



Brain Size Evolution in Syngnathidae: The Role of Sexual Selection and Feeding Ecology

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Abstract: Brain size varies greatly across vertebrates. Feeding ecology, life history and sexual selection have been proposed as key components in generating contemporary diversity in brain size. Analyses of brain size evolution have so far been limited to lineages where males predominantly compete for mating and females choose mates. This research bias has considerably compromised our understanding of brain size evolution with respect to the role of sexual selection. Here, we present the first original data set of brain sizes in pipefishes and seahorses (Syngnathidae) a group in which intense female mating competition occurs in many species. After controlling for the effect of shared ancestry and overall body size, brain size was positively correlated with relative snout length. Moreover, we found that females, on average, had 4.3% heavier brains than males and that polyandrous species demonstrated more pronounced (11.7%) female-biased brain size dimorphism. Our results suggest that adaptations for feeding on mobile prey items and sexual selection in females are two major factors in brain size evolution of pipefishes and seahorses. Most importantly, our study supports the idea that sexual selection plays a major role in brain size evolution, regardless of on which sex sexual selection acts stronger. Our study adds significant credibility to an old but highly controversial idea that brain size is a sexually selected trait.

Keywords: Evolution, Behavioral ecology, Phylogenetics, sexual selection, phylogenetic comparative method