



SYSTEMATIC AND TAXONOMY OF *Xenotoca*

*Domínguez-Domínguez, O. (1), K. Piller (2), R. Pérez-Rodríguez (3), A. F. Mar-Silva (1), C. Kenway-Lynch (2), D. Ma. Bernal-Zuñiga (1) and D. Camak (2)

(1) Laboratorio de Biología Acuática, Facultad de Biología, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, México.

(2) Southeastern Louisiana University, Hammond, Louisiana, USA.

(3) Posgrado en Ciencias Biológicas, Universidad Nacional Autónoma de México, DF, México.

*Email: goodeido@yahoo.com.mx

ABSTRACT

The genus *Xenotoca* has been widely recognized as a taxonomically problematic genus, since several studies failed to recover the genus as monophyletic. Moreover, phylogenetic analyses have demonstrated that the three species within the genus possess highly divergent populations suggesting the existence of undescribed species within the three species of *Xenotoca*. We use a phylogeographic approach, with nuclear and mitochondrial markers, and geometric morphometrics and traditional taxonomic approaches to investigate the taxonomic status of the three species and their inclusive populations. The results show the existences of four new species within the genus, two for *X. eiseni* and one each for *X. melanosoma* and *X. variata*. The genetic divergences varied from 5% between *X. variata* populations from Cuitzeo drainage population with respect to the other populations to 2% for *X. melanosoma* population from Tamazula and Armeria drainage with respect to other populations. Other molecular results, including fixation indices, demographic analyses, structure, migration and coalescent methods show that these genetically divergent lineages represent independent evolutionary lineages that have been evolving in isolation for a long period of time. Geometric morphometric, meristic counts and linear measurements show a clear differences between the new species and sister taxa, with the differences being more evident within *X. eiseni* and less evident in *X. melanosoma*. We conclude that four undescribed species are present within the *Xenotoca* genus.