

Sex in Cetaceans

Bernd Würsig • Dara N. Orbach
Editors

Sex in Cetaceans

Morphology, Behavior, and the Evolution of
Sexual Strategies

 Springer

Editors

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Cover image: Several species of cetaceans engage in male-male scramble competition for access to a single female. In gray, bowhead, and right whales, there is often much white water at the surface while males attempt to position themselves to mate with the female. Accumulating data support female mate choice and that females make it difficult for all or some males to mate. This image from an unoccupied aerial vehicle shows two sexually active gray whales “hug” the female in the center. Image by Fabian Missael Rodríguez-González, with permission.

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Preface

When we editors first envisioned this book on cetacean sexual strategies and tactics, we worried that there was not enough known on the subject to produce an in-depth specialty book that spanned the vast cetacean populations and species. After all, mating often occurs beneath the surface of the water out of sight of human observers, with copulation not having been witnessed (or at least not published) for most cetacean species. When we surveyed colleagues, we received back the resounding supportive response: “Do it—It is time!”. *Sex in Cetaceans: Morphology, Behavior, and the Evolution of Sexual Strategies* has demonstrated that there is a wealth of knowledge within the discipline and much work ahead for aspiring cetologists. We hope that this compilation will serve as a foundational tool for academics and non-academics in identifying the knowns and unknowns and shape where the discipline could progress. We point out that sex can be fun or function in learning; thus, not all sexual acts are procreative in nature. Some examples are homosexual mating and copulation among sexually immature animals.

Historically and regardless of species, much research into sexual selection has used a male-centric perspective, with males believed to have active roles and females generally believed to have passive roles in conception. Because cetacean pregnancy is at least 11 and up to 17 months in duration, the minimum interbirth interval is one year and generally much more, the duration of lactation can span 7 years in some species, and paternal care is unconfirmed, females are heavily invested temporally and energetically in their offspring’s survival. Selection of “the best” mate who will increase offspring viability via heritable traits is critical and it is unlikely that females mate “promiscuously” without discerning among prospective mates. Yet, it is unclear which traits are “the sexiest” among cetaceans, as the fluid three-dimensional oceanic habitat poses unique constraints and liberties that differ from terrestrial and arboreal environments. Whereas sexual size dimorphism is generally advantageous on land to monopolize a female, adroitness and agility may be favored in the ocean. The ability to survive—perhaps evident from many battle scars indicative of physical combats, attainment of a large body size, or “ornaments” that pose handicaps—may also contribute to a male’s “sexiness”. As underwater sound travels

faster and with less attenuation than in air, acoustics produced by males may provide females with cues about prospective suitors. A large relative testes-to-body-size ratio—higher in cetaceans compared to terrestrial counterparts likely due to relief of gravitational constraints—and penis length may augment fertilization success during and post-copulation through sperm competition and cryptic female choice. This book explores these ideas, including the post-copulatory aspects of reproduction related to rearing of offspring.

Chapter 1 lays the groundwork of sex and sexual strategies, in general, in mammals, and especially in marine mammals, while Chap. 2 provides a foundation in genetic tool use to explore the consequences of sex. Chapters 3–6 investigate broad evolutionary aspects of sex in cetaceans, including morphologies such as dentition (Chap. 3), hindlimbs (Chap. 4), female reproductive anatomy (Chap. 5), gonads (Chap. 6), and sexual dimorphism (Chap. 6). Chapters 7–11 explore sexual behaviors in nature and captivity (Chap. 9), including non-conceptive mating (Chaps. 7 and 8), infanticide (Chap. 10), and the application of promising drone technology as a novel vantage point for observations (Chap. 11). Chapters 12–19 delve into species-specific morphologies, genetics, and behaviors in toothed whales, including bottlenose dolphins (Chap. 12), Risso’s dolphins (Chap. 13), dusky and spinner dolphins (Chap. 14), pilot whales (Chap. 15), killer whales (Chap. 16), beaked whales (Chap. 17), porpoises (Chap. 18), and sperm whales (Chap. 19), with our apology that not all species could be represented. Chapters 20–23 focus on sex in baleen whales, including humpback whales (Chap. 20), right whales (Chaps. 20 and 23), gray whales (Chap. 21), and bowhead whales (Chap. 22). Chapter 24 discusses aspects of sex and sexual strategies that provide important considerations in the health and welfare of individuals, populations, and species of cetaceans. We gave authors much leeway, so the “voice” among chapters may be quite different (e.g., “managed care” vs “captivity”). We did not make moral (“human”) judgments when editing the chapters of this compendium, and we believe that the authors did not do so either.

We thank the authors for making this book an up-to-date compendium of concepts in sex and procreation within cetaceans. We thank the >50 reviewers, some anonymous and some acknowledged, who reviewed and provided insightful edits to the 24 chapters. We especially thank Thomas A. Jefferson, who served as guest editor of several chapters of which we editors were co-authors, and who shepherded those manuscripts through the thorough peer-review processes. We thank Éva Lörinczi and Bibhuti Sharma of Springer Nature for selflessly giving good advice and moral encouragement. We also thank our universities, Texas A&M University at Galveston and Texas A&M University-Corpus Christi for generously providing funds to make this compendium open access, with digital versions of all chapters free to all readers.

Submitted with respect, Bernd Würsig and Dara N. Orbach

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