

Book Review

MOLECULAR AND CELL BIOLOGY OF MARINE MAMMALS. Edited by Carl J. Pfeiffer, 427 pp. Krieger Publishing Company, Florida, 2002. ISBN 1-57524-062-9.

This well-organized volume presents a comprehensive overview of the application of molecular and cell biology to the study of marine mammals to date. Throughout the book, leading authorities in their respective fields discuss not only the field and laboratory techniques employed, but also the evaluation of behaviourally derived hypotheses and the methods of data analysis. The topics covered range from molecular genetics and disease diagnosis, to immunology and cellular structure. The contributions are generally well written and although the information is not 'cutting edge', each chapter presents an accurate synthesis of data currently available through primary peer-reviewed publications.

Sections I and II address the key uses of molecular genetics illustrated through case studies on species ranging from bottlenose dolphins (*Tursiops truncatus*) and sperm whales (*Physeter macrocephalus*), to elephant seals (*Miownga* sp.), and sirenians. Throughout these two sections, molecular genetic techniques are employed to examine molecular evolution, phylogeography, phylogenetics, social structure and mating systems, demonstrating both the depth and breadth of molecular studies.

In Chapter 1, Duffield and Wells summarize the current understanding of the structuring of the best-studied population of inshore bottlenose dolphins to date. They describe the techniques employed to assess the structuring of this population in Sarasota, Florida, and discuss both the extent and limitations of inference from molecular genetic data highlighting future research directions.

In Chapter 5, Dillon *et al.* provide a thorough review of the state of knowledge of the structuring of sperm whale populations globally. They also address the advantages and disadvantages of two contrasting methods of tissue sample collection (biopsy sampling vs non-invasive tissue sampling). Both Dillon *et al.* and Schaeff (Chapter 7) discuss the benefits of molecular ecology in filling knowledge gaps in data gathered from direct observations. Students of molecular genetics will greatly appreciate the detailed discussions of the values and

properties of commonly used molecular markers and the pros and cons of contrasting markers, reiterated in several chapters.

The chapter by Coltman *et al.* (Chapter 13) on harbour seals (*Phoca vitulina*) offers a well-written overall view of molecular ecology studies, from an introduction to existing data on population structure from conventional methodologies, to the application of molecular genetic data for testing specific hypotheses concerning kin selection. They review the genetic data for each marker type, applying the data to the study of population structure, and then compare and contrast the results across markers; providing an excellent example of how these data can be used to assess reproductive success, kin selection, and individual fitness.

The studies highlighted and summarized in each chapter direct the reader towards a comprehensive list of relevant primary literature, and provide valuable information through discussions of the inferential limitations of the molecular work conducted to date. A prominent thread common throughout the two opening sections is the use of molecular genetics to assess hypotheses that have been developed through long-term observations, emphasising the value of longitudinal studies in understanding the biology and ecology of long-lived marine mammals, and the value of integrating both behavioural and molecular data.

The next section (III) covers the mechanisms, detection, and diagnosis of marine mammal diseases. Barrett & Rima (Chapter 15) start the third section of the book with an introduction to morbilliviruses that covers the phylogenetic relationships between different viruses within the genus, the mechanism of infection, and the global occurrence of morbilliviruses in marine mammals. This chapter is complemented by Kennedy *et al.*'s presentation of immunohistochemical techniques for morbilliviral disease diagnosis (Chapter 17). Other diseases covered throughout this section include Lobo's disease, cetacean erysipelas, brevetoxicosis, and papillomaviruses. As in the first two sections of the book, the authors introduce the various molecular techniques in a clear and concise fashion. Each chapter contains an overview of the assay(s) employed in the study of marine mammals that is easily comprehended by anyone with a background in biological sciences.

The disease epidemiology and pathology reviewed in Section III leads into the marine mammal immunology discussed throughout Section IV. The opening chapter (Chapter 23) in this section greets the reader with a great overview of the generalized mammalian immune system, and then reviews the current knowledge of cetacean immunology.

Romano *et al.* characterise cetacean immune system structure and function in Chapter 25, and demonstrate a neural-immune interaction in belugas. This chapter presents important advances in understanding the effects of external stressors on cetacean immunocompetence, an avenue that will likely attract much attention in achieving greater understanding of factors contributing to the management and conservation of marine mammals.

The volume closes with a section covering cetacean cellular biology and ultrastructure. Section V comprises several chapters covering a

wide range of topics from cell culture growth and cytological characteristics, *in vitro* fertilization, intercellular chemical signalling, mechanisms of cetacean vision, and epidermal and epithelial cellular structure.

Overall, this book is an impressive collection of papers presented by the leading authorities in their fields covering the current state of knowledge in the broad fields of molecular and cellular biology of marine mammals. Whilst a review, rather than a presentation of new information, this book would constitute a valuable addition to the library of any student of marine mammal cellular or molecular investigations.

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