



BOOK REVIEWS

PREFACE

The current volume of the Journal of Paleontological Techniques is the fifth number of our yearly series dedicated to the publication of book reviews. We intend to publish a collection of reviews early every year, of books that were published the year before, and which cover any aspect related to paleontology or natural history in general. Due to a number of reasons, the publication of this volume has been delayed considerably, and we want to apologize for this delay.

Deadline for the submissions is generally at the end of the year, 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 reviews for six books published in 2020. The reviews are written by Simone M. Seghetti, Alexandre R. D. Guillaume, Darío Estraviz López, Victor Beccari, Miguel Moreno-Azanza, and André Saleiro. The discussed books are about theropods and the origin of birds, the history of discoveries supporting the theory of evolution, the origin of big cats, sauropodomorphs, the PhyloCode, and paleoecosystems.

PREFÁCIO [in Portuguese]

O atual volume do Journal of Paleontological Techniques é a quinta edição da nossa série anual dedicada à publicação de resenhas críticas de livros. A nossa intenção é publicar no início de cada ano uma compilação de resenhas de livros focados em qualquer tema relacionado com Paleontologia e/ou História Natural, que tenham sido editados no ano anterior à publicação do nosso volume. Devido a várias razões, a publicação deste volume sofreu em atraso considerável, pelo qual gostaríamos de pedir desculpa.

A data limite de submissão é geralmente no final do ano, mas as propostas deverão ser discutidas em antemão com os editores do volume de modo a evitar receber múltiplas resenhas para o mesmo livro. Convidamos todos os autores, coautores e editores deste tipo de livros a notificar-nos relativamente a futuras publicações, para que as possamos publicitar ao nossos leitores e seguidores nas redes sociais.

O atual volume inclui resenhas de seis livros editados em 2020, tendo sido escritas por Simone M. Seghetti, Alexandre R. D. Guillaume, Darío Estraviz López, Victor Beccari, Miguel Moreno-Azanza, e André Saleiro. Os livros apresentados discutem os seguintes temas: dinossauros terópodes e a origem das aves, História das descobertas que suportam a Teoria da Evolução, a origem dos grades felinos, dinossauros sauropodomorfos, o PhyloCode, e paleoecossistemas.

Edited by Emanuel Tschopp, book review editor, Journal of Paleontological Techniques



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LA RIVOLUZIONE PIUMATA - I NUOVI DINOSAURI E L'ORIGINE DEGLI UCCELLI

Andrea Cau. 2020. Independently published, available on Amazon. 186 pp. Illustrated. Soft cover. US \$24.43.
ISBN: 9798649719766.



Courtesy of Andrea Cau.

If Little Red Riding Hood would have lived in the Mesozoic and would have encountered a tyrannosaur dressed like her grandmother, she might have exclaimed “goodness, what little arms you have!”, and the tyrannosaur would probably have replied “better for running and catching you with”. But how would such tiny forelimbs allow better running skills? This is only one of many things explained in the second book of the Feathered Revolution series of Andrea Cau. In the first book, Cau spoke about the evolution of Theropoda from basal archosaurs to carnosaurs. Now is the time for the other group of theropods, coelurosaurs, the most diverse dinosaur clade. Although this book focuses only on one clade of Theropoda, it is distinctly longer than the first

volume. This is due to the fact that Andrea, probably because of a more restricted topic, was able to spend more time (and pages) to discuss the evolution of these fascinating dinosaurs in more depth.

The main structure of the book is the same as in the first volume: there are 13 chapters, the first being a prologue, the last an epilogue and the remaining 11 focusing on the coelurosaur sub-groups which, starting from Tyrannosauroida, finally leads to the birds. Every chapter is introduced by a simplified phylogenetic tree displaying the position of the clade, with a live restoration of a representative species.

As mentioned before, Andrea spent more time to talk about the different groups in this book, but he does not only discuss the anatomy. As you know, Coelurosauria includes the most popular, beloved, and mythologized dinosaurs, *Tyrannosaurus rex* and *Velociraptor mongoliensis*. Both of these dinosaurs are well known, but more from the popular culture than from paleontology, so much of this knowledge is fictional. Andrea deconstructs many debated topics (such as the *T. rex* integument and dromaeosaurid social behavior) rebuilding them according to scientific knowledge. It is also worth mentioning that this is one of few Italian popular books that focuses on the anatomy and evolution of early avian birds, a topic generally ignored or only briefly discussed in non-technical books. Also, Andrea talks about the history of the studies of the bird-dinosaur relationship, from the early discovery of *Archaeopteryx lithographica* to the beginning of the Dinosaur Renaissance of the current days. This renders the reading really immersive and makes it more interesting, especially for those who are not used to anatomical descriptions. A final chronology summarizes the evolutionary history of the avian birds, helping to refresh and keep in mind the morphological steps leading to this group.

As in the first volume, the greatest merit of this book is to provide technical information in an easy way. There are not many books in which anatomy, biology and evolution of dinosaurs are well described (at least in the Italian editorial panorama). This allows every reader to gather specific knowledge without having to check technical literature, which is, as you know, a slower, more time-consuming process that requires more extensive previous knowledge. Here, as long as you know the name of the bones, you can easily read this book. I think that science must be for everyone, and I am always glad

when I read good, exhaustively up to date, but friendly, readable books, as Andrea's one is.

The main critical point of the first volume was the absence of explanatory figures; this issue has been partially addressed in this second volume, in which Andrea inserts two figures displaying selected osteological structures (the arctometatarsal and the different types of the dinosaurian hands). These images will surely help many generic readers, but a higher number of figures would have facilitated reading even more and would embellish the book. As in the first book, also in this one the bibliography is restricted. Both of these critical points, however, are evidently editorial choice (remember that it is independently published), not real faults.

In summary, the second volume of "The Feathered Revolution" is the immediate follow-up to the first volume. All what was good in the previous book is still valid in this one, which benefits of some improvements (e.g., anatomical images, more in-depth discussions). This makes it a must have for any Italian (but not only) dinosaur lover. At last, the rumored third volume is already available, and it focuses on the other side of the saurischian dynasty, the sauropodomorphs.

