nected Borneo with Australia and that all mammals except marsupials "traversed [the Cretaceous-Tertiary boundary] without major variations"—a supposition hardly supported by the excellent fossil record of North America. It is also somewhat misleading to state that the didelphoid family "has only one representative: the opossum," because this belies the considerable ecological diversity among its 80-odd living species. Such errors, though, largely concern the book's periphery.

These imperfections will not lead astray the informed reader. Many of those who delve into *Mammoths, Sabertooths, and Hominids* will certainly benefit from such a comprehensive and detailed account of how Europe's mammals have changed over the last 65 million years. For European faunas, there really is no resource like it.

BOOKS: ZOOLOGY

Mammals of the Sea in Science and Culture

Ronald J. Schusterman

An encyclopedia is a set of cross-referenced articles, usually arranged alphabetically, intended to cover all aspects of knowledge dealing with a circumscribed subject matter. The focal subject of *Encyclopedia of Marine Mammals* comprises the order Cetacea (whales, dolphins, and porpoises), the order Sirenia (dugongs and manatees), and several members of the order Carnivora: polar bear, marine otters, and the pinnipeds (true seals, sea lions and fur seals, and walruses). Editors William F. Perrin, Bernd Würsig, and J. G. M. Thewissen have produced a grand compilation of 283 essays by 253 expert authors, who discuss topics from "Abundance Estimation" through "White-Beaked Dolphin." The essays vary in length, style, and, to some extent, objectivity; nevertheless, all are quite readable and some are original, eloquent, and even moving.

Encyclopedia of Marine Mammals
William F. Perrin, Bernd Würsig, and J. G. M. Thewissen, Eds.
Academic Press, San Diego, 2002. 1452 pp. $139.95, £90. ISBN 0-12-551340-2.

On the whole, the volume's format provides a generally effective and efficient mode for transmitting information from the vast literature reviewed by the authors. Human impacts, research methodology, physiology, ecology, and evolution are among the aspects considered in focused and cohesive essays.

Much of the material on the behavior and physiology of marine mammals has been gleaned through the use of new telemetry devices, which researchers are using to obtain a window into the underwater world of their subjects. When, in the 1960s, Gerald Kooyman developed the first underwater data loggers for pinnipeds, little was known about the diving, foraging, traveling, and migration patterns of marine mammals. Today, creative applications of digital technology allow scientists to collect detailed information about the activities and environments of free-ranging animals. For example, researchers can attach miniaturized "crittercams" and hydrophones to individual mammals in order to better understand what they see, say, and hear below the surface of the sea.

Hanging together. After the breeding season in the Channel Islands of California, male California sea lions (*Zalophus californianus*) of all ages aggregate in large numbers at Año Nuevo Island, 500 km to the north. Benefits of group living include thermoregulation, enhanced detection of predators, and improved foraging ability.

CREDIT: COLLEEN REICHMUTH KASTAK/LONG MARINE LABORATORY, UNIVERSITY OF CALIFORNIA SANTA CRUZ

In several essays, contributors address topics related to conservation, endangered species, and environmental threats; these accounts make it clear that their authors are rightfully concerned about human degradation of marine mammal habitats. Authors also point out that no matter how impressive conservation efforts may appear, the steps are often only palliative. In the context of global politics and economics, many governments are failing to protect and regulate marine habitats when doing so would conflict with the demands of free enterprise. The conservation theme is also highlighted by various accounts that describe changes in species abundance. For example, James Estes and his colleagues note that the precarious decline of sea otters in the Aleutian archipelago has resulted in concomitant changes in sea urchin density, grazing intensity, and kelp density in subtidal areas. The otter decline itself may be related to a shift in prey preference by killer whales, whose former diet of Steller's sea lions and harbor seals has declined (perhaps as a result of global climate changes and other human impacts). In a volume filled with concise facts and figures, these big-picture stories are invaluable.

