



The Evolutionary Diversity of Syngnathid Fishes

H Hamilton, N Saarman, GA Short, WB Simison

Presenting Author: Healy Hamilton

Author 1) NatureServe, Arlington, Virginia USA; Author 2) Yale University, New Haven, Connecticut USA, Authors 3 & 4) California Academy of Sciences, San Francisco, California USA

Abstract: Although syngnathid fishes have long been fascinating for their many unusual traits, such as male brooding, derived body plans, and extraordinary crypsis, their evolutionary relationships remain poorly known. A lack of taxon sampling, few diagnostic morphological characters, and limited molecular data have provided an incomplete picture of patterns of syngnathid diversification. Based on extensive field collecting and expanded genetic sampling, we present a phylogenetic hypothesis focused at the generic level for 91 syngnathid species representing 48 of the 57 recognized genera, including many genera never previously investigated using phylogenetic analysis. We synthesize evidence from eight nuclear and mitochondrial markers, 17 morphological characters, and biogeographic distributions to present an integrative hypothesis of syngnathid evolution. The results confirm the deep phylogenetic split between lineages with trunk- or tail-brood pouch placement, define well-supported and sometimes novel clades, and suggest multiple pathways to characters such as prehensile tails, complex skin filaments, and fully enclosed male brood pouches. We propose a revision of Syngnathidae classification into only two subfamilies: the Nerophinae and the Syngnathinae. For multiple genera, taxonomic revision is required to reflect deep evolutionary splits in nominal lineages from the Atlantic versus the Indo-Pacific. Our results suggest the highly cryptic, miniaturized pygmy pipe horses evolved independently in the Atlantic and Pacific oceans, and neither lineage represents an evolutionary pathway between pipefish and seahorses. Contrary to previous studies, we find the seahorse genus *Hippocampus* originated in the IndoPacific and is most closely related to a strikingly diverse clade that includes both the elongate *Trachyrhamphus* and the highly ornate *Haliichthys*.

Keywords: Evolution, Phylogenetics, Ecology, Biogeography