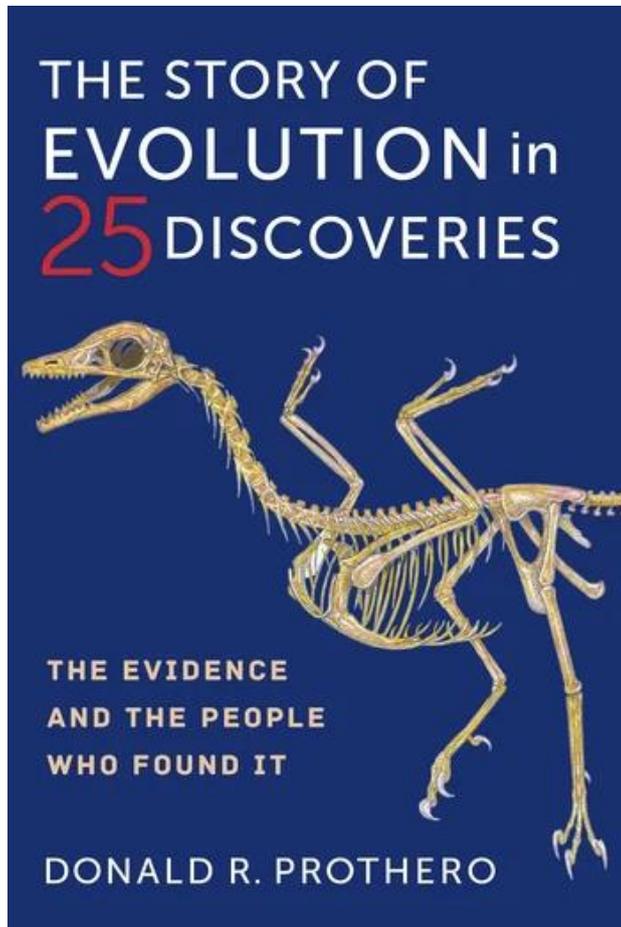
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THE STORY OF EVOLUTION IN 25 DISCOVERIES: THE EVIDENCE AND THE PEOPLE WHO FOUND IT

Donald R. Prothero. 2020. Columbia University Press. 376 pp. Illustrated. Hardcover. US \$35.00.

ISBN: 9780231190367.



Courtesy of Columbia University Press.

Since the publication of *On the Origin of Species* by Charles Darwin in 1859, evidence of evolution has been found over and over, and yet some people are still rejecting it. Based on his personal experience with evolution deniers, Donald Prothero decided, with his last book, not to argue against them in an endless debate. Rather, he exemplifies the evidence that has led to discover evolution and support it since over 160 years. By doing so, Prothero reports not only how such evidence is found, but also how evolution remains the sole explanation, correcting some misconceptions spread in the general public. However, more than an umpteenth account on evolutionary theory, this book is an ode for science in general, its methods, and the people behind each discovery. No matter if they were

right, made some mistakes along the way, or were wrong from the start, each and every one of them contributed to the progress of science.

The book is divided into five sections, organized in a way that leads us from our universe to the future of our own species in a linear and gradual reasoning. Each section and the chapters within them make us dive deeper and deeper into the lines of evidence, covering paleontology, molecular biology, ecology, geology, and even astronomy!

Part I (In the Beginning: Everything Evolves and the Earth Is Very Old) focuses on two notions that cement our universe: space and time, and how those dimensions are far greater than what we could ever comprehend.

The first chapter "Everything Evolves and Changes" emphasizes how the view of mankind on the world shifted from the old anthropocentric paradigm to the modern cosmology theory. In this very first chapter, Prothero already adopts the style and the approach that he will follow in the rest of the book, with anecdotes on the people who made the discovery that changed our view, but also how they came to make it. This is the first important lesson that Prothero teaches us: if discoveries are made when looking for an answer, more often than the general public believes, it is "pure scientific research" that leads to the breakthroughs.

In his second chapter "The Abyss of Time", Prothero makes us realize how old Earth really is, by the help of classic analogies (although the football field example will speak mostly to US American readers). This chapter is the only one really dedicated to geology. It illustrates how some discoveries presented in this book were guided by the beliefs of their times, and how science can make mistakes or inaccuracies because scientists are missing important data (here, marvelously exemplified with Lord Kelvin).

Part II (Darwin's Evidence for Evolution) recounts the main hypotheses put forward by Darwin, and how they have later been confirmed or reinforced with evidence.

The chapter "Evolution in Action" reminds the reader that evolution is not a thing from the past, but still occurring nowadays. With the tale of Darwin's journey on *The Beagle* and the foundations of his theory to explain the mechanisms behind evolution, the unrivaled fieldwork with finches on Galapagos done by Peter and Rosemary Grant, who witnessed evolution in real time, and several other famous examples,

Prothero reminds us not only that “evolution happens all around us all the time”, but also that we must acknowledge it for our own survival.

The chapter “Our Common Body Plan” addresses the long story behind the concept of homology, and how, although it was known and accepted, it has been misinterpreted for a long time to fit religious beliefs. It is an opportunity for Prothero to illustrate how science works and what it does: explaining why and how using testable hypotheses. It is also the first introduction to the concept of the “Divine Designer”, a creationist metaphor that Prothero will use throughout his book to tackle each question risen; if such a being exists, why would its creation be so imperfect?

The chapter “Ontogeny Recapitulates Phylogeny” corrects this common misconception by telling the story behind embryology, and the impact (and mistakes) Haeckel had. Beyond its support to the main goal of the book, the importance of this chapter highlights how careful we must be when doing scientific research, and how easy it is to exaggerate or misinterpret some concepts.

The chapter “The Sinking of Noah’s Ark” is undoubtedly one of the most vindictive toward creationism. As Prothero comments, ancient civilization cannot be held accountable for their beliefs, as they were coherent with the knowledge of their world they had at that time. However, most of these myths cannot stand anymore in the light of the evidence for evolution. Prothero reminds us how important another great scientist of Darwin’s time was for the understanding of evolution: Alfred Russel Wallace and his work on endemism.