With regard to the always contentious topic of the evolutionary history of marine mammals, the authors summarize some remarkable molecular and fossil findings about the origins of whales. Although there are several competing hypotheses about phylogenic relationships among cetaceans and various extant ungulate taxa, recent fossil evidence for the origin of aquatic locomotion in primitive whales suggests close ties between cetaceans and even-toed ungulates. Indeed, this morphological evidence and molecular data indicate hippopotamuses may actually be the closest living relatives of whales, with whom they share several aquatic specializations, including underwater sonic signaling.

Many of the shorter essays describe interesting and obscure facets of marine mammal biology and culture that even the most seasoned reader will savor. One such article delightfully explains the mysterious origins and unusual characteristics of ambergris, a fragrant, lumpy, and legendary substance now known to be formed in the intestines of sperm whales. Another samples folklore and mythology from the times of the ancient Greeks to contemporary beliefs about these animals serving as personal patrons or tribal totems—in other words, as sources of wisdom, strength, and inspiration.

It is traditional for reviewers of encyclopedia to identify errors of omission, as the constraints on length inevitably produce gaps in coverage. The otherwise readable and original essay on pop culture emphasizes cetaceans but omits any significant references to pinnipeds, despite their overlapping presence with people in coastal areas around the world. For example, the ongoing invasion of California sea lions at San Francisco's Pier 39 vastly affects local

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tourism and economics; on protected beaches a little farther south, every winter massive northern elephant seals strut their reproductive stuff before throngs of enthusiastic tourists. Contributors provide extensive coverage of the importance of communication to marine mammals, but the principal material emphasizes only the cooperative nature of communication without also considering its selfish features. Selfish-gene theory suggests that animals manipulate the behavior of other individuals with their own signals and use the signals produced by others to assess their strengths, weaknesses, and motivations. Another surprising oversight is the failure to mention Winthrop N. Kellogg's significant contributions to the discovery of echolocation in dolphins.

The alphabetically arranged entries are followed by a list of living and recently extinct species of marine mammals, a set of very brief biographical sketches, and a comprehensive glossary. The paragraph-long biographies highlight 53 individuals (all deceased) who made lasting contributions to the field; each includes references to some of the individuals' most important work. It is fitting that the editors have dedicated this ambitious volume to one of these individuals, the late Kenneth S. Norris: a premier cetologist, a great naturalist, and an inspirational leader of the current crop of marine mammalogists.

As I digest the myriad of information included in this volume, I am continually reminded of my own early days in the field. In the 1960s, my colleagues numbered only in the tens, and what little we knew was scattered in relatively obscure and inaccessible sources. Over the past few decades, our science has grown exponentially, fueled in large part by society's unabated enthusiasm for marine life. As a result, we have come to understand a great deal about marine mammals and their lifestyles. Indeed, the average marine mammalogist has trouble keeping up with the information explosion currently taking place. This timely encyclopedia, along with several newly published textbooks (*1*–*3*), establishes a solid and satisfying foundation for current study and future exploration.

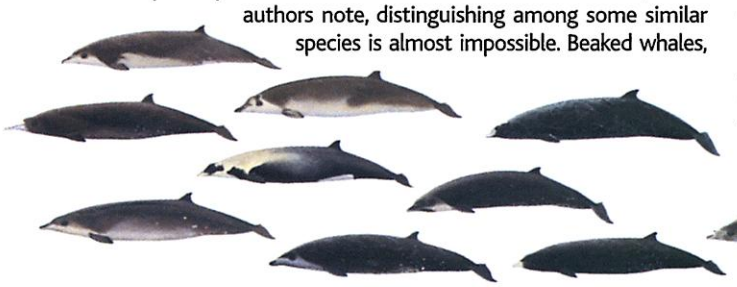
References

1. A. R. Hoelzel, Ed., *Marine Mammal Biology: An Evolutionary Approach* (Blackwell, Oxford, 2002).
2. A. Berta, J. L. Sumich, Eds., *Marine Mammals: Evolutionary Biology* (Academic Press, San Diego, CA, 1999).
3. J. E. Reynolds III, S. A. Rommel, Eds., *Biology of Marine Mammals* (Smithsonian Institution Press, Washington, DC, 1999).

