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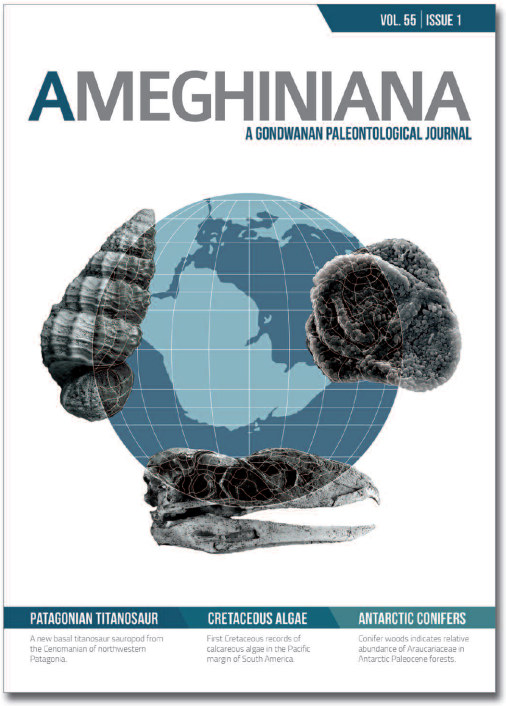

CETACEAN PALEOBIOLOGY

Felix G. Marx, Olivier Lambert and Mark D. Uhen. Wiley Blackwell, 336 pp, ISBN 978-1-118-56127-0.

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To cite this article: Mónica Buono, and Mariana Viglino. (2018). CETACEAN PALEOBIOLOGY. *Felix G. Marx, Olivier Lambert and Mark D. Uhen.* Wiley Blackwell, 336 pp, ISBN 978-1-118-56127-0. *Ameghiniana* 55: 134–135.

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ISSN 0002-7014

CETACEAN PALEOBIOLOGY. *Felix G. Marx, Olivier Lambert and Mark D. Uhen*. Wiley Blackwell, 336 pp, ISBN 978-1-118-56127-0.

The evolution of cetaceans is one of the most spectacular macroevolutionary process in mammalian history. The fossil record of cetaceans, which has markedly increased in the last 20 years, provides an excellent documentation of the morphological changes that accompanied the transition from their ancestral land mammals to obligate aquatic forms, which allows us to understand the modern cetacean body plan. An account of cetacean anatomical adaptations analyzed within an evolutionary context and the fossil record known to date was much needed, and the book "*Cetacean Paleobiology*" by Marx, Lambert & Uhen has fulfilled that objective. The authors use first and foremost baleen whales as a model throughout the book, which is uncommon for most of cetacean literature. Nonetheless, they also include archaeocetes and odontocetes for comparative and evolutive interpretations.

The book has nine chapters. In Chapter 1, the authors introduce the concept of Cetacea, describing their composition and principal characteristics. They also introduce the main concepts used along the book related to functional anatomy, phylogeny, and macroevolution, and the different methodologies nowadays used in cetaceans for these kind of studies.

Chapter 2 starts with an account of the major contributors in the history of cetacean paleontology. Then, it presents the fossil record known to date of cetaceans, with their strengths and weaknesses, types of preservation, geological or geographical biases and their reliability. Then, the most important fossil localities are presented including their age and groups recorded. When applicable, it also discuss the palebiogeographic patterns inferred based on that record.

Chapter 3 is one of the key chapters of the book, and it focuses on the main osteological features of the cetacean skeleton. The osteological characteristics of the two extant groups, mysticetes and odontocetes, are presented but in an evolutionary perspective considering the anatomical changes related to the land-water transition. The descriptions can easily be followed by readers because the authors used a specific but clear terminology, and they are also accompanied by high quality illustrations. Pleasantly, the authors also make a good approach in some important paleobiological aspects of cetacean anatomy, based on osteological correlates of soft tissue structures like muscles, baleen, air sinus systems, nervous system, and sensory organs.

Chapter 4 presents an account of the taxonomy and phylogeny of Cetacea. The authors briefly present how the ideas about the origin of the clade evolved, from Flower until the most recent molecular studies. The authors revise, in a phylogenetic context, the principal characteristics and taxonomic composition of the different groups of archaeocetes, mysticetes and odontocetes. The fossil record of each group as well as some comments about the paleobiogeographic distribution are also presented. Finally, the authors discuss the current conflicts between morphological and molecular studies regarding the phylogenetic position of some groups of mysticetes and odontocetes, and time divergence of the main clades. This is an interesting issue because many of the on-going cetacean debates are focused in the conflictive information provided by molecules and morphology. Moreover, such conflicts have encouraged new anatomical studies focused in, for example, ontogeny, soft tissue reconstructions and combined phylogenetic analysis.

A review of the evolutionary history of cetaceans is presented in Capitalize 5. Here, the authors make an account of archaeocetes, mysticetes and odontocetes in an evolutionary context, presenting their anatomical adaptations, diet, different senses and habitat changes. They also mention the invasion of freshwater habitat by some odontocetes lineages and their specific anatomical adaptations. However, the account of fossil record presented for this group seems scarce. Finally, the authors present a list of key fossil species, with the corresponding publication and a short explanation as to why they are important.

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

Chapter 6 presents the issues a paleontologist has to deal with when studying the fossil record. The authors present how much it is preserved and if different biological aspects of extinct cetaceans, such as feeding strategies, reproduction, migration, sexual dimorphism, diving and ontogenetic age can be inferred.

Chapter 7, on the other hand, presents the macroevolutionary patterns that can be when analyzing cetacean fossil record. It focuses in diversity and disparity patterns, and habitat changes that might be related to such events. These kind of analyses have only recently been applied for cetaceans, and a field to further explore in the future. The authors also discuss the evolutionary patterns of brain and body size, as well as paleobiogeographic and convergence examples.

An interesting is 8, which focuses on the paleontological insights into evolution and development. The authors analyze the evolution of cetacean limbs, vertebral column and dentition morphology, integrating information from paleontology and developmental mechanisms. These kind of methodologies have provided useful information in the last century to paleontologists in order to understand in a more comprehensive way the anatomical transformations occurred along the evolution of cetacean body plan. Finally, they discuss heterochrony, which has been identified as playing an important role in cetacean evolution, with examples from odontocetes and mysticetes.

Chapter 9 gives a summary of the cetacean evolutionary history, listing the main events that the authors have dealt with carefully in the previous chapters. They also mention how humans are currently impacting on cetaceans and the importance of studying extinct species to understand evolutionary patterns and protect living species.

Finally, there is an index and 16 plates, including beautiful reconstruction of extinct cetaceans, illustrations of living species, photographs of different fossiliferous localities and a plot of cetacean diversity over time by family level and ocean basin. Since the book uses specific terminology, inclusion of a glossary would have been useful.

This book presents the main topics of cetacean anatomy and evolution, although not in-depth but in an updated and extensive enough manner to be easily understood. The most important and novel approach is the use of an evolutionary context for the study of cetaceans throughout the book, highlighting the fossil record. It is an important book that will prove to be very useful for students starting their studies in cetacean evolution, but also will be a frequently consulted source by specialists.

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