The chapter “The Branching of Life” addresses the concepts of taxonomy, introduced by Carl von Linné, and how subsequent developments strongly supported Darwin’s theory, how taxonomy led to the study of phylogeny. It is the first chapter in which Prothero blends morphological evidence—which have been the core of Darwin’s work—with evidence that Darwin could never have dreamed of: molecular evidence. And so, how evolution predicts our anatomical features but can also be proven in every cell of our bodies.

The chapter “The Case of the Cruel Wasps” opens the main argumentation against the Divine Designer of creationists, using one of the most famous examples of Darwin’s theory: the absence of (human) morality in Nature. This chapter uses by far the most quotations, to

emphasize the graphic examples and how we should avoid imposing our own moral onto an amoral world. However, it is maybe the weakest chapter of this book. Indeed, it only entertains the common misconception of atheism by creationists: the amorality of nature would be the strongest evidence for the absence of a benevolent deity.

Evolution does not prove the absence of such deity, as proving the absence is rather a difficult challenge in science. Evolution is the explanation of our world without the need of the hypothesis of a deity. Creationists think that atheists, using evolution, want to prove that God, or any other deity, does not exist. However, atheism is only accepting and explaining our universe without resorting to such a hypothesis. Unfortunately, Prothero misses his point in this chapter, although he is perfectly right in what he supports: “Nature is neither good nor bad—it is just as we find it”.

The chapter “Jury-rigged Contrivances”, on the other hand, is one of the strongest and most interesting of this book. It focuses on a line of evidence often misunderstood, but most shattering: “nature does not require perfection”. Where our society always seek for the optimum, either in engineering, economics or labor, nature relies on suboptimal jury-rigged solutions that will work as long as the organism succeeds in its only matter: reproduction. This is another core argument against the Divine Designer, which would not be as clumsy as evolution. Prothero teaches us how we can find the evidence of this evolution around us, in the evolutionary histories of organisms, and how this suboptimal adaptation may appear not only once, but several times through evolution.

Part III (Great Transitions in the History of Life) explains how we can find the evidence preserved in the fossil record, and how the belief that we do not know how things evolved is at best incorrect, at worst deceptive. This part may seem repetitive with time, since we explore the history of the whales, the first tetrapods, birds, horses, giraffes and elephants; but repetitive does not mean boring, as each chapter will bring light on how each discovery has been made and on the important concepts behind it.

The whales teach us how and why evolution keeps vestigial organs, or even vestigial DNA sequences. The earliest tetrapod reveals the fantastic adventure of fishes walking on land. Birds are here to prove us that dinosaurs are still among us, and that evolution encountered many

adversaries since Darwin. Horses remind us how outdated the “ladder of evolution” is, and how bushy and branching our family trees are. The giraffe, a long-time exemplification of Lamarckism, are living proof of how clumsy evolution can be and how easy it can be to overinterpret it. Last, but not least, we can thank the elephants to be the first fossils used by science to prove the phenomenon of extinction, but also being a constant reminder that morphology and molecular data can lead to surprising and unsuspected results. My only concern with this part is the chapter “Missing Links Found”, which is as interesting and relevant as its counterparts by addressing the macroevolution and transitional fossils, core arguments of this part, and the erroneous concept of “missing links”. I would simply have put this chapter as the first one of its section, as an introduction of what is going to be developed next.

Part IV (Eyes and Genes) emphasizes one of the most important breakthroughs for evolution since Darwin’s theory: molecular biology, and the evidence it revealed to reinforce even more details of the mechanism of evolution.

The chapter “A Warm Little Pond” is extremely instructive. Not only does it address one of the most, if not the most, striking aspects of Darwin’s theory, but it also sheds light on one of the most misunderstood and fascinating topics: the origin of life. The misconception is that if spontaneous origin of life does not occur in present days, it could not have been the case billions of years ago. Here, Prothero presents a fundamental concept of evolution: although genetic variation is indeed random, evolution is everything but random and conservative. It is selective and destructive, and life did not originate by chance. Prothero’s tale on how science came to understand the origin of life, which bricks composed it and how they assembled in more complex structures, is captivating.

The chapter “Genetic Junkyard” is truly enlightening because it is the only one confronting two dogmas from Darwin’s theory, instead of confronting misconception from creationist believes. Here, Prothero addresses one major pillar of evolutionary theory: it itself evolved since Darwin’s proposal, adapting to new evidence found since 1859. Prothero reminds the reader that science is not fixed, but rather in perpetual motion. Having one aspect of the theory wrong does not mean the entire theory is wrong. We may misunderstand it, but new evidence will help scientists to fine-tune it. The following

chapter “Legs on Their Heads” carries on this aim, with the emergence of neo-Lamarckism and “evo-devo”. It highlights the importance of environment in the regulation of DNA, contradicting the slow, gradual process figured by Darwin, but confirming we all share the same genetic tool kit. Which leads to the next chapter “The Eyes Have It”, in which Prothero exemplifies with one of the major objections to Darwin’s theory – the complexity of the eyes – how complex organs can form through evolution. This is another strong chapter for the understanding of evolution and all the mechanisms involved.

Part V (Humans and Evolution) finally addresses what is usually the most controversial topic among deniers of evolution: the place of humans in our universe. In his book, Prothero uses evidence that kept challenging our own sense of priority in the universe; from Copernicus, who restored the sun in the center of the known universe, displacing Earth, to Darwinian evolution – humans are not special on this Earth, but just one of many life forms. Therefore, this part is the climactic conclusion expected, as Prothero uses all the evidence he already brought up to show how they apply to humans too.

The chapter “A Tinkerer, Not an Engineer” exemplifies how, as other organisms addressed earlier, humans are not well designed, and certainly not at the image of a perfect Divine Designer. The chapters “The Third Chimpanzee” and “The Ape’s Reflection” address how close we are to apes and, most importantly, how common our anatomical and behavioral features are. Even more puzzling, Prothero shows how humans appear to simply be neotenic apes. And again, he provides evidence from Darwin’s own observations, as well as evidence found later, through stories that sometimes reveal to be enthralling for story-telling.

