AMEGHINIANA
A GONDWANAN PALEONTOLOGICAL JOURNAL

EARLY MAMMALIAN HISTORY GOES PUBLIC

REVIEW OF "BEASTS BEFORE US: THE UNTOLD STORY OF MAMMAL ORIGINS AND EVOLUTION". *Elsa Panciroli.* 2021. 320 pp. Bloomsbury Sigma. ISBN 978-1-472983-82-4. Illustrations by April Neander.

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To cite this article: Guillermo W. Rougier & Brigid Connelly (2021). EARLY MAMMALIAN HISTORY GOES PUBLIC. REVIEW OF "BEASTS BEFORE US: THE UNTOLD STORY OF MAMMAL ORIGINS AND EVOLUTION". *Elsa Panciroli*. 2021. 320 pp. Bloomsbury Sigma. ISBN 978-1-472983-82-4. Illustrations by April Neander. *Ameghiniana 58*(6), 492–494.

UBIQUITOUS MICROBIALITES IN THE PERMIAN OF BRAZIL

A major microbial development over an extensive area indicates stressful conditions in this part of Gondwana.

A BASAL AETOSAUR FROM THE UPPER TRIASSIC OF ARGENTINA

An incomplete skeleton from the Ischigualasto Formation is described, including novelties on appendicular armor and caudal ventral carapace.

SPARASSODONTA FROM THE MIOCENE OF PATAGONIA

Cladosictis patagonica from the Collón Cura Formation is reported and analyzed considering the intraspecific variability.

AMEGHINIANA - 2021 - Volume 58 (6): 492–494

ISSN 0002-7014

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REVIEW OF "BEASTS BEFORE US: THE UNTOLD STORY OF MAMMAL ORIGINS AND EVOLUTION". *Elsa Panciroli.* 2021. 320 pp. Bloomsbury Sigma. ISBN 978-1-472983-82-4. Illustrations by April Neander.

Dr. Panciroli has done us all a great favor by making an obscure and much-neglected segment of our ancient history accessible and, we dare to say, entertaining. The long and complex story of mammalian evolution reaches deep into the past and often is a topic not suited for the faint of heart. Abstruse and complex names abound; unfamiliar creatures and distant corners of the globe pop up routinely. Mammals are the sole survivors of one of two distinct branches of amniotes, vertebrates which propelled themselves to dry land and prospered. Mammals themselves are as old as dinosaurs, and their forerunners much older. The last common ancestor of mammals and flying dinosaurs (known in some circles as birds) lived at least 320 million years ago (Mann *et al.*, 2020). Panciroli's book centers on the prequel to the familiar mammals of today. She covers the vast expanse of time and morphology stretching from the last common ancestor of all amniotes until the start of the greatest radiation of mammals, often linked to the cataclysmal end of the Cretaceous brought about by an errant meteorite roughly 65 million years ago (Chiarenza *et al.*, 2020). From this point on, the author rightly says, we "know the way home from here."

The book is presented as the first popular science work on the ancient mammalian lineage, bringing the subject to the modern world. In the process it provides digestible discussions on the main issues that keep nerdy paleontologists awake at night—in that, it succeeds wonderfully. The author's dynamic, colorful, and at times plainly funny writing style makes otherwise dry and technically-challenging subjects accessible and engaging. Dr. Panciroli shows her mettle as a science writer and communicator in the age of Twitter. A colorful vignette is never far away: we are surprised to learn that the sunny Sagrada Familia in Barcelona has been built in part with rocks from the gelid Skye seashore, or of the appalling percentage of avian biomass currently represented by domestic chickens. Parts of the book might not be as approachable as *Green Eggs and Ham*, but hopefully it is captivating enough to awaken the interest in these ancient lineages in anyone with a modicum of curiosity about evolution, extinction, and the history of life on this planet. Those who already have at least some interests in paleontology and evolution will get the most benefit from it.

The book is organized into 11 chapters and follows a roughly chronological journey through the mammalian family tree. We are treated to the convoluted arguments and animosities of Victorian science in the persons of Owen, Lyell, Cuvier, and more, as well as the pivotal role that the early discovery of Mesozoic mammals had in shaping evolutionary discourse. Through the chapters we meet the most prominent figures and ideas of the last couple hundred years. The book therefore serves as both a biological history of change and an intellectual history of the changing of ideas. As such, we move through the book from a theologically infused universe in which mammals could *a priori* not be present alongside dinosaurs to a modern scientific view dominated by methodology and technology.

