



## BOOK REVIEWS

### PREFACE

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

Deadline for the submissions is generally in mid-January, 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 four book reviews by Abagael R. West, William E. H. Harcourt-Smith, Tom Trapman, and Lukardis C. M. Wencker. The discussed books are about the evolution of horses, humans, invertebrate paleontology, and curators of natural history collections.

### PREFÁCIO [in Portuguese]

O volume corrente do Journal of Paleontological Techniques é o segundo número de quatro séries anuais dedicadas à publicação de revisões de livros. Publicamos revisões todos os anos em Fevereiro ou Março, de livros que foram publicados no ano anterior e que digam respeito a qualquer aspecto relacionado com a Paleontologia ou com a História Natural em geral.

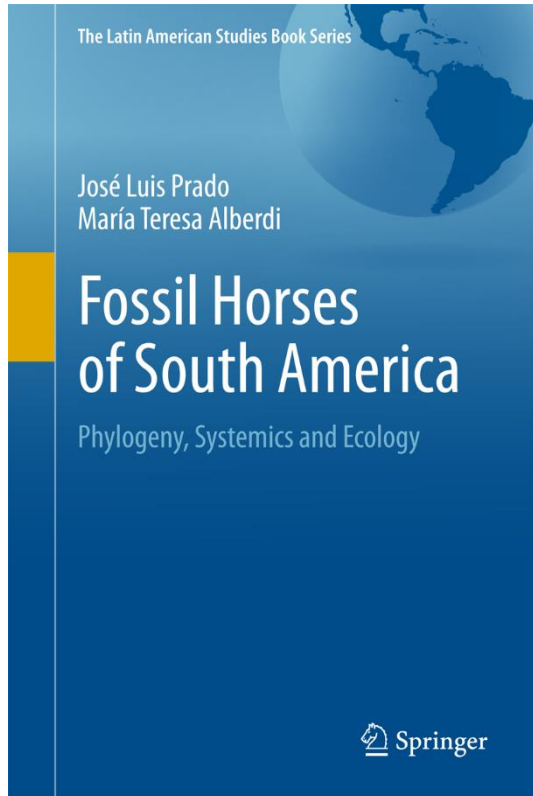
O prazo para submissões é, geralmente, meados de Janeiro, mas as propostas têm de ser discutidas com os editores previamente, de modo a evitar revisões duplicadas dos mesmos livros. Convidamos igualmente as editoras a notificar-nos sobre livros que serão publicados em breve, os quais teremos muito prazer em publicitar entre os nossos leitores e seguidores nas redes sociais.

Este volume inclui quatro revisões de livros feitas por Abagael R. West, William E. H. Harcourt-Smith, Tom Trapman e Lukardis C. M. Wencker. Os livros discutidos visam a evolução dos cavalos, a Paleontologia de Invertebrados e os curadores de colecções de História Natural.



**FOSSIL HORSES OF SOUTH AMERICA:  
PHYLOGENY, SYSTEMATICS, AND ECOLOGY**

**José L. Prado and María T. Alberdi. 2017.**  
Springer. 150 pp. With illustrations. Hardcover.  
\$109.00.  
ISBN: 9783319558769.  
eBook ISBN: 9783319558776.



Courtesy of Springer

Authored by two accomplished paleontologists with expertise in equids, this volume had the potential to be a transformative contribution. It falls short, primarily because it overreaches: I'd have rather read a couple of really brilliant papers reviewing applications of the South American equid record to stable isotope paleoecology and Quaternary megafaunal extinctions. Chapters 3, 6, and 7 are excellent and up-to-date. It is probably worth reading this volume for those three.

Chapter 1 introduces "horses" via a brief summation of their present diversity and distribution, and abundance in the fossil record, as a good system for macroevolutionary studies. It also touches on the natural and cultural history of horses from cave paintings through their historical importance as status symbols and in mythology. The chapter concludes with a return to the fossil record in South America, and

the description by Charles Darwin of fossil taxa that led to the realization that horses had previously inhabited the new world ahead of their (re)introduction by Europeans.

