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Differences in karyotype between two sympatric species of *Gymnotus* (Gymnotiformes: Gymnotidae) from the eastern amazon of Brazil

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Abstract

In this paper we describe the karyotypes of two sympatric species of *Gymnotus* from Marajó Island, Pará, in the Eastern Amazon basin of Brazil. One of these species, *G. mamiraua*, has not previously been identified from this area. Karyotype studies demonstrate that *G. cf. carapo* Linnaeus, has 2n=42 (30M/SM+12ST/A) and *G. mamiraua* Albert & Crampton, 2n=54 (50M/SM+4ST). The Nucleolar Organizer Region (NOR) was found in the distal region of the short arm of pair 20 in *G. cf. carapo* and in the interstitial region of pair 1 of *G. mamiraua*. Both species have centromeric constitutive heterochromatin (CH) in all chromosomes and some in interstitial or distal regions. In both species, 4´6-Diamidino-2-phenylindole (DAPI) staining has shown banding concordant with C-banding, whereas the Chromomycin A_3 (CMA_3) staining in both species agrees with the NOR location. The new data and review of cytogenetic data in *Gymnotus* presented here is concordant with a hypothesis that *G. carapo* is either a complex of populations, or a complex of morphologically similar cryptic species with distinct karyotypes. These taxa may be reproductively isolated by prezygotic reproductive isolation barriers (such as the structure of the Electric Organ Discharge), or by post-zygotic barriers (such as karyotypic formula). The understanding of the cytogenetic structure of *G. carapo*, combined with associated studies of signal diversity, will yield insight into the mechanisms underlying the origins and maintenance of high species diversity in *Gymnotus*.

Key words: Cytogenetics, *Gymnotus carapo*, *Gymnotus mamiraua*, C-Banding, Ag-NOR, CMA_3 and DAPI

Introduction

Gymnotus (Gymnotidae—Gymnotiformes) is the Neotropical electric fish genus with the largest geographic distribution, occurring from southern Mexico to northern Argentina (Albert *et al.*, 2005). *Gymnotus* is also the most species-rich gymnotiform genus, with 32 valid described species, of which 18 are known to occur in the Amazon basin (Albert and Crampton, 2001; Albert and Crampton, 2003; Albert *et al.*, 2005; Crampton *et al.*, 2005). The number of species and their geographic distributions has a tendency to grow throughout the years, as a result of new methods of sampling, and identification and collecting of electric fishes from places not previously investigated (Crampton *et al.*, 2005). Like all other Neotropical electric fishes, *Gymnotus* generates weak electric organ discharges (EODs) for communication, prey detection, and orientation relative to

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