The chapter “Bones of Our Ancestors” addresses our fossil record and constitutes one last nail to the coffin of the idea that having false, outdated, or mistaken notions does not imply that the mountains of evidence are invalid. The book ends with the chapter “The Once and Future Human”, which is a truly clever chapter. Instead of going to speculation as in science-fiction, Prothero remains steady on solid science, peering into our past to anticipate our future. Because, once again, “natural selection is not about making perfect organisms [but] about adapting to the local conditions of the time”. Prothero uses his last chapter to remind us a truth most often forgotten: how close humans

are to each other, and how fast our culture changes compared to our body. And that can be, again, read in our evolutionary history in our bodies.

The Story of Evolution in 25 Discoveries: The Evidence and the People Who Found It is an amazing book. More than a lecture on evolution pretending to close the unending debate with evolution deniers, it is a tale. A tale on how, through research, scientists accumulate observations and evidence that make no sense “except in the light of evolution”. More than an evolutionary book that would explain all the mechanisms at stakes, it is an epistemological adventure in which the reader will discover the excitement of research and the wonders it can reveal.

Obviously, the main target of this book is the general public, which is the most susceptible to mistakes and misconceptions debunked by

Prothero in all the chapters. Readers with more expertise in evolution and paleontology, or the field discussed in each chapter, can be entertained by Prothero having his own way with words; although there will always be some oversimplifications or frustrations, because each chapter would be worthy a book in itself. This book provides tools to teach and learn about evolution, with strong evidence and demonstrative examples, which is always helpful and useful.

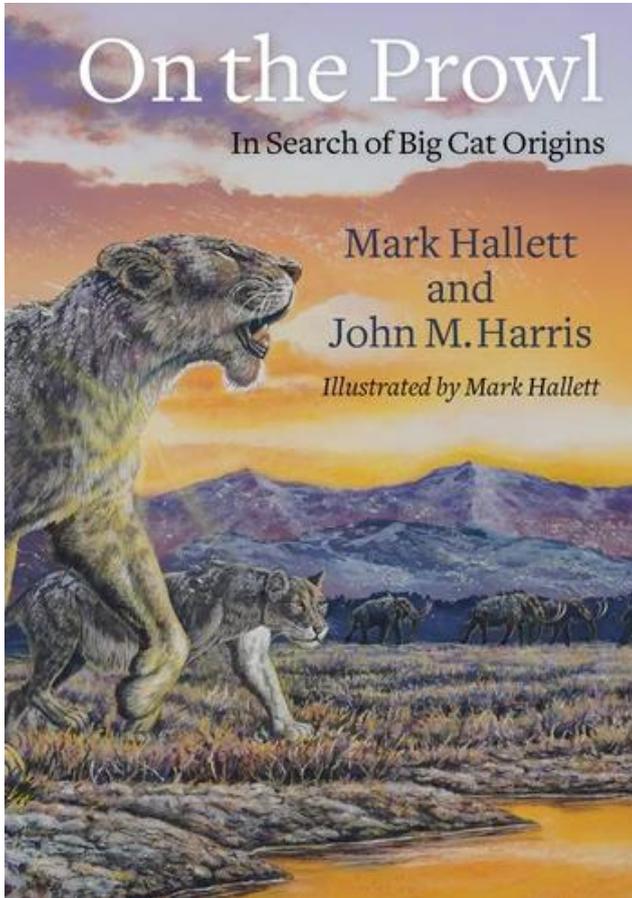
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ON THE PROWL: IN SEARCH OF BIG CATS ORIGINS

Mark Hallett and John M. Harris. 2020. Columbia University Press. 272 pp. Illustrated. Hardcover. US \$35.00. ISBN: 9780231184502.



Courtesy of Columbia University Press.

The first impression that I had about "On the Prowl: In Search of Big Cats Origins" was that it was basically the pantherine version of "Saber-tooth" (2013) by Mauricio Antón, but the more I read of it, the more different to that book I found it to be. Yes, the illustration of the fossil skull next to its life reconstruction, the diagrams of hunting techniques, the fur patterns of the animals ... all reminds of the masterpiece of Antón, and indeed in the acknowledgements the authors note the inspiration that his book had on their work. This is justified as later in the book they literally describe a piece of

"The Big Cats and Their Fossil Relatives" (1997) by Turner and Antón, that everybody familiar with his work knows about (The white *Homotheirus* with the Dall's sheep at its feet). But, as this work is not only dealing with fossil but living

animals too, the more you advance, the more you understand how the authors benefit from this for describing the hunting techniques, paleoecology and distribution of the pantherine cats.

The relevancy of the topics is apparent as soon as one starts to read the preface, with a short story involving an Indian woman and a female tiger that brings the subject of the book from the fossil bones to the everyday life of thousands of people in some parts of the world. Those small stories appear at the beginning of every chapter and they are indeed like a story-abstract of the situations that are going to be discussed in the following chapter. The preface quickly refers to the very comprehensive glossary, that will be extremely useful for any reader not familiar with zoological and paleontological technical terms. This preface provides a general overview of the History of the big cats and also mentions the interesting artworks and extra information in the appendix. Some people will want to consult that extra information as the book advances without the text mentioning it.

The first chapter is a quick run through most of the Cenozoic (I think the word "Tertiary", mentioned in some parts of the text is actually a bit "old fashioned"). This first chapter is a short introduction to general anatomy common to all carnivores as well as to felids in particular, and to the phylogeny of living and extinct clades. It also features some of the main characteristics that would become important later during the rise of the pantherines. It is really enjoyable how the book changes from a more historical perspective of the evolution of the clades to the explanation of generalities of evolution and anatomy, which makes the reading really interesting at all times. This chapter has a small "bonus" with the treatment of Felini and Acinonychini that I found really fitting, as they are not so closely related with lions and tigers but deserve some treatment in the book.

The second chapter is centered around the detailed anatomy of pantherines, the characters that all of the members of the group share and that make them effective predators recognizable by everyone. I found the comparison of them with the Machairodontinae, the so-called "saber-toothed cats", particularly interestingly, because those differences partly explain the survival of pantherines whereas machairodontines got extinct. There are some minor errors in some scientific names, but nothing terrible, and they are not really common throughout the book.

