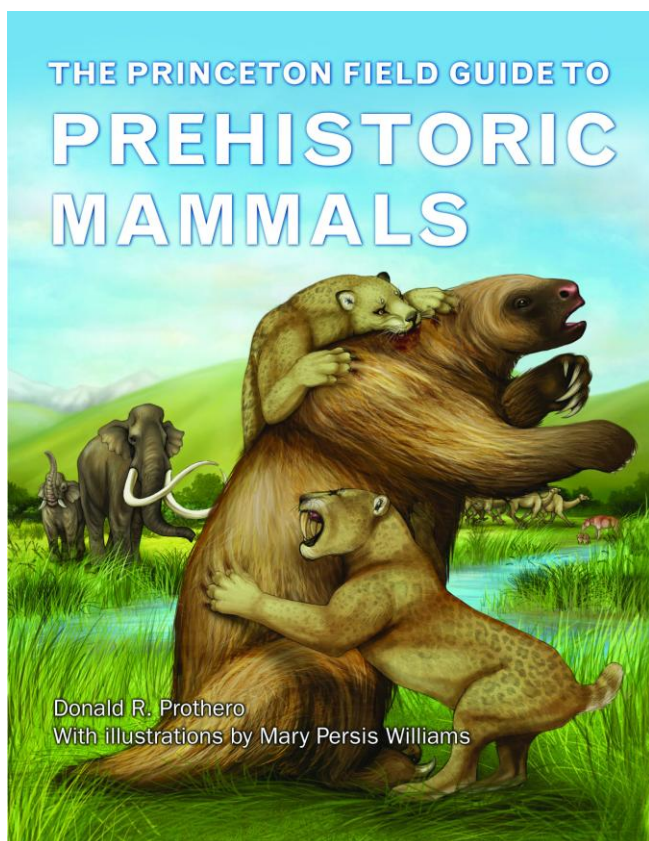
As submissões devem ser enviadas até 15 de Dezembro. No entanto, quaisquer propostas devem ser discutidas com os editores antecipadamente de forma a evitar duplicação de trabalhos sobre as mesmas obras. Gostaríamos de convidar as editoras para que nos notifiquem sobre os livros que serão publicados para que possamos divulgá-los junto dos nossos leitores e seguidores nas redes sociais.

O presente volume inclui três resenhas críticas escritas por Christine Böhmer, Femke Holwerda, e Emanuel Tschopp. Os livros agora revistos debruçam-se sobre mamíferos pré-históricos, dinossauros e sobre o estudo das espécies em contexto paleontológico.



**THE PRINCETON FIELD GUIDE TO PREHISTORIC MAMMALS**

**Donald R. Prothero. 2016.** Princeton University Press. 240 pp. With illustrations by Mary Persis Williams. Hardcover. \$35.00. ISBN: 9780691156828. eBook ISBN: 9781400884452.



Courtesy of Princeton University Press

As the descendants of tiny, insectivorous and furry beasts, mammals have diversified to occupy many ecological niches and have undergone striking anatomical evolution during their 200 million year history. There are today about 5,500 different mammalian species living all over the world. Yet, the fossil record of mammals documents the existence of an even greater variety of forms in the past. *The Princeton Field Guide to Prehistoric Mammals* is an illustrated book describing hundreds of extinct species and complements the existing series of Princeton Field Guides.

The book comprises 18 chapters, including an introductory section on the age of mammals (chapter 1) and their evolutionary origin (chapter 2), followed by several sections arranged according to the main mammalian groups (chapter 2 to 17) and a final section on the evolution and extinction of mammals (chapter 18). Two and a half pages of further reading principally indicate other books dealing

with evolution of mammals and to a lesser extent publications in scientific journals. The index is informative and includes phonetic pronunciations of scientific names.

The first chapter provides a coherent and concise explanation of paleontological basics, such as stratigraphy, taxonomic nomenclature and basic anatomy, which facilitates the comprehension of the subsequent sections. After discussion of the origin and early evolution of mammals, the main taxonomic groups are presented and the most important representatives are described with reference to key fossils. On the first page of every chapter, a figure and/or a phylogenetic tree illustrates the spectrum of extinct animals of the respective mammalian group. The information given for each group includes characteristic anatomical features, important evolutionary adaptations and chronological details (stratigraphic occurrence). The last chapter addresses fundamental questions with regard to the complex causes of diversification and extinction of mammals focusing on mammalian body size, the relationship between dinosaurs and mammals as well as a brief notion on the future of mammals in present age. Overall, the book brings together up-to-date information on recent research results (e.g. contrasting an "old, linear view" of horse evolution against a "new, complex view"), and also considers topics that are yet to be resolved, for example the vanishing of multituberculates at the end of the Eocene.