Chapter 2 leaps into the taxonomy of South American equids, revising *Hippidion*, *Amerhippus*, and *Equus*. This is a thorough compilation of taxonomic studies using different methods: geometric morphometrics, bivariate and multivariate discriminant analyses of dental and limb bone measurements, and concludes with a brief summation of comparative morphology between *Hippidion* and *Equus*, which includes hypsodonty and gracility (=cursoriality?) indices and body mass estimates. A section titled "data set" lays out the materials studied, and also contains a short reminder that the Plio/Pleistocene biochronology of South America remains stubbornly difficult to time-calibrate, and that stratigraphic control on museum specimens collected long ago is generally poor. The Pleistocene fossil record in South America is very good, particularly in Patagonia. This actually probably contributes to the confusion regarding biochronologic calibrations; the more sites there are of the same putative biochronologic unit, the harder it is to reconcile temporal data and its margins of error between them all (not to mention, the question of biochron diachroneity across spatial scales, particularly as climatic zones in South America differentiated rapidly starting in the Oligocene; this facet is addressed in later chapters).

The chapter concludes with a revised systematic paleontology and differential diagnosis of the treated taxa. Emphasis is placed on the discarding of the "subgenus" *Amerhippus*, as its morphological basis is observably plastic. Is it helpful to have a textbook reference explicitly for this? *Amerhippus* is barely used in any capacity beyond the parenthetical; and subgenera are functionally meaningless in vertebrate paleontology anyway. Perhaps this is the final nail in that coffin.

Chapter 3 is a useful review of the major natural history collections housing South American equid fossils. It includes some material that doesn't seem pertinent, such as a photograph of the front door of Museo de La Plata and a map of the voyage of the Beagle. However—this kind of synthesis of the availability of material at different institutions is really useful if you are planning a collections visit, and it would be

helpful if more of its kind for various taxonomic groups existed as a reference for students and other researchers.

Chapter 4 is a review of historical and contemporary phylogenetic hypotheses for the relation of South American taxa to the rest of Equidae. Even though this is a new book, it seems a bit dated in terms of which studies they include. Historical context is good, but 80% of the chapter discusses works from before the adoption of systematic phylogenetics. Minimally, this textbook's major focus isn't systematics.

A section is devoted to discussing ancient DNA findings about Equids, and that is a nice synthesis of the available information as of 2015. A somewhat confusingly organized paragraph or two are also devoted to describing a diversification-rate shift study (Cantalapiedra et al., 2016; 2017) but its actual outcomes are barely touched on, and the concern articulated in chapter 2 ("data set") regarding biostratigraphic and chronologic control is not readdressed.

Chapter 5, as with the previous chapters, seems somewhat dated—biogeographic inferences in it are anchored by decades old systematic hypotheses (e. g. Prado and Alberdi, 1996; Hulbert and MacFadden, 1991). If you were looking for a really helpful introduction to equid phylogeny and historical biogeography, even restricted to South America, look elsewhere.

This volume really shines in the latter chapters: chapter 6, feeding ecology and niche differentiation, and chapter 7, Quaternary extinctions. Clearly this is the area in which the authors most excel. Studies and datasets synthesized in these chapters are more up-to-date than in earlier sections; the chapters are also better organized and follow a consistent flow through materials and methods to conclusions and interpretations. The relevance

of these methods and isotopic systems (carbon and oxygen) to the equid fossil record is undeniable; indeed, the utility of most horse fossil material for phylogenetic systematics is minimal in comparison to its paleoclimatic and biogeographic potential. I would recommend chapter 6 of this volume, in particular, as a good reference for stable isotopic methods in paleoecology and niche differentiation studies.

Chapter 7 contains a nice modern synthesis of palynological, archaeological, radiocarbon, and geologic data surrounding the Quaternary megafaunal extinctions in South America, again citing modern datasets and models and putting them clearly in context of the equid fossil record. The appendices of this volume pertain to the final two chapters and are particularly valuable, containing an exhaustive list of localities in South America yielding horse fossils and an up-to-date table of available stable isotope data from the literature.

I would recommend this volume as a good introduction to certain facets of the South American equid fossil record, its diversity and paleoecology, and its availability for study in various museums (this last, a nice novel element absent from similar volumes). Chapters 2, 4, and 5 are of minimal novelty and serve basically as background context. If you are studying stable isotopes in paleoecology, chapter 6 is useful beyond just South America and beyond just horses, containing a concise and logical review of modern methods and studies. If you are interested in the Quaternary megafaunal extinctions, chapter 7 is a good place to start, with its compilation of modern geographic and radiocarbon data and its clear explanation of methods and questions.