BROWSINGS

National Audubon Society Guide to Marine Mammals of the World. *Pieter Folkens (illustrator), Randall R. Reeves, Brent S. Stewart, Phillip J. Clapham, James A. Powell.* Knopf, New York, 2002. 530 pp. $26.95, £23.95. ISBN 0-375-41141-0.

This guide offers readers an introduction to the appearance, occurrence, and habits of mammals that spend at least part of their lives in the sea. Accounts for each of the 125-odd extant species summarize current knowledge of behavior, reproduction, foraging tactics and food, population sizes, and conservation status. The paintings, photographs, and descriptions provide useful hints for field identification. But, as the authors note, distinguishing among some similar species is almost impossible. Beaked whales,



such as *Mesoplodon* (above), are particularly challenging: They favor deep waters, spend little time near the surface, and are so difficult to encounter that several species have never been seen alive.

CREDIT: PIETER FOLKENS/COURTESY ALFRED A. KNOPF, INC.

The Atmospheric Environment. Effects of Human Activity. *Michael B. McElroy.* Princeton University Press, Princeton, NJ, 2002. 320 pp. $80, £55. ISBN 0-691-00691-1.

This text offers nonspecialists a comprehensive introduction to the physics and chemistry of Earth's atmosphere. McElroy discusses relevant aspects of biogeochemical cycles, ocean dynamics, and climatic history. He also addresses problems such as air pollution, ozone depletion, and climatic change. His account outlines important deficiencies in our current understanding as well as the policy implications of what we do know.

The Fate of the Mammoth. Fossils, Myth, and History. *Claudine Cohen.* University of Chicago Press, Chicago, 2002. 331 pp. $30, £19. ISBN 0-226-11292-6. Translated from the French edition (1994) by William Rodarmor.

With their massive bodies, shaggy coats, and heavy curved tusks, wooly mammoths have fascinated humans from Paleolithic artists who left their images on cave walls to molecular biologists who are attempting to retrieve their DNA. They survived until about 10,000 years ago, and their bones were among the first fossils to be recognized as the remains of extinct animals. In this enjoyable, stimulating, and well-illustrated account, Cohen discusses the mammoth's natural and cultural histories. She also explores how changing views of a single organism illuminate the development of scientific methods and practices.

Eye of the Albatross. Visions of Hope and Survival. *Carl Safina.* Holt, New York, 2002. 397 pp. $27.50, C$41.95. ISBN 0-8050-6228-9.

Safina structures this consideration of human impacts on seabirds and the marine environment around the travels of an individual Laysan albatross through one breeding season. A satellite transmitter allows the bird to be tracked as she journeys from her nest in the Northwest Hawaiian Islands. Some short excursions total only a few hundred kilometers; trips to subarctic waters teeming with food may last two weeks and cover 6500 km. Along with the discussions of ecology, evolutionary biology, and conservation, the author provides firsthand accounts of field biology on remote tropical islands and of life on a trawler in the Gulf of Alaska that fishes with longlines while avoiding killing seabirds on the thousands of hooks.

I Have Landed. The End of a Beginning in Natural History. *Stephen Jay Gould.* Harmony, New York, 2002. 429 pp. $25.95, C$39.95. ISBN 0-609-60143-1.

I Have Landed. Splashes and Reflections in Natural History. Jonathan Cape, London, 2002. 429 pp. £17.99. ISBN 0-224-06299-9.

This is the tenth collection of Gould's essays for the general reader, most of which first appeared in his column in *Natural History*. Through 27 years and 300 consecutive issues, he offered informative excursions into the worlds—and, often, obscure corners—of evolution, biology, culture, and the history of science. This last collection ranges over topics from the "intellectual promiscuity" of the writer and lepidopterist Vladimir Nabokov to a 1836 paper in which the physiologist Friedrich Tiedemann argued for the equality of races. Gould's final *Natural History* column memorialized his grandfather's landing in New York on 11 September 1901, and the book includes four short pieces written in response to the events of the centenary of that day.