

UNIVERSITY OF CALIFORNIA, SAN DIEGO

Molecular phylogenetics of the serranid subfamily Epinephelinae: Speciation and  
Biogeography in a nearshore marine fish clade.

A dissertation submitted in partial satisfaction of the requirements for the degree

Doctor of Philosophy

in

Marine Biology

by

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## ABSTRACT OF THE DISSERTATION

Molecular phylogenetics of the serranid subfamily Epinephelinae: Speciation and  
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The processes that shape present day distributions of marine organisms have remained a central topic in evolutionary biology, conservation biology, and ecology. In this thesis, genetic data from mitochondrial and nuclear genes were used to create a phylogenetic hypothesis for the groupers of the subfamily Epinephelinae as a means of evaluating the current taxonomy of the group and the geography of speciation in marine organisms.

The molecular phylogenetic hypothesis presented in Chapters I and IV identifies several genera that are paraphyletic. New taxonomic considerations, including the resurrection of the genus *Hyporthodus* Gill, are discussed. We identify four main radiations: *Cephalopholis*, *Epinephelus*, *Hyporthodus*, and *Mycteroperca*. These lineages each represent a unique pathway of colonization to the New World and patterns of evolutionary radiation.

In Chapter II, the phylogenetic relationships among the genera *Alphestes* and *Dermatolepis* are discussed based on a molecular analysis of two mitochondrial and

two nuclear genes. Here we show that previously hypothesized trans-isthmian geminate species are not each other's closest living relatives, and that speciation may have been ongoing within the Central American Seway prior to the final closure of the Panamanian Isthmus.

Chapter III discusses the finding of *Alphestes afer* (Bloch 1793), a common western Atlantic species, at Svo Tomé Island (Gulf of Guinea; West Africa). Mitochondrial and nuclear DNA data indicate that this specimen is conspecific with western Atlantic specimens. Although it was originally described from the coast of Guinea, the presence of this species in the eastern Atlantic has gone unnoticed, and the type locality has been regarded as erroneous. A morphological comparison of the holotype with 44 specimens from western Atlantic and Caribbean localities indicates that the holotype is conspecific with western Atlantic specimens.

Chapter V discusses intra-specific genetic diversity in the flag cabrilla. The mitochondrial Cytochrome B gene was used to examine the phylogeography of two putative eastern Pacific sibling species, the flag cabrilla, *Epinephelus labriformis* (Jenyns 1840) and the Clipperton grouper, *E. clippertonensis* Allen and Robertson 1999. Significant genetic structure corresponding to geographic locality was found. These data imply that in some marine fishes, changes in color patterns may evolve more rapidly than genetic markers commonly used in phylogenetic analyses.

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