

MAMMOTHS, SABERTOOTHES, AND HOMINIDS: 65 MILLION YEARS OF MAMMALIAN EVOLUTION IN EUROPE. Jordi Agustí and Mauricio Antón. 2002. Columbia University Press, New York. 313 p. Hardcover, \$39.50/£27.50.

The task of writing trade books on fossils (other than dinosaurs) is a difficult one. The author cannot assume that the targeted audience of "intelligent lay readers" knows very much about the systematics or anatomy of the organisms, and the market for such books (without dinosaurs to sell them) is very small. Even

though there has been an explosion of science shows on cable television (including the recent BBC production, "Walking with Prehistoric Beasts," which largely focused on Cenozoic mammals of Eurasia), the actual market for trade books on fossils other than dinosaurs is shrinking. The author of a book on fossil mammals has at least some advantages in that most of the living representatives are familiar from the zoo (although few people other than zoologists recognize much beyond lions, tigers, and bears). But one is still confronted with two problems. The first is how to introduce hundreds of extinct taxa, many with no living analogue or even a good proxy (without illustrating every one and running up a huge art budget). The second is the dilemma of how much anatomy to introduce when the level of biological literacy of most non-scientists is decreasing every year. One can use "shin bone" rather than "tibia" only so much! What does one do about tooth nomenclature, which is *de rigueur* among paleomammalogists, but incomprehensible to nearly everyone else (even vertebrate paleontologists not specializing in mammals)? I've struggled with this challenge in two different books (*The Eocene-Oligocene Transition*, 1994, Columbia University Press; *Horns, Tusks, and Flippers*, with R. M. Schoch, 2002, Johns Hopkins University Press), and I've learned much about the difficulty of the task in the process.

Jordi Agustí makes a valiant attempt in *Mammoths, Sabertooths, and Hominids*. He claims (in the Preface) that his book is written as a successor to Bjorn Kurten's *The Age of Mammals* (Columbia University Press, 1971), or earlier books such as Henry Fairfield Osborn's *The Age of Mammals in Europe, Asia, and North America* (Macmillan, 1910). However, both of those authors wisely kept the list of names and taxa very short and simple, and introduced as little anatomy as they could get away with, while generously illustrating these strange and unfamiliar beasts to get around the lack of words to describe them. Agustí on the other hand, plunges immediately into description of taxa at the species level (especially in the Neogene chapters), and freely uses anatomical terms on the assumption that the readership will know what they mean. Consequently, although the book is promoted as written for a general scientific audience of geologists, anthropologists, and students of paleontology, most of those readers will immediately be lost with all the unfamiliar names and anatomical and dental terminology. Even a specialist in fossil mammals must read closely to follow all the details, so the book will be tricky for most people to use.

Nonetheless, it is an important resource for specialists who wish to know the latest about European mammal evolution, because so much has changed since Kurten (1971). Not only have the number of discoveries and new taxa increased, but even our fundamental phylogenetic framework for fossil mammals is radically different with the advent of cladistics. More importantly, thirty years of developments in paleoclimatology and chronostratigraphy have meant that we can now date many Cenozoic deposits and fossils to the nearest 100,000 years, and also decipher the details of global climatic change and their potential effects on terrestrial faunas. Agustí has done an excellent job of bringing these latest developments into the text and integrating them with the great increase in our understanding of European tectonics as well. This is a huge improvement over earlier books, which could talk only vaguely about the time framework (much of which was erroneous), and say very little about global paleoclimate. In this area alone, paleontology has made quantum leaps in our understanding, mostly within a single generation.