The third chapter is the second most interesting of the book, in my opinion. It focuses on the biological and geological factors that led to the rise of pantherine cats. The broad scope of the paleoecological reconstruction of the paleocommunity of the Tibetan Plateau and the Himalayas during the Late Miocene is amazingly well structured and at the same time very interesting to read, because its implications go further than felines, affecting much of the Pleistocene fauna that would become dominant in the “Mammoth steppe”. I had some notions of those factors, but the way they are presented is really enjoyable to read. I think that even a reader that has no background in paleoecology might find this section entertaining.

The fourth chapter dissects the bulk of the systematics and paleobiogeography of pantherine cats from the end to the Miocene to the Holocene, with a comprehensive overview of the main occurrences and extinct taxa of this group. This section is absolutely up to date, so it is interesting that some of the studies referenced and considered here are ignored in some of the later chapters of the book (mostly about extant subspecies). The paleoecology of these cats during the Pleistocene is also broadly treated, meaning that it would be immensely useful even as reference for technical literature.

The fifth chapter is the most interesting for me of the entire book. It is centered around the data that we can infer from the Pleistocene fossils of this group recovered from caves. It is a treasure of up-to-date information about the paleobiology of pantherines, including case studies of emblematic Pleistocene sites like Atapuerca, Neumark-Nord, Kudaro cave or the sites near Sterkfontein (Taung, Kromdraai, and others). It is necessary to note, however, that the reconstructions of the Aurignacian and Magdalenian peoples from Europe seem to be a little bit too much inspired by native American peoples in their facial features and not by European hunter-gatherers of darker skin.

The sixth chapter starts with the best short story of the book. It is just one paragraph, like all the others, but I found it extraordinarily well written and emotive. This chapter discusses the final touches of the paleoecology of the extinct members of the group and outlines the chronology of their demise, as well as its most likely causes. It also discusses some of the differences of this process compared to Machairodontinae. Particularly interesting is the phenomenon of *dzuds* that still happens nowadays and that no doubt

had an important effect when the snow started to fall in the arid mammoth steppe at the end of Pleistocene.

The seventh chapter comprises most of the Holocene decline of the pantherine cats caused by humans. The Roman Empire and the effects of the European powers on Africa, India and Central Asia are really treated in detail, but I missed a little bit the everlasting effects of the Neolithic, Ancient Civilizations (Asurbanipal hunting lions would be fitting here), or Indian and Chinese cultures (even though they are subject of much of the following chapter). The best part of the chapter is the second half, where the status of each of the living species is detailed at subspecific level. It is a little bit confusing that even when the most recent taxonomy is mentioned, the traditional subspecies name is used and its status discussed, but it is indeed quite informative.

The eighth and last chapter is the one that I found the least well written and structured. It deals with current problems in the conservation of the remaining “big cats”. Up to this point the claims of the authors were always backed with citations, but even when I agree with most of the points treated, I would appreciate better references for some of the statements made. I think the book overextends itself a little bit in this final chapter, and that a shorter conclusion could have been fitting.

Appendix 4 of the book, a compilation of the known species and subspecies of the *Panthera* genus, is a useful reference in itself and deserves to be mentioned too.

Finally, I have to talk about one of the biggest values of the book that is present across its entire length, the paleoart. I am personally not the biggest fan of Mark Hallett, in the same way that I do not find extremely attractive the style of other big names of paleoart such as John Sibbick or James Gurney. But the amount of almost technically perfect paleoart that is featured in this book cannot be understated. The quality and the quantity, with the rhythm that it provides to the text is really a pleasure for the eyes. Only here and there, in small details like the angle of a spear, the anatomy of a bear, an aurochs, or the slightly offset position of the eyes of a cat, can someone notice minimal defects in this overall outstanding work.

To conclude, “On the Prowl: In Search of The Big Cats Origins” is a piece that surely will be fitting in the bookshelf, both of every enthusiast of this

fascinating group of animals and of some paleontologist working on Pleistocene mammals. It is indeed a perfect compromise between strict technical literature and entertaining read for someone to disconnect, with just minor flaws that put place it among the best books about Pleistocene mammals.

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DINOSAUR FACTS AND FIGURES: THE SAUROPODS AND OTHER SAUROPODOMORPHS

Rubén Molina-Pérez and Asier Larramendi. 2020. Princeton University Press. 272 pp. Illustrated. Hardcover. US \$35.00. ISBN: 9780691190693.

Rubén Molina-Pérez & Asier Larramendi

Dinosaur Facts and Figures

The Sauropods
and Other Sauropodomorphs



Illustrated by Andrey Atuchin & Sante Mazzei

Courtesy of Princeton University Press.

The second book of the series “Dinosaur Facts and Figures” by Rubén Molina-Pérez and Asier Larramendi is an encyclopedia on sauropodomorphs with accurate and dynamic illustrations by Andrey Atuchin and Sante Mazzei. The book has over 250 pages, most of them fully illustrated by paleoartists whose portfolios speak for themselves. Sauropodomorphs are well known and have been studied since the dawn of dinosaur research. They are among the first dinosaurs ever to be scientifically described and include the first dinosaur to be scientifically named outside of England: *Plateosaurus engelhardti* (now *Plateosaurus trossingensis*, see ICZN, 2019), reported from the Late Triassic of Germany by C. E. H. von Meyer (1837). Each taxon shown in this book comes with abundant information about its general morphology, ecology, and a visual guide that makes browsing

through this book an easy and pleasant experience.

The book approaches the evolutionary history of sauropodomorphs in chronological order, from the faunivorous earliest sauropodomorphs of the Late Triassic of Brazil and Argentina to the massive sauropods that ranged from the Late Jurassic to the extinction event at the end of the Cretaceous. The book proceeds to geographically correlate this fauna and then dives deeper into the taxonomy of the group. However, sauropodomorph taxonomy is a very active field of research, and new works on the clade are published frequently. After only one year of the book release, some aspects of the systematics and taxonomy of sauropodomorphs are already outdated, as the abovementioned newly designated type species of *Plateosaurus*. As a vertebrate paleontologist studying plateosaurid sauropodomorphs, the amount of new data not featured in this book that was released in the last two years is enough to overhaul the section about this clade. Nevertheless, the book still manages to be a good resource to kick-start any research about sauropodomorphs.

