EVOLUTIONARY HISTORY, SEASCAPE GENETICS AND SPECIATION IN ELASMOBRANCHS FROM THE GULF OF CALIFORNIA.

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Abstract

Speciation is one of the most important but less understood processes in nature. An identification of evolutionary and ecological processes promoting reproductive isolation and genetic differentiation is necessary to understand speciation. Although elasmobranchs generally show life histories thought to reduce the potential for regional genetic structure, we are largely unaware about the relative contribution of dispersal potential in shaping population structure and speciation in this group. The Gulf of California (GC) shows high ecological diversity, complex oceanography and active geological history, characteristics that make it a suitable scenario to study speciation. This study aims to elucidate ecological and biogeographic factors that influence genetic structure and speciation in co-distributed elasmobranchs from the Gulf of California and the Pacific coast of Baja California Peninsula (BCP), in Mexico. This was achieved using both nuclear and mitochondrial markers and a range of analytical tools in population and seascape genetics, phylogeography and phylogenetics. Tissue samples of three co-distributed groups of sharks and rays from the genera *Rhinobatos*, *Squatina* and *Mustelus* were obtained from several localities encompassing the major bioregions of the GC and the BCP. These taxa represent a range of dispersal ability, allowing testing the influence of mobility on genetic structure of elasmobranchs. Patterns of phylogeographic structure and genetic connectivity are described for each species and related to the geological history and the contemporary oceanographic setting of the GC. At a large spatial scale, patterns of genetic divergence were better explained by both vicariant geological events and oceanographic complexity. This indicates that ecological isolation via oceanographic discontinuities could be an important driver of marine biodiversity in the GC. Overall, genetic structure appeared inversely correlated with species vagility. This study also reports on previously unsuspected cryptic species and on well-delineated populations that should be managed separately. These results provide urgently

needed information for conservation management of the heavily exploited elasmobranch fisheries in the region. This work represents the first comparative genetic analysis in elasmobranchs from the iconic GC ecosystem and has important implications for the study of the Gulf's biodiversity and its origin and for improving our understanding about speciation in the sea.

Declaration of authorship and originality

The work in this thesis has not previously submitted for a degree or as part of requirements for a degree at any other institution. This thesis contains original research material and has been prepared and written by myself. Any help and assistance received during my research work and preparation of the thesis are acknowledged

JSC performed research (100%), analysed data (90%), wrote the thesis (60%) and designed the research (90%). His supervisor LB contributed to research design (10%), to writing (40%) and analysis (10%)

Also, all information and literature source are indicated in the thesis appropriately

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