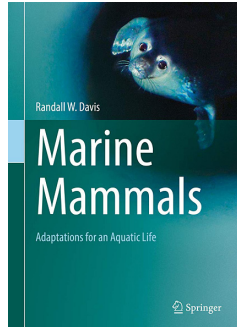


ZOOLOGY

Marine Mammals: Adaptations for an Aquatic Life

By Randall W. Davis. 2019. Springer International Publishing. 192 pages, 99.99 USD, Cloth.

Marine Mammals is a scientific text that reviews the different adaptations of marine mammals that allows them to survive in a marine environment. This book comes from the perspective of physiology, and thus it focusses primarily on the different physiological and sensory adaptations specific to marine mammals. There



are a few different ways to categorize marine mammals, and this book specifically includes all members of Cetacea (mysticete and odontocete whales), Sirenia (dugongs and manatees), Pinnipedia (seals and sea lions), and Sea Otters, and excludes other peripheral marine mammals such as Polar Bears and aquatic sloths. This comparative physiological approach offers a powerful perspective on convergent evolution—how mammals on different evolutionary trajectories all became adapted to living in the same harsh environment that is so different from the terrestrial environment that their ancestors lived in.

The eight general topics covered in this text are: 1) evolution; 2) respiration and the effects of pressure; 3) metabolism and thermoregulation; 4) locomotion; 5) physiological adaptations for breath-hold diving; 6) sensory systems; 7) feeding and digestion; and 8) sleep. As an ecologist, I would have liked to see information on behavioural adaptations; however, the text is already more than 300 pages long and is full of detailed information, so there was clearly no room for more topics beyond physiology. This book would be excellent reference material for anyone studying marine mammals (both students and researchers), and is also filled with information that would be interesting for any naturalist who wants to dive deep into what makes marine mammals so different from their terrestrial counterparts. Some knowledge of physiology and anatomy will be required to understand some of the material in this book.

One of my favourite aspects of this book is how it frames the entire story around the evolutionary history of marine mammals. Chapter 2 gives an interesting overview of how marine mammals evolved from

their terrestrial ancestors, looking at transitions from life on land to life in the water. This sets the stage very nicely for all of the different physiological adaptations that mammals needed to acquire to be able to live in the water. A very useful feature of this book, especially for those wishing to use it as reference material, is that each chapter ends with a good summary, which the reader can quickly skim to determine if the information that they are looking for is present.

As an ecologist who studies bioacoustics (the sounds made by animals) in marine mammals, I was particularly interested in Chapter 7 (Sensory Systems), which includes a section on audition and sound production (section 7.2.1). The section is very detailed, and even describes separate adaptations of the four different groups of marine mammals that this book focusses on. Based on my own understanding of hearing and vocalizations made by cetaceans and pinnipeds, this section does a good job of reviewing the many aspects of hearing and audition in these marine mammals.

The author, Randall Davis, is a professor at Texas A&M University who studies the behaviour and diving physiology of marine mammals. According to the Preface for this book, he wrote a review article on adaptations for diving physiology (Davis 2014), and the editor asked him if he would be willing to turn his review article into an entire book on adaptations for aquatic life. Davis then spent the next five years diving into the scientific literature to determine what adaptations marine mammals have evolved for the life aquatic. This book is the culmination of a tremendous amount of time digging into the scientific literature, and I think that the author has done an excellent job of presenting and summarizing all of this information.

Literature Cited

Davis, R.W. 2014. A review of the multi-level adaptations for maximizing aerobic dive duration in marine mammals: from biochemistry to behavior. *Journal of Comparative Physiology B* 184: 23–53. <https://doi.org/10.1007/s00360-013-0782-z>

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