The structure of the text and the choice of information depicted in the figures make the book readable and highly informative. Descriptive analogies used to explain principles, for example in geology, are entertaining and informative and would therefore be appealing to both professional paleontologists and undergraduate students, as well as the general public. The excellent illustrations supplement the reconstruction of extinct animals without exaggerating current knowledge. The vast majority of photographs in the book are high-quality, with a few exceptions. Two such examples are a blurred photograph (Figure 17.5), and a Figure (1.8) that intends to describe a typical artiodactyl skull but is in fact a pathological specimen, which detracts from that purpose. The figure credits are indicated at the end of the book in a separate section. Instead of listing the figures in numerical order, the credits are sorted in alphabetic order by name of the copyright holder. In my opinion, this is unfortunate because it makes it very

time-consuming to identify the copyright holder of a specific picture.

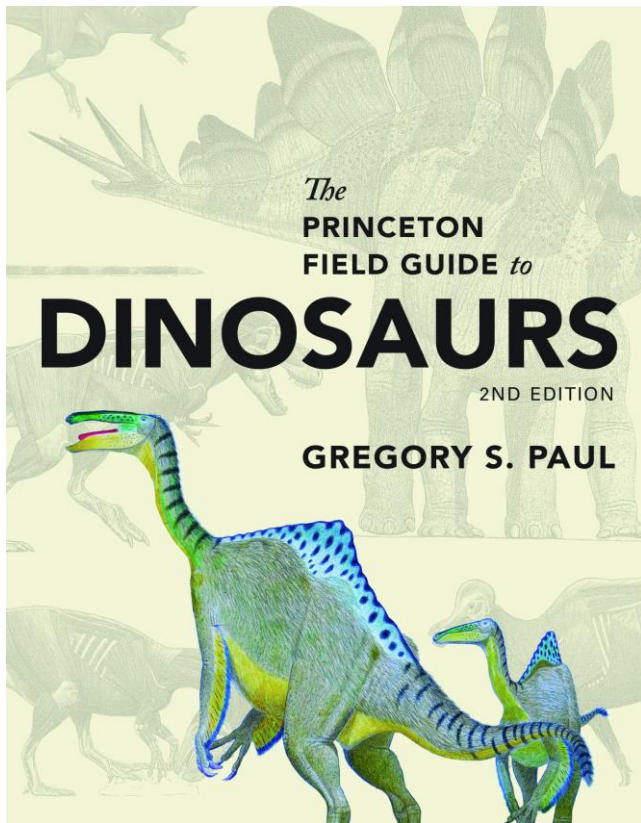
In summary, I highly recommend this comprehensive and well-illustrated book to non-professionals with proficiency in paleontology and undergraduate students who are interested in the evolutionary history of mammals. Furthermore, the book may be a handy guide for professional paleontologists involved in teaching.

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**THE PRINCETON FIELD GUIDE TO DINOSAURS – 2<sup>ND</sup> EDITION**

**Gregory S. Paul. 2016.** Princeton University Press. 360 pp. With illustrations. Hardcover. \$35.00.  
ISBN: 9780691167664.



Courtesy of Princeton University Press

With new dinosaur species popping up rapidly, it's hard to keep up with who's who. The updated Princeton Field Guide to Dinosaurs introduces a 360 page long, colorfully illustrated reference work for dinosaur paleontology.

This lavishly illustrated, second edition of G.S. Paul's field guide to dinosaurs starts with a thorough and very thoughtful introduction, not only on dinosaurs, but also on paleontology in general. This volume begins with an introduction into the history of dinosaur paleontology as a science, which underwent an evolution in itself, from the first fossil fever to current research. After this, the concept 'dinosaur' is explored; what is a dinosaur exactly, and how did dinosauriforms evolve to become dinosaurs? When did dinosaurs live and how did they diversify? What are the main dinosaur groups? Here, Paul also spends quite some time explaining the taxonomical definition and evolution of Dinosauria, which is a good

read for those who need to become acquainted with these concepts.

Next, dinosaur biology and physiology is explored with examples of very recent research, amongst others the gigantism in sauropods, skin and feather colors in theropods, biomechanics of the dinosaur skeleton; translated into movement, and dinosaur reproductive biology.

The introduction ends with Mollweide (world) maps of the Mesozoic world from the Triassic to the Cretaceous period, and finally with short notes on how paleontologists excavate and prepare fossils.

Then, the main section of the book takes off, as a wonderfully illustrated, comprehensive guide, showing dinosaur taxon by taxon. Paul starts with theropods, works his way to sauropods, and ends with ornithischians. Even some of the more 'obscure' taxa are mentioned, and Paul does his best to say something noteworthy on each.