Naturally, there are problems that are inherent when one author tries to tackle such a broad spectrum of topics and tries to write outside the areas of his own research expertise. Agustí works on Neogene mammals, which are covered exhaustively (separate chapters on the early, middle, and late Miocene, for example), while the Paleogene (two-thirds of the Cenozoic) zips by in the first third of the

book. As a result, much of what is said about Paleogene mammals is very brief and sometimes cryptic—largely because these animals are so unfamiliar and have few living analogues. Most species of Neogene mammals are given much greater coverage, usually with several sentences speculating on how their ecology differs from other related animals. In some cases, one can see the European perspective on paleomammalogy (in contrast with that of North American paleontologists) in the writing. For example, Agustí follows the view (with which I agree) that hyraxes are closely related to perissodactyls, not tethytheres, even though that idea is out of vogue on this side of Atlantic. Although Agustí is familiar with cladistics, he uses a mixture of that method and older ideas, so there are frequent references to ancestors, widespread use of paraphyletic taxa, and (unfortunately) the persistence of obsolete taxa such as “condylarths” and “Bunodontia” that vanished from paleomammalogy years ago.

There are also problems inherent in writing a book in English when it is not your native language. The copy editor did an excellent job of getting most of the conventional prose and spelling right (although I did find a few typos, such as “staving” instead of “starving,” p. 62, and mistranslations, such as “loosening” when the author means “loss,” p. 35), but was less successful in getting the spelling of scientific terms correct. Anatomical terms such as “condyl” instead of “condyle,” “diasteme” instead of “diastem,” “symphial” instead of “symphysial,” and “ectolophes” instead of “ectolophs” are difficult for a non-specialist copy editor to correct, and are misspelled consistently (or transliterated from their Spanish spelling, which is not the accepted English spelling). Likewise, taxonomic names are often incorrectly spelled: “Hyrachius” and “hyrachid” instead of *Hyrachyus* and hyrachyids; “Parodectes” instead of *Paroodectes*; “Kolpidodon” or “Kopiodon” instead of *Kolpidodon*; “menoceratheres” instead of menoceratines; “rhinocerathine” instead of rhinoceratine, and so on. The book could have used a technical review to catch these problems, since copy editors cannot be expected to have that expertise.

And of course, there are a few technical errors that the author (or a scientific reviewer) should have corrected. For example, Agustí repeats the old myth that shovel-tusked mastodonts ate marsh vegetation, while the wear on their tusks shows no such thing (p. 106). He recycles the outdated notion that *Pliohippus* was ancestral to *Equus*, whereas horse specialists have known for twenty years that *Pliohippus* is a side lineage of independently one-toed horses; *Equus* is descended from *Dinohippus*. He uses the old magnetic “epoch” terminology, which has been replaced by magnetic “chrons” (since they are not “epochs” in the sense of subdivisions of geochronological periods). In one place, he suggests that there were Oligocene multituberculates, whereas all the re-dating of the Eocene-Oligocene transition has placed the extinction of the multituberculates (and the brontotheres, which are ignored here, even though they occurred in Europe) in the late Eocene.

On the positive side, the book is gloriously illustrated with original line drawings (plus color plates in the center) by Mauricio Antón, including illustrations of many animals that have never been reconstructed before. In this respect, the authors have surpassed many other books like this, which are forced by their low budgets and small sales to do their art programs on the cheap, and thus recycle many outdated and inferior illustrations of variable sources and quality.

For the historian of science, this book would be excellent for a comparative study of how much our understanding of fossil mammals has changed in a century from Osborn (1910) through Kurten (1971) to the present book. Clearly, the quality and quantity of data about fossil mammals has increased enormously, which requires somewhat longer and more detailed treatment than Osborn could attempt in 1910. And, as mentioned above, the biggest transformation since 1971

has been the enormous expansion in our knowledge of Cenozoic global climatic changes and how they are precisely correlated to the terrestrial record, which are developments that were only vaguely (and incorrectly) understood in 1910 or 1971.

On the whole, the book is a worthy successor to Kurten (1971), even if it is written at a level that will make it comprehensible only to fossil mammal specialists. Still, for those who must keep up to date with European mammals, there is no better source other than the primary technical literature, which is even more inaccessible to the non-specialist.

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