The book then approaches the anatomy, ecology, and biomechanics of the clade. The visual guide to sauropodomorph bones at the beginning of this section illustrates well the subtle (and not so subtle) changes between the various clades of sauropodomorphs. This is the kind of visual guide that every new student of sauropodomorph anatomy wants to have at hand. It allows for the general identification of bones and points to their respective references.

In the following, the authors calculate sauropodomorph maximum speed using their limb lengths and comparison to modern, biomechanical analogs, the elephants. The methodology applied is well referenced but is still in need of more studies to be confirmed.

Two chapters on the ecology section of the book stand out. The first pictures sauropodomorph eggs and highlights the research history on the subject. This shows possibilities for future studies in an area of paleontology that is usually overlooked. Having worked with sauropod eggs, it is great to see this section of the book. The second chapter to stand out relates to paleobotany. This chapter briefly describes the Mesozoic vegetation and can be a valuable resource even to paleoartists trying to understand the environment where the sauropodomorphs lived.

Ichnofossils are pictured across the book and have their dedicated chapter. As in the rest of the book, the illustrations serve as a general identification guide, as this section approaches several different footprint morphotypes and where to find them.

The illustrations play a major role in “Dinosaur Facts and Figures”. Therefore, it is only fitting that the book includes a dedicated section about the history of sauropodomorphs in arts. Ranging from how the reconstructions progressed through time to where these dinosaurs appear in pop-culture, this section shows the massive presence and impact these animals have on our lives (both for paleontologists and for the general public).

This book is a good addition to the collection of any dinosaur enthusiast and paleontologist, and I would certainly recommend it. The sauropodomorph taxonomy issue is easily counterbalanced by the sheer number of resources this book includes. The artwork is spectacular, being the selling point of this book. The writing is easily

understandable for the general public, and the reference list makes this book a valuable steppingstone for research and paleoartistic reconstructions.

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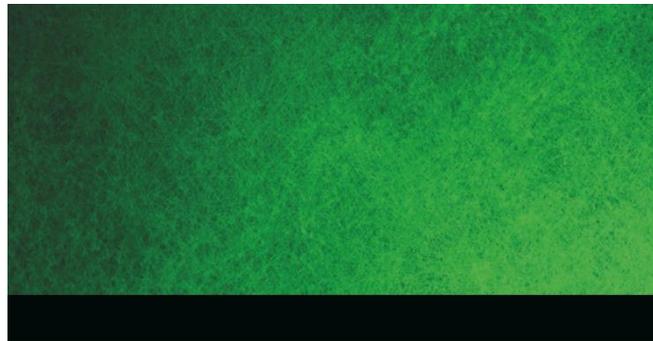
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INTERNATIONAL CODE OF PHYLOGENETIC NOMENCLATURE (PHYLOCODE)

Philip D. Cantino and Kevin de Queiroz. 2020. CRC Press. 189 pp. Paperback. £38.99. ISBN: 9781138332829.



**INTERNATIONAL CODE OF
PHYLOGENETIC
NOMENCLATURE
(PHYLOCODE)**

Kevin de Queiroz and Philip Cantino



Courtesy of CRC Press.

The International Code of Phylogenetic Nomenclature is a book that has been on the making for over thirty years, with the first version of the Code published online in 2000. It has since been curated by the Committee on Phylogenetic Nomenclature of the International Society for Phylogenetic Nomenclature. In 2020, coinciding with Version 6 of the code, it was published as a hard copy for the first time, together with its companion volume, Phylonyms. It is important to remark that the official publication of the Phylonyms is the starting point of the governance of the PhyloCode, and all clade names published before this date are not considered established under the code. This will probably result in the

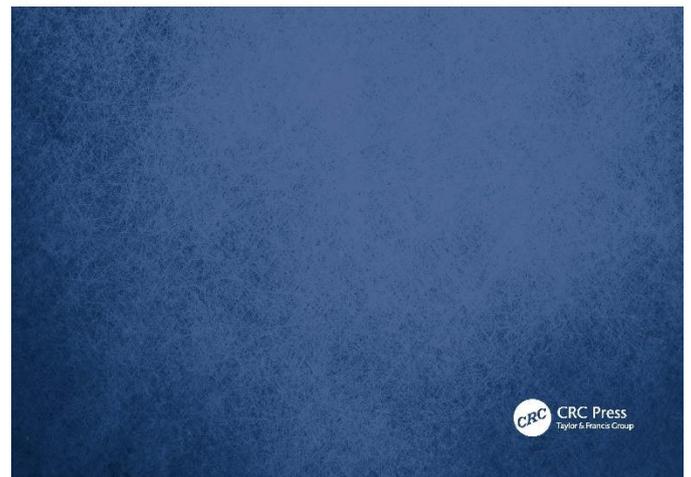
PHYLONYMS. A COMPANION TO THE PHYLOCODE

Kevin de Queiroz, Philip D. Cantino and Jacques A. Gauthier. 2020. CRC Press. 1352 pp. Illustrated. Hardcover and eBook: £200. ISBN: 9781138332935.



Phylonyms
A Companion to the PhyloCode

Kevin de Queiroz, Philip D. Cantino,
and Jacques A. Gauthier



Courtesy of CRC Press.

need of registering and re-establishing a significant number of clade names in future publications, but the PhyloCode includes provisions to properly credit the authors of the original publications.

The PhyloCode is organized in two divisions, comprising eleven chapters that include the 22 articles of the code, plus a Preface, a preamble, a glossary, and a series of appendices. This revision is based on eBooks provided by the editor, which are exclusive for the Bookshelf App, which I tested in a Kindle Fire eBook, an Android phone, and a Windows computer. It is not the objective of this review to address the user-friendliness of the App, but it is important to mention that the eBook is organized in chapters

that include several related articles of the code. You move between chapters by swiping laterally, and go through the chapters by scrolling down, which renders the navigation between articles difficult. Also, cross reference links between articles are not enabled, which feels like a missed opportunity and makes navigation through the Phylocode even more counterintuitive.

The book starts with a preface, which presents the mission and vision of the Phylocode, and how it relates to the Rank-Based botanical, zoological and bacteriological nomenclature Codes. This section includes a detailed historical account of the origin of the International Society for Phylogenetic Nomenclature, the Commission, and the Code itself. I enjoyed the reading of this section, both because it helps to understand the motivations behind the initiative, but specially because of the detailed account of the criticisms to the Phylocode, and the efforts put to address them, including references to discussion articles in scientific journals, and to the parts of the code that have been affected.