Here, however, is where some paleontologists might scratch their head. Some 'facts' are in fact speculations. Moreover, Paul tends to lump many taxa together in clades that phylogenetically have nothing to do with each other (see for instance, the whole '*Plateosaurus*' group, including the European *Plateosaurus*, but also the Argentine *Adeopapposaurus*, and the Chinese *Lufengosaurus*). Paleontologists with phylogenetic training may not agree with this type of line-ups, as G.S. Paul seems to use his own ideas on dinosaur taxonomy, rather than consulting current phylogenetic consensus.

The book ends with some additional reading, and an index for all taxa and formations used in this book.

The Princeton Field Guide to Dinosaurs is an enjoyable read, and is valuable for beginning dinosaur enthusiasts and undergraduate students, especially because of the extensive introduction for the topic. It can also be a handy reference work for paleontologists, (though perhaps not for phylogenetic research), and the illustrations are definitely a huge bonus.

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**SPECIES + SPECIATION IN THE FOSSIL RECORD**

**Edited by Warren D. Allmon and Margaret M. Yacobucci. 2016.** The University of Chicago Press. 384 pp. With Illustrations & tables. Cloth or eBook. \$65.00. ISBN: 9780226377445.

SPECIES +  
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IN THE FOSSIL  
RECORD

EDITED BY

WARREN D. ALLMON +

MARGARET M. YACOBUCCI

Courtesy of University of Chicago Press

"Species are the material basis upon which all paleontological studies of biodiversity must be grounded". This is how Schweitzer and Feldmann start their chapter in "Species + Speciation in the Fossil Record", and it summarizes the intentions of the entire book very well. What are species in paleontology? Do we all use the same species concept? And are these "paleospecies" comparable to biological species?

The so-called "species problem" has been discussed in evolutionary biology and paleontology since the 1930s. Much has been written in the past concerning species concepts, and the inapplicability of the biological concepts based on reproductive isolation to paleontological data. Finding a way to define paleospecies such that they represent

biological units as is the case (at least in theory) in extant species, is indeed crucial for any kind of biodiversity study, especially if we want to put today's diversity and extinction rates into a Deep Time context. The book "Species + Speciation in the Fossil Record", edited by Warren D. Allmon and Margaret M. Yacobucci, shows that this discussion started in the 1930s is far from being resolved, but also highlights important steps taken in the right direction.

The book is a collection of articles analyzing the concept and use of species through time and across taxa. It starts with a review of the "Modern Synthesis" by Sepkoski (chapter 1), explaining the beginnings of Paleobiology and Evolutionary Biology as scientific disciplines, and how they tried to interact with each other. Miller (chapter 2) and Allmon (chapter 3) then explore the history of the various proposed species concepts, and how best to apply them to paleontology, making a strong case for the use of the General Lineage Concept originally proposed by de Queiroz (1998). Next, Allmon and Sampson (chapter 4) discuss the process of speciation, suggesting that it can be divided into four distinct stages (their "stages of speciation (SOS) framework"): 1) formation of isolated populations (or "incipient species"), 2) persistence of these isolates, 3) isolate differentiation (leading to "neospecies"), and 4) species persistence (resulting in "established species"). At any of these stages, both extrinsic and intrinsic factors can interrupt speciation, potentially producing different patterns that might be observable in the fossil record. Hageman (chapter 5) proposes a way to compare morphological and molecular distances, and Liow and Ergon (chapter 6) adapt a speciation model used in extant biology to paleontology.

The second half of the book is dedicated to more specific case studies, where the authors analyze how species are identified and how speciation can be studied in corals (Budd and Pandolfi, chapter 7), ammonoids (Yacobucci, chapter 8), decapods (Schweitzer and Feldmann, chapter 9), echinoderms (Ausich, chapter 10), fishes (Bemis, chapter 11), and a number of other vertebrates (Prothero et al., chapter 14). Finally, Stigall (chapter 12) reviews the impact of invasive species on speciation rates in general, and Hopkins and Ligard (chapter 13) check if there is any correlation of the recognition of characters as taxonomically useful and their evolutionary mode.

Being a series of scientific papers, this book is not an easy read, and it is clearly addressed to experienced paleontologists. However, especially the first part with the more methodological chapters is a great source of inspiration for studying species in the fossil record. I particularly acknowledge the very extensive references in all chapters, and the proposal of the SOS framework by Allmon and Sampson. The second part of the book, on the other hand, provides a number of examples showing that even though the fossil record is incomplete, we are at a point, in which we can study species and speciation. The often suggested use of genera instead of species for paleodiversity studies should therefore be challenged, and we as paleontologists should be more confident in being able to contribute

significant data to evolutionary biology. I therefore highly recommend this book to anybody interested in the study of species and speciation.

### References

**de Queiroz, K. 1998.** The general lineage concept of species, species criteria, and the process of speciation; pp. 57–75 in D. J. Howard and S. H. Berlocher (eds.), *Endless Forms: Species and Speciation*. Oxford University Press, Oxford, UK.

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Additional images and material can be downloaded at <http://www.jpaleontologicaltechniques.org/>