

**PhD Dissertation**  
**Department of Environmental Science and Policy**  
**College of Science**  
**George Mason University**

**Candidate:** Nickolas A. Brand

**Defense Date and Time:** April 15, 2024 at 11:00am

**Defense Location:** Hybrid - Johnson Center Meeting Room E, Room 334 and Virtual

**Title:** Filter Feeders in the Making: Examining the Evolution, Expansion, and Ecology of the Stem Mysticetes

**Dissertation Directors:** Dr. Mark D. Uhen

**Committee:** Dr. David Luther, Dr. Stacey Verardo, Dr. Carlos M. Peredo

**ABSTRACT**

Modern baleen whales evolved from toothed ancestors in the Late Eocene-Early Oligocene. The relationships and ecology of this group have been highly controversial, with few hypotheses retaining stable consensus. This dissertation provides a study of stem mysticete phylogenetics and paleobiogeography, which refutes a rising hypothesis wherein basal mysticetes are reclassified as archaeocetes. Elliptic Fourier Analysis of cheek teeth indicates a divergence in form of mysticete and odontocete teeth by the late Chattian. Finally, an analysis of lateral palatal foramina in extant cetaceans provides evidence against a longstanding, controversial hypothesis that these structures are indicative of baleen in fossil mysticetes.