In the midst of discussing these scientific problems, Dr. Panciroli often gives us breathers via flashbacks to her fieldwork in Skye or in South Africa. There, instead of being concerned with paleontological arcana, she is more occupied with basic biological needs such as huffing her way to the top of a hill or surviving a frosty rain. The numerous diversions from the main story inform us about the current status of theories about the origin of milk, hair, mastication, body plan, as well as how we look for and study fossils, and so on. This meandering history of mammals is at once a comprehensive and a friendly compendium of our discipline as a whole. After reading this book (maybe with a basic biology class under the belt), anyone should be able to glaze over the eyes of more than a handful of relatives by retelling the triumph of mammals on Earth from humble origins to the rise of the "fuzzy little ninjas" of today. There should be

AMGHB2-0002-7014/12$00.00+.50

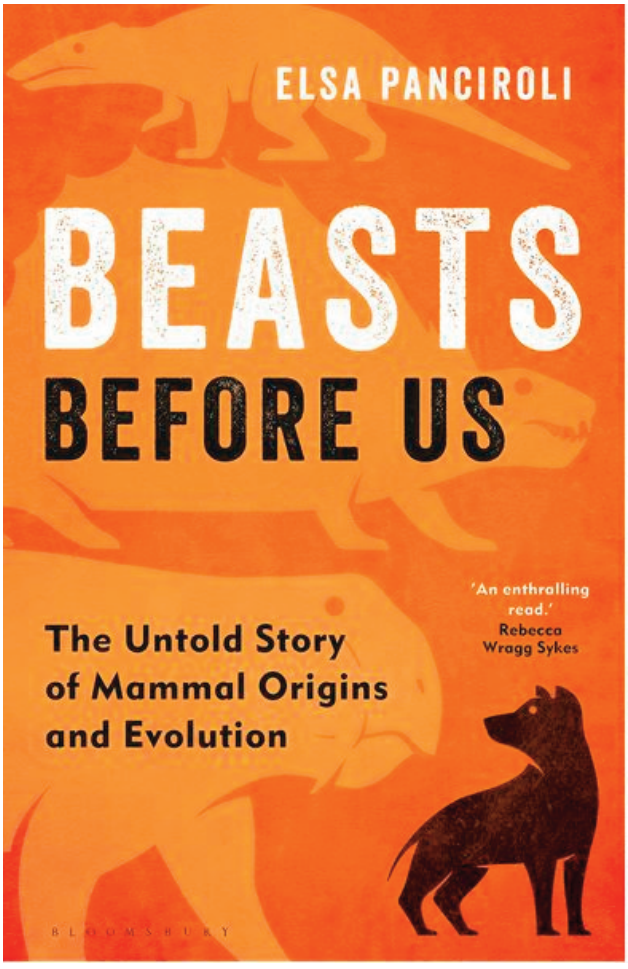

Figure 1. Cover of the book "Beasts Before Us: The Untold Story of Mammal Origins and Evolution" - Bloomsbury Sigma.

something valuable in this book for anyone, from the person interested in biological change to the more ethereal intellectual interested in the evolution of ideas. Even those mechanically inclined, pining for engineering feats and amenable to the unrelenting invasion of technology into every realm of life, should find satisfaction in the universe opened by X-ray study of long-dead fossils.

Dr. Panciroli, a recent PhD, is aware of current paleontology meta; the book is thoroughly modern in other ways, too. As much as she encourages considering mammalian lineages in a new light, she also argues for thinking critically about figures who have shaped the field and the burdensome history of colonialism and inequity attached to a discipline that is intrinsically dependent on exploration and collections. Such considerations permeate the book and at times take a life of their own. However, it is a refreshing attitude to find in a book that deals mostly with a branch of the natural sciences where social consciousness is largely dormant.

The book is a glorious achievement. Nevertheless, and perhaps inescapably in something with such a gargantuan scope, it is confusing at times and not entirely consistent. Concepts and ideas about evolution in general, and about mammals in particular, have changed over time based on the methodological precepts that guide our exploration of nature. In pursuing the history of mammals, the central subjects of the book, the author often uses a lax and archaic definition of mammals (Rowe, 1987). Her definition is tied to particular morphologies or characters instead of the more current cladistic concept of common ancestry as the guiding principle. The author is well aware of this difference and, in fact, later in the book explicitly delineates Mammalia under a more current light, but shortly afterwards continues to use the outdated concept. Other topics are similarly ambiguous in treatment. Nevertheless, these are vagaries that will only be noted by the persnickety paleontologists. The book's language is precise enough for general readership and does not detract from its overall approachability and content. The lack of technical illustrations, however, will represent a more substantial hurdle to visualizing the critters and transformations discussed for most of the non-specialist readers. The black and white life-restorations that close each chapter lack a figure legend and work more as a graphic stop sign than as a didactic tool. We reviewed the ePub book, which does not include a few color pictures present in the paper copy.

In closing the book, Dr. Panciroli reminds us that the mammalian lineage has already traveled through more than 300 million years of extinction and is once again facing ecological disturbances of a planetary dimension. The current crisis evokes those that in the past have profoundly shaped the trajectory of our really-great-great-grandparents: early amniotes, stem mammals, mammals, and humans. She ominously notes, though, that "the mammals that survive this mass extinction will be the same as in the previous ones: small, burrowing, nocturnal, generalists. It's a way of life they've been practicing for the last 210 million years. They're pretty good at it."

If approached by curious biology students or budding paleontologists, we would give them this book without reservations. We are all the better for it.

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