The second division comprises the Rules of the code. It is written with much care to detail, and the effort put by the commission in using a clear and concise language transpires through the volume. Most articles and clauses are accompanied by notes that describe specific cases and address the main points of each article in a more verbose way. Most of them are also accompanied with real examples that further precise the meaning of the article. This is extremely important, as the Phylocode does not work on a "case law" basis, and all future nomenclature problems should be resolved by application of the code by the Committee on Phylogenetic Nomenclature.

In general, the Phylocode is easier to read than the Ranked-Nomenclature analogs, and it feels that it will lead to less misinterpretations of the rulings. The Code itself does not differ from the online version, which is available at www.phylonames.org, other than in the aforementioned lack of cross reference links between articles. Therefore, the usefulness of the eBook version is limited, although this can be easily fixed in future editions.

Phylonoms on the other hand represents the start of the governance of the Phylocode and intends to serve as an example on how the code should be applied. It opens with an introductory chapter, which offers a brief history of the origin and conception of the Phylonoms, its objectives,

and the organization of the Volume. It also provides an explanatory template for the clade name entries -named protologues-, which acts both as an explanation on the organization of the entries presented in the book and as an outline for future protologues that will need to comply with the Phylocode. The introductory chapter continues with a rationalization of the guidelines and strategies used to write the protologues, that itself works as a simplified, eight-page version of the code that covers the main steps needed to write a good protologue that can support the naming of a clade.

The rest of the book comprises 285 protologues establishing 285 clade names across all living organisms. Protologues are organized in eight sections for quicker reference (Pan-Biota, Archaeplastida, Embryophyta, Angiospermae, Metazoa, [Vertebrata], PanMammalia-Synapsida and Reptilia, and are more or less organized in successive nesting clades. Of course, this list is not exhaustive – as mentioned in the preface of the Phylocode, a comprehensive Phylonoms would comprise tenths of volumes –, but it provides closely related examples from most living and fossil groups. In doing so, it serves its function as a model to be followed in future nomenclatural acts. Each protologue varies in extension from one to ten pages, depending on how stable the reference phylogeny is and how strong the scientific consensus on that clade is.

It is important to note that this is not the same basic information that can be found online in the Regnum database – the online resource to register and access clade names governed under the Phylocode –, but a much more verbose discussion, with reasoning of the choices made on name, definition, specifiers, composition of each clade and reference phylogenies. And here it is where Phylonoms has its, in my opinion, major weakness: reference phylogenies are cited as figures on their original papers, which are not reproduced in the book, probably due to copyright restrictions. This makes following the protologues much more difficult than it should, more even so when competing topologies are discussed for certain clades. A set of figures re-drawing the reference trees with a standardized design would have helped immensely and made the protologues much more intuitive.

Another major critique to Phylonoms it is release format as a single, indivisible volume. I doubt any researcher will be interested in buying the expensive over a-thousand-pages volume, when

at most they will be interested in ten to twenty protologues. It would be an improvement if individual protologues could be acquired separately.

It is yet to be seen if the Phylocode will be accepted and implemented by the scientific community now that it has officially released. It is true that the online version has had an impact on the scientific literature, and in general has greatly improved the definitions of clade names in the areas of biology and paleontology, which slowly but surely are abandoning ranked nomenclatures, but some of the recommendations, such as the use of italics for all clade names, or the abbreviated clade definitions using unusual symbols, are far from widespread in the community. In any case, it represents a brave, well

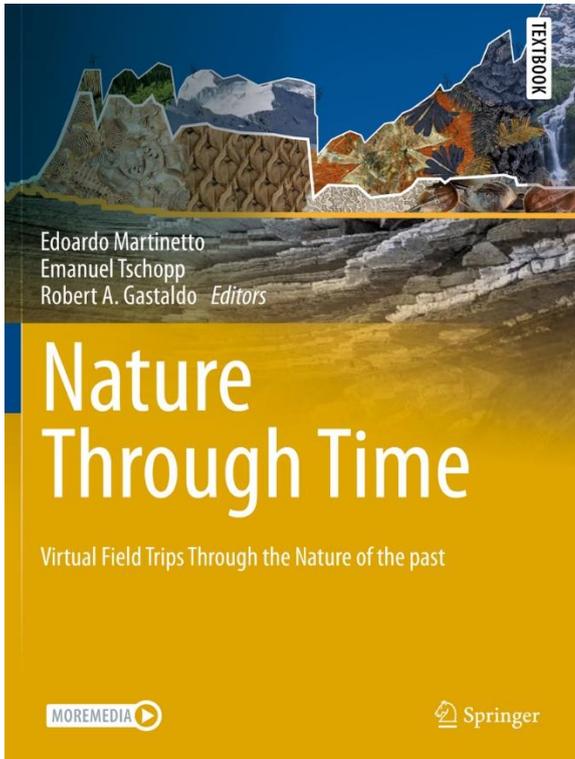
thought and well written proposal that addresses much of the problems with ranked nomenclatures, at the same time it is well integrated with the existing systems. This publication truly represents a turning point in Phylogenetic Nomenclature and, as such, I will add a copy of the hardcover edition to my library, although I am sure I will keep using the web page for my everyday work.

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NATURE THROUGH TIME – VIRTUAL FIELD TRIPS THROUGH THE NATURE OF THE PAST

Edoardo Martinetto, Emanuel Tschopp, and Robert A. Gastaldo (eds.). 2020. Springer. 462 pp. Illustrated. Hardcover. €62.39.
ISBN: 9783030350581.



Courtesy of Springer.

