Department of Biology
St. Cloud State University

Biology Seminar

Phylogenomics of Lanternfishes and the Evolution of Feeding Structures

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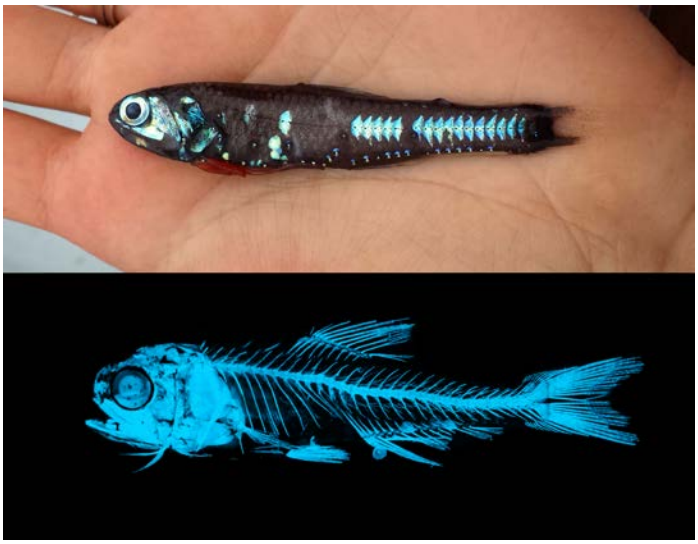

Mechanisms of speciation in the deep-sea, an environment with few physical isolating barriers, are relatively understudied in deep-sea fishes. This research focuses on the lanternfishes (Myctophiformes ~250 species) as a study system to investigate speciation in deep-sea environments and to test new phylogenomic approaches at resolving contested phylogenetic relationships. This study is the first to infer the evolutionary relationships of lanternfishes with a genome scale target-enrichment approach with ultraconserved elements (UCEs), which are noncoding areas of the genome that are highly conserved across distantly related taxa. Little is known regarding how lanternfish achieved such high species richness in the deep sea, and this study also focuses on the evolution of feeding structures in lanternfishes, and the potential for niche differentiation in this group. Geometric morphometrics were performed on 955 lanternfish specimens, and an ancestral character-state reconstruction was used to examine patterns of evolution in mouth size in lanternfishes. I identified that mouth size in lanternfishes is highly variable, with general trends towards longer and shorter mouths in various clades of lanternfishes. To further investigate the evolution of feeding structures, I examined 229 lanternfish specimens within Myctophiformes, assessing variation in tooth anatomy, presence on tooth bearing bones, and presence of heterodonty (having different tooth morphologies on the same bone). An ancestral character-state reconstruction was also used to examine the evolution of heterodonty in this group, and indicates at least four separate evolutions of heterodonty in lanternfishes.