

Commentary

Cetaceans: Illuminating Evolution and Ecological Dynamics

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Description

Extant cetaceans (whales, dolphins, and porpoises) and their extinct ancestors offer some of the strongest and best-known examples of macro evolutionary transition as well as micro evolutionary adaptation. Unlike most reviews of cetacean evolution, which are intended to chronicle the timeline of cetacean ancestry, document the current knowledge of cetacean adaptations, or simply validate the brute fact of evolution, this review is instead intended to demonstrate how cetaceans fittingly illustrate hundreds of specific, detailed terms and concepts within evolutionary biology and evolutionary ecology. This review, arrayed in alphabetical glossary format, is not meant to offer an exhaustive listing of case studies or scholarly sources, but aims to show the breadth and depth of cetacean research studies supporting and investigating numerous evolutionary themes. Perhaps no story within the field of evolutionary biology has attracted more popular attention over the past half century as the evolution of whales. This is undoubtedly due to the steady stream of striking, significant, and substantial fossil finds, and to the general appeal of whales and dolphins to scientists and non-scientists alike. No general textbook of modern biology is complete without at least a minor section or box feature outlining the reversion of early cetaceans to the watery habitat of their pre-mammalian tetrapod ancestors, and the many consequent anatomical and ecological changes that followed this major shift. This is a story well and broadly told in print, online, and in superb, instructive video documentaries. Where textbooks of the preceding century could reliably be counted on to depict evolution with the history of horses from Eohippus to Equus, cetaceans are now justifiably cited as prime exemplars of biological evolution. Given this ubiquity, Thewissen and Bajpai

crowned cetaceans as the current “poster child for macroevolution.” These are presented in alphabetical glossary form. They can be used by teachers or scholars searching for examples, or they can simply raise awareness about cetacean research. Neither the examples nor the cited references are meant to offer an exhaustive listing of case studies and illustrations. Rather, the aim is to provide readers, specialists, and non-specialists alike, with an appreciation for the breadth and depth of cetacean research studies. Given their relatively rapid return to the sea, and hence major change in environment, it is instructive to examine all features of Cetacea within light of the terrestrial-to-aquatic transition. For example, the multi-chambered cetacean stomach is well known. Is this a legacy of cetacean ancestry (specifically their close relation to—indeed, their classification within. Artiodactyl, many of which have stomachs with multiple compartments), or does this instead represent a functional adaptation. A mill for gastric breakdown of ingested food items in the absence of cusped teeth and mastication typical of mammals. Like the compartmentalized stomach, many aspects of cetacean bodies and life history offer prime examples for explicating and elucidating evolution. The following list of examples runs the gamut from anatomical, behavioral, genetic, and physiological traits, all intended to demonstrate the ease and effectiveness with which Cetacea provides a deep, rich well of exemplars for teaching and studying evolution.

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None.

Conflict of Interest

None.