Nature Through Time is presented to the reader as a virtual tour guide to Earth's last 400 My of paleobiological history (give or take a million), structured as a highlight reel of some of Life's best-known achievements, from both a biological and an ecological point of view. Unlike many works on the subject, which use phylogeny as their structural backbone, the discussed themes are ordered from the most recent to the oldest, as one would come to expect if he or she would go on a field trip through time. The book is the culmination of the work of almost 100 researchers, resulting in a rich diversity of subjects discussed in its 15 chapters, all accompanied by several high-quality photos, drawings, and graphs that perfectly deliver on their part as visual guides, and by several boxes of information along the text providing the reader with some of the concepts upon which the chapters are built. In the first chapter, Martinetto and colleagues present us an extensive and very detailed account of the ecological changes of the past three

million years, going on a journey around the world through several localities representative of this time period, making use of very descriptive accounts on the structure of these ancient ecosystems, backed-up by stratigraphy, isotope analysis, and fauna and flora distribution (just to name a few). Martinetto and colleagues follow up with a chapter dedicated to the temperate forests of the past (Oligocene-Pliocene), their range, ecological structure, how they developed through time, and the eventual decline in taxa associated with them, by making use of specific regions around the globe where the fossil and stratigraphic records provide good data regarding these once extensive habitats. In the third chapter, Saarinen and colleagues provide the reader with an in-depth account of the gradual transition of forest ecosystems into the wide-open grasslands characteristic of the Cenozoic, by highlighting the appearance and expansion of the plant group Poaceae (grasses), the changes in climate, and how mammals adapted and evolved along with this revolution in the Earth's flora. DeVore and Pigg focus on the Paleocene-Eocene Thermal Maximum as a case-study to show the importance of the plant fossil record as tools to not only discern climatic factors and changes in Earth's past, but also to compare them with current weather patterns, and create predictive models.

A Mesozoic-focused portion of the book starts with Kvaček's and colleagues' chapter on angiosperms (flowering plants), where they not only touch upon their elusive ancestry, their evolution, and general characteristics of this group, but also present a summarized record of the Cretaceous angiosperms from different regions of the planet, and the environmental conditions and habitats in which these flowering plants thrived and diversified. In the following chapter, Gee and colleagues continue the subject of paleobotany, starting with the drastic changes in the world's vegetation at the end of the Cretaceous, then going back all the way to the Triassic, taking the reader on a "safari" through some of the best studied Mesozoic plant communities ranging from North America to the British Isles, South Africa, and Oceania. The seventh chapter, by Tschopp and colleagues, brings us landmark examples of the Mesozoic high diversity of vertebrate life-forms, along with detailed explanations of the ecological and evolutionary factors behind them, such as the gigantism of sauropod dinosaurs, the adaptation to herbivory in some theropod lineages, and the rise of birds, without neglecting the fast radiation of groups "in the side lines", such as mammals, turtles, crocodyli-

forms, and fishes. Tschopp and colleagues then focus on the global patchwork of ecosystems that have been recorded from the Mesozoic, how these ecosystems evolved through the ages, and taking us on a world tour via a thoroughly descriptive compilation of some of the best known and well-studied paleoecosystems, focusing not only on the diversity of their faunas, but also on the conditions that led to this diverse Mesozoic menagerie. The ninth chapter, by Roghi and colleagues, takes the reader on a journey through the ancient depths and shores of the Tethys Ocean, from the Early Jurassic to the Permian, filled with well-intertwined information regarding subjects such as stratigraphy, paleoecology, ichnology, and palynology, giving the reader a window to a region in Earth's past that would play an important part on our current understanding of how life made it through world changing events such as the Carnian Pluvial Episode and the Permian-Triassic Mass Extinction. Still on the topic of the Permian-Triassic Mass Extinction, Delfino and colleagues present a well-summarized work on the largest known mass extinction, not only the paleoecological shift caused by this event, but also the reasons that might have led to it, and incredible bounce-back and accelerated speed of adaptation of lifeforms to the resulting ecological "vacant spaces".

The eleventh chapter, by Pšenička and colleagues, is a detailed "fern-centric" account on the evolution of ferns and their long-lasting basic morphology, that presents to the reader an Eurasian assemblage of this group recorded throughout the Phanerozoic along with the description of the different groups of ferns, the habitats they occupied, and co-existing flora. Gastaldo and colleagues follow, with a study on the tropical forests during the Late Paleozoic Ice Age, where they go through the fossil record of the plant groups that made up this expanding ecosystem (club mosses, horsetails, ferns, and gymnosperms), the effects of this period of fluctuation between hot-house and ice-house climatic conditions on this expansion, and a comparison of the processes behind the formation of coal in these ancient tropical forests with present day proxies. These "coal farms" of the Paleozoic are then touched upon in greater detail by Gastaldo and colleagues, where they go through the floral assemblages from the Carboniferous and Permian localities across the world, the habitats they occupied and how these were structured, and the environmental factors that led to this immense accumulation of coal.

Tinn and colleagues dive into the Silurian and Devonian seas, presenting us with the diverse fauna that comprised the biotic structures of both shallow and deep-sea environments, and adding a good paleogeographic and geological background, as well as an overview of the several extinction events that occurred during the Silurian. To finish it all, Gensel and colleagues take the reader back to the expansion of land plants during and before the Devonian, by characterizing the different ecosystems created during this time period and describing their respective flora assemblages, as well as providing information regarding the factors that led to the colonization of land by plants, and the lineages that played a part in this first incursion.

After reading *Nature Through Time* I found it a valuable source of information for those who work on, or study, paleontology. This book manages to compile the general concepts of paleoecology in an incredibly detailed and well-thought-out manner, by focusing on specific themes presented in a study-case like structure. Not only that; the scientific content and overall structure of the book makes it highly recommendable for both educators and graduate/post-graduate students. It is also worthy to mention that the editors of this book take it one step further by providing teaching-aid material in the form of slide presentations for each chapter, all made available for free upon request. The inclusion of recommendations for further reading at the end of some of the chapters supports this statement, as it provides an important segue to further discussion of the themes covered in a book, especially in an educational context, and the taxonomic index containing all taxa mentioned throughout the book is a welcome addition to this book. I would also like to point to the spotlight given to paleobotany and palynology throughout the book, showing the importance of these two study areas, many times overlooked by those with a general interest in paleontology, and by those studying it. Right from the start of the book, the editors invite us to travel through the ages via the concept of a virtual field trip, with the book serving almost as a hitchhiker's guide to Nature's past, and as a closing remark, I can clearly state that they have brilliantly delivered on their part.

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