Abagael R. West

Carnegie Museum of Natural History  
Pittsburgh, USA

**CURATORS - BEHIND THE SCENES OF NATURAL HISTORY MUSEUMS**

**Lance Grande. 2017.** University of Chicago Press. 432 pp. Cloth. \$35.00.  
ISBN: 9780226192758.  
eBook ISBN: 9780226389431.



Courtesy of University of Chicago Press.

The profession of curator of a natural history museum has changed and adapted to the needs of society over time. Recently, however, museums and their research are becoming increasingly confronted with a growing distrust in science. In *Curators - Behind the Scenes of Natural History Museums*, Lance Grande guides the reader through the different aspects of life as a curator, based on his own story, mostly focusing on the curator as the “museum’s primary scientist”. The author himself is a well-recognized paleontologist, a curatorial scientist and former Senior Vice President of the Field Museum in Chicago.

The book is divided into a preface, fourteen chapters, acknowledgments, a section with notes, added commentary, references and figure credits, and an index. Small collections of pictures that illustrate the previous chapter and introduce the next, provide small breaks for the reader. Grande starts his journey at the very beginning of natural history museums, with Princess Ennigaldi of Babylonia as the initial curator in 530 BC, followed by the development of

natural history museums from cabinets of curiosities to “libraries of life”. Subsequently, the reader is introduced to Lance Grande’s early life and his childhood fascination for nature. As a business student the gift of a *Knightia eocaena*, a fish fossil, encouraged him to change direction and soon set him on the path to become a paleontologist and finally a curator at the Field Museum in Chicago. The author explains his experiences with, and of, curatorial colleagues such as Willy Bemis. He moreover shows the administrative and exhibition planning background to such events as the lawsuit, selling and mounting of SUE the *T. rex*. Grande brings up past and recent problems curators and natural history museums have faced, while explaining how some of them could be solved. He points out that ethically correct collections and the conservation of ecosystems should be the focus of natural history museums. Eventually, the author describes the current difficulties that challenge natural history museums, and again provides possible approaches to solve these. In order to address internal issues of ever-growing collections and the need for special storage, he suggests forming alliances between several institutions. Concerning the big external issue of distrust in science and scientific illiteracy, Grande’s approach is to increase the involvement of the public, i.e. to nurture or awaken its curiosity for the natural world around us. He is hoping for “the world never [to] run out of passionately curious people with extraordinary aspirations.” At the end of the book, individual parts with comments, notes, and references exist for every chapter. These are interesting stories in themselves. The chronological order of the comments and notes makes it easy to find all the information when needed.

*Curators* is an enjoyable and easy read. The passion Lance Grande has for paleontology and his job as a curator is palpable on every page. As the author points out, the book is more an emotional autobiography rather than a scientific book. Therefore, I recommend this book to every person interested in natural history, irrespective of their profession. It is a fascinating travel through time, which demonstrates the importance of respectful communication and networking within and beyond the scientific sector.

Lukardis C. M. Wencker

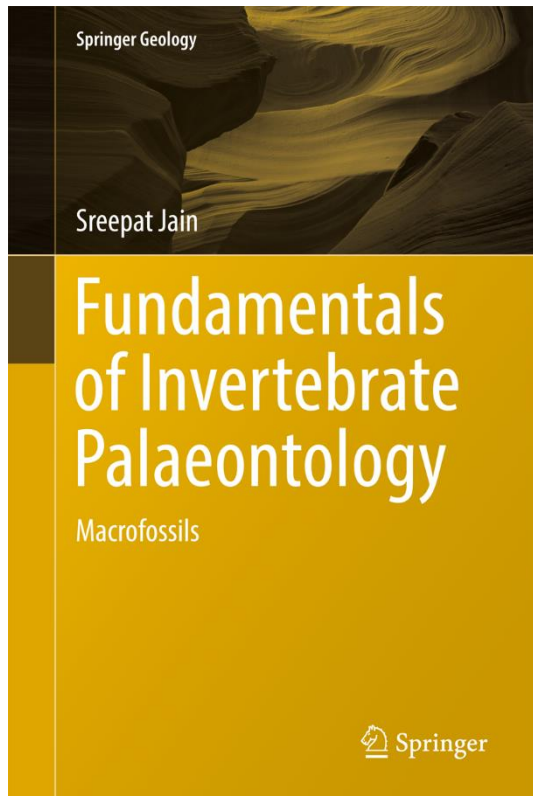
Dipartimento di Scienze della Terra  
Università degli Studi di Torino  
Turin, Italy

## **FUNDAMENTALS OF INVERTEBRATE PALAEOLOGY - MACROFOSSILS**

**Sreepat Jain. 2017.** Springer. 405 pp. Hardcover. \$119.00.

ISBN: 9788132236566.

eBook ISBN: 9788132236580.



