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Book Review

DEEP THINKERS: INSIDE THE MINDS OF WHALES, DOLPHINS, AND PORPOISES. Janet Mann (Ed.). University of Chicago Press, Chicago, Illinois, 2017. 022638747X; ISBN13: 9780226387475, 192 pp. (Published in Europe by Ivy Press under the title *Deep Thinkers: An Exploration of Intelligence in Whales, Dolphins, and Porpoises*)

Cetacean intelligence has long been a topic of intense interest. We are fascinated with stories of their tool use, self-recognition, flexibility in problem solving, how and what they communicate with one another, their social organization and cultures, and so on. Cetacean intelligence is a niche topic made accessible to a wide audience in *Deep Thinkers* through a combination of well-written text and more than 150 illustrations. This book is edited by Dr. Janet Mann whose research interests focus on social networks, life history, conservation, tool use, social learning, and culture among the bottlenose dolphins of Shark Bay, Australia, and, understandably, this volume draws heavily from her areas of interest. *Deep Thinkers* is authored by Dr. Mann and her expert contributors: Drs. Camilla Butti, Heidi E. Harley, Patrick Hof, Vincent Janik, Eric Patterson, Andrew Read, Luke Rendell, Laela Sayigh, and Hal Whitehead. Marine photographer Bryant Austin's close-up shots of whales awe visually, nicely complementing how the reader will feel when reading the book itself.

The book is divided into eight chapters, and I really liked the labeling on the left side of the pages in the book so you knew which section of the book you are reading. This was especially helpful since each chapter is composed of focal subtopics that can be quickly read as standalone pieces, which makes this a nice book to read equally if you have only short blocks of time or are reading it cover to cover.

As an introduction, the book begins with a brief account of cetacean evolution and a feel for the unique anatomical adaptations of these species. This was an ambitious amount of information to cover in just a few pages, and I personally feel like it came up a bit short. For example, I would like to have seen a list of cetacean species and/or some indication of the taxonomy of cetaceans past the suborder level since various species are referred to in this book. The introduction to this section says it demonstrates "convergence with other taxonomic groups in a range of other habitats (land, sea, air)," but then never actually presents that information except as a garbled list of traits for the reader to decipher. I also was disappointed that the differences between odontocetes and mysticetes were not better addressed in this chapter (though some of these are indeed addressed later in the book in Chapter 5).

Chapter 1, "Beneath the Surface" (Mann & Read), starts with the question "How and why do we study cetaceans?" This chapter looks at some of the different ways in which humans have gleaned information on cetaceans, ranging from whaling to research involving captive individuals and field studies. The latter was the most interesting part of the chapter to me. This section included short descriptions of individual identification; surveys; behavioral, biological, and acoustic sampling techniques; tagging; and newer technologies, including autonomous vehicles (i.e., drones). This was formidable to cover in just a few pages, and I have to admit that I felt a little let down that there were not more photographs of the techniques mentioned. I personally would like to have seen some reference made to the fact that many researchers are working under permits as well as the importance of studying stranded animals. The "why we study cetaceans" is not actually addressed in this chapter, but we can presume that this is addressed by the subsequent chapters.

Chapter 2, "The Cetacean Brain" (Butti & Hof), considers the relationship between brain and body mass and how scientists determine what it means to have a big brain. The chapter begins with a discussion of the evolution of the cetacean brain. The authors then turn to comparing the structure of cetacean and hippopotamus (closest living land relative) brains, then cetacean vs human brains and odontocete vs mysticete brains. Brain weights and basic details of brain parts and functions are described, and the concept of encephalization quotient as one estimate of relative brain capabilities is presented in comparative terms for cetaceans vs primates vs elephants. Informative illustrations depict the complex particulars presented. Information presented in this chapter nicely sets the stage that the large brain of cetaceans evolved to support complex cognitive abilities. I should note that this was the most technical part of the book, with terminology that might be a bit over the head of some readers. I suspect there are some

folks that will skip right through to read the subsequent chapters.