Courtesy of Springer.

With “Fundamental of Invertebrate Palaeontology – Macrofossils” Jain attempts to acquaint paleontologists and paleobiologists to the morphological study of invertebrate macrofossils.

A short opening chapter refamiliarizes the reader with the concept of geological time, and briefly introduces the major clades of invertebrates discussed in the book: sponges, cephalopods, bivalves, trilobites, echinoderms, graptolites, brachiopods, gastropods, and corals. Although the introductory chapter is certainly concise, it lacks an explicit outline of the concepts of invertebrate paleontology and fails to emphasize the importance and versatility of invertebrate macrofossils.

The following chapters, concerning the invertebrate clades mentioned above, are elaborate, and richly illustrated. The temporal distribution, taxonomical affinity and evolution of the clades are discussed in each of the (sub-)chapters, providing an efficient introduction to also the less-commonly known families. It is in the description and depiction of morphology, however, where “Fundamentals of Invertebrate Palaeontology – Macrofossils” truly excels. Morphological characters are extensively described, accompanied by a diverse array of detailed illustrations. Additionally, the terminology required to understand and describe the morphology of invertebrate macrofossils is provided separately in each chapter, tailored to each of the clades.

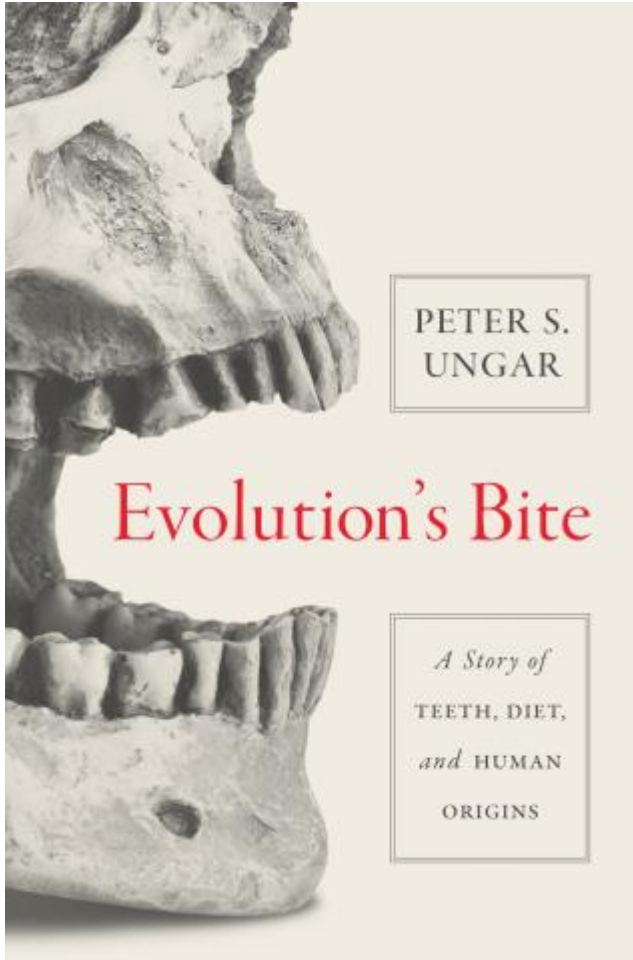
“Fundamental of Invertebrate Palaeontology – Macrofossils” would be well suited for those aspiring to familiarize themselves with invertebrate palaeontology, and particularly students and amateurs attempting to identify and describe invertebrate macrofossils. Hence, this book by Professor Sreepat Jain would certainly serve as an excellent reference work for paleontology students or enthusiastic amateurs.

Tom Trapman

University of Utrecht  
Utrecht, The Netherlands

**EVOLUTION'S BITE: A STORY OF TEETH, DIET, AND HUMAN ORIGINS**

**Peter S. Ungar. 2017.** Princeton University Press. 236 pp. Hardcover. \$27.95. ISBN: 9780691160535.



Courtesy of Princeton University Press.

If you're a vertebrate paleontologist, the chances are that you've dealt with teeth in one way or another. They're hard, preserve well, and are subsequently very common in the fossil record. They also tell you a lot about how an animal lived, from (unsurprisingly) its diet, to the habitat it lived in, to even its species' social structure. Peter Ungar's absorbing new book, *Evolution's Bite: A Story of Teeth, Diet, and Human Origins*, is a welcome journey through the evolutionary history of these remarkable structures, with a strong emphasis on their role in human origins. It's a popular science book for sure, but everyone from seasoned paleontologists to the informed layperson will enjoy it.

The first chapter focuses on how teeth work. Ungar takes a "food's eye" view, and discusses how the material properties of different types of food

require teeth with very particular anatomical configurations. He draws heavily on the paleontological record to show how mammalian teeth evolved their startlingly varied forms, detailing the importance of complexes such as the tribosphenic molar system along the way. In the process the reader is introduced to the highly detailed anatomy of teeth, with their cusps and pits and shearing crests. He details why they are formed the way they are, and how they wear down. In the wrong hands this sort of thing could be a bit dry to the non-specialist, but the author does very well in keeping one's attention with crisp prose and a light touch. I particularly enjoyed the historical parts of this chapter; Ungar does a fine job of peppering his discussion of the pioneering work of such luminaries as Marsh, Cope, and Simpson with fun anecdotes and asides. Chapter two addresses how teeth are actually used by organisms, and here Ungar focuses in on his own group of interest, primates. He provides comparative examples of the dental morphology and dietary behavior of living species, and deftly explains how, in an evolutionary context, tooth and jaw anatomy, food type, and ecology all interact with each other. As someone who works mainly on locomotion, I must admit to moments of rustiness when it comes to teeth, and I loved these first two chapters. They were a real refresher, and I actually learned something.

Chapter three introduces the hominin fossil record, Ungar's main area of taxonomic specialty. Rather than dive straight into the specifics of hominin dental form and function, he devotes this chapter to an overview of the history of paleoanthropology, with a particular emphasis on South African fossils like the Taung Child, and how they changed our understanding of human evolution. He also discusses how the blossoming field of paleoecology influenced researchers attempting to reconstruct ancient dietary behaviors. This segues into chapter four, which summarizes how the environment shaped (and shapes) human evolution, and how scientists have worked this out. It's a good review if you're in need of brushing up your knowledge of stable isotope analysis or the latest in lake core drilling in the African Rift.

Chapter five focuses on Ungar's main area of research, dental microwear analysis, and is really the heart and soul of the book. He describes the collection of microscopic pits and scratches found on teeth as "foodprints", and explains with great clarity what they can (and cannot) tell us about what an animal ate during its life. This

information is vital for reconstructing fossil hominin dietary behavior, and Ungar is the *de facto* global expert on this technique. Some scholars worry that dental microwear is problematic, in part due to the fact that it can only tell what an animal was eating in the last few days or weeks of its life. What if the animal was eating something it didn't normally eat before it died? The author deals with this well, and is convincing in explaining that if you have enough specimens, it's the taxonomic range of variation of different microwear metrics that matters. Some fossil hominins have very tight ranges, implying a more restricted diet, others vary greatly, implying perhaps a wider range of ingested food types.

Chapter seven focuses on the rise of agriculture in the Neolithic, and how as our diets shifted, so did our teeth and jaws. Chapter eight, the last in the book, continues this discussion, and brings up what is happening to our teeth today and the problems we face with them. It's not necessarily a pretty picture, with high levels of sugar in our diets and small, crowded mouths, no wonder dentists do so well. Fans of the "paleo" diet will also not enjoy this chapter. Ungar, quite rightly, takes a dim view of such fads, and explains why from a number of scientific viewpoints related to his and others' work.

My only gripe is that the book skips over some fascinating parts of the human evolutionary story, in particular the spread of the genus *Homo* out of Africa, and the emergence of larger brained taxa such as *Homo erectus* and the Neanderthals. Just as for any other hominin taxon, the teeth of these creatures tell us much about their lives, and I would have loved more discussion of this critical part of human evolution.

In summary, Ungar is an excellent writer, and he vividly brings to life a fascinating and important subject area. Dental morphologists and other experts will enjoy the detailed content, but the book is accessible to all, and is well interspersed with fun anecdotes and a strong historical perspective. Students, enthusiasts, and the more general reader will get a lot out *Evolution's Bite*. Go read it. After all, as the saying goes, you are what you eat.

William E. H. Harcourt-Smith

1) Division of Paleontology  
American Museum of Natural History  
New York, USA

2) Department of Anthropology  
Lehman College  
City University of New York  
USA