Chapter 3, "Cognition" (Harley), provides the reader with information regarding how the mind of a dolphin is studied. Various research programs and their efforts are introduced to the reader, with easy to understand and engaging accounts of the dolphins in those programs and their contributions to our understanding of dolphin cognition. The chapter concludes with information on the manners in which cetaceans perceive their world as well as themselves.

Chapter 4, "Cetacean Communication" (Sayigh & Janik), examines how cetaceans (both odontocetes and mysticetes) communicate with one another. The authors of this chapter effectively use visual information for the reader in the form of schematics of sound production and reception and how dolphins echolocate, as well as spectrograms to illustrate the different types of cetacean sounds. Two case studies revolving around signature whistles are presented. The chapter concludes with a discussion of how anthropogenic noise sources affect the ability of cetaceans to communicate with one another.

Chapter 5, "Quintessentially Social Cetaceans" (Mann), describes the social lives of cetaceans, with a very heavy focus on the long-term work of Mann and her colleagues in Shark Bay, Australia. Explored are the important bond between a mother and her calf to the complexity of dolphin communities, as well as how bonds between dolphins are maintained and the importance of group living in general.

Chapter 6, "Deep Culture" (Whitehead & Rendell), assesses behavior, communication, social dynamics, migration, cooperative hunting, and learned foraging techniques. Cultural attributes have been identified in many cetacean species, and the authors provide an interesting and easy to comprehend distillation of that information. A case study of cultural transmission is presented in the form of kick feeding behavior in humpback whales off the U.S. East Coast.

Chapter 7, "Cetacean Tool Use" (Patterson & Mann), presents information on how cetaceans use tools for different tasks and different reasons. This is arguably one of the most interesting chapters of the book. The authors talk about tools used in social contexts (e.g., object waving to attract females and sea-shell throwing) and foraging (e.g., water jets, bubble clouds and nets, mud plumes and rings, wave-washing, and sponging). You can really feel the enthusiasm the scientists have for this topic, and this chapter is richly illustrated.

Chapter 8, "Us & Them" (Read), looks at how humans and cetaceans coexist. Hunting, fishing, pollution, and acoustic disturbance are among the threats that whales and dolphins face from human activity. This chapter does a very good job of imparting the fact that the conservation status of these social and intelligent animals is dire indeed. I very much liked that the section concluded with useful information on what the reader can do to help cetaceans—not leaving the reader in a bit of despair after all the doom and gloom that faces these animals and their environments.

The book concludes with a helpful glossary of terms and a section listing resources for further information (i.e., books, papers/periodicals, and websites). While I would not expect a comprehensive list, notable oversights include no mention of the *Encyclopedia of Marine Mammals* (3rd ed.), *Marine Mammals of the World*, *Cultural Lives of Whales and Dolphins*, or *Sperm Whales: Social Evolution in the Oceans* (the latter two also published by the University of Chicago Press) or links for the European Association for Aquatic Mammals, the Society for Marine Mammalogy, the U.S. Marine Mammal Commission, or a number of other research organizations.

The printed book is sturdy and well-bound and dressed with a nice dust jacket (even the book under the dust jacket has the same beautiful images that the dust cover has), which means it will hold up to repeated use and will equally present well just lying on a coffee table. My major criticism with this book is with the publisher's ill-advised print choice. The type font choice is small and light-inked, which makes the book look at first glance slick and artsy but actually makes it tedious to try to read for any extended period of time, especially if you have old or tired eyes. Additionally, there were some minor oversights in the book. To name just a few, a striped dolphin is erroneously labeled "white striped dolphin" (p. 178); "balaenids" and "white whale" are just a few terms with typographical errors in the index; and the glossary in some parts is muddled with terms out of alphabetical order.

In summary, *Deep Thinkers* is an excellent compilation that delivers, as the publisher promises, "an awesome and inspiring journey into the fathoms—a reminder of what we gain through their close study, and of what we lose when the great minds of the sea disappear."

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