

SHORT COMMUNICATION

CHROMOSOME COMPLEMENT OF INDUCED HYBRIDS OF THE FISH *Prochilodus marggravii* AND *Prochilodus affinis* (PROCHILODONTIDAE, CHARACIFORMES)

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ABSTRACT

A study was conducted on the mitotic chromosomes of hybrid fish resulting from induced crosses between *Prochilodus marggravii* and *P. affinis*. Preparations were obtained from kidney cells and submitted to standard Giemsa staining and to silver staining for the identification of nucleolar organizer regions. All hybrids analyzed had $2n = 54$. The homeologous elements of the complement were practically identical, thus preventing the identification of clear markers of the parental species. The high degree of genetic and cytological compatibility is probably the decisive factor in the success of hybridization.

INTRODUCTION

Prochilodus marggravii and *P. affinis* (Prochilodontidae), popularly known as "curimatãs" and "curimbatas" in Brazil, coexist in the São Francisco river basin (Britski *et al.*, 1984) where they are particularly outstanding in terms of abundance and economic value. Hybrids of these species were obtained by Sato *et al.* (1985) in a reproduction program based on hormonal induction. In the last few years, cytogenetics has been used as an important tool for the characterization of hybrids obtained in pisciculture programs (Almeida Toledo *et al.*, 1988). In the present study

we investigated the mitotic chromosomes of young individuals from a line obtained by crossing *P. marggravii* with *P. affinis*.

MATERIALS AND METHODS

The mitotic chromosomes of two distinct hybrid lines were analyzed: 18 young specimens resulting from a cross between *P. marggravii* females and *P. affinis* males, and 13 young specimens resulting from the reverse cross, i.e., *P. marggravii* males with *P. affinis* females. The hybrids of both crosses were obtained by Sato *et al.* (1985) at the Hydrobiology and Pisciculture Station of CODEVASF (Três Marias, MG), through reproductions induced by carp pituitary extracts.

Chromosome preparations were obtained from cell suspensions of the cephalic portion of the animals kidney, by the standard air-drying technique and by Giemsa staining (pH 6.8), as described by Bertollo *et al.* (1978). The nucleolar organizer regions (NORs) were identified by the colloidal Ag technique, using a 50% silver nitrate solution and a 2% gelatin emulsion (Howell and Black, 1980). The chromosomes were measured with the aid of a pachymeter and arranged in decreasing order of size for analysis.

RESULTS

Analysis of the mitotic chromosomes of the two lines of hybrids showed a diploid value equal to 54 meta- and submetacentric chromosomes (Figure 1A). Silver-stained NORs were identified in two very similar chromosomes (Figure 1B). No chromosome differences were noted between the hybrid lines analyzed. Furthermore, strict structural similarity was observed between the homeologous chromosomes in the hybrids' complement, except for the two largest chromosomes, which appeared to differ slightly in centromere position (Figure 1C).

DISCUSSION

The present results show that it is practically impossible to identify cytological markers of the parental species in the complement of *Prochilodus* hybrids. This is explained by the fact that *P. marggravii* and *P. affinis* have very similar karyotypes (Pauls, 1985). Like the hybrids, the two species present $2n = 54$ biarmed chromosomes. The NORs appear to be located in a single chromosome pair, possibly similar in the two species, so that in the hybrid complement these chromosomes seem to be true homologues. No sex-related chromosome differences have been reported for these species, possibly explaining the lack of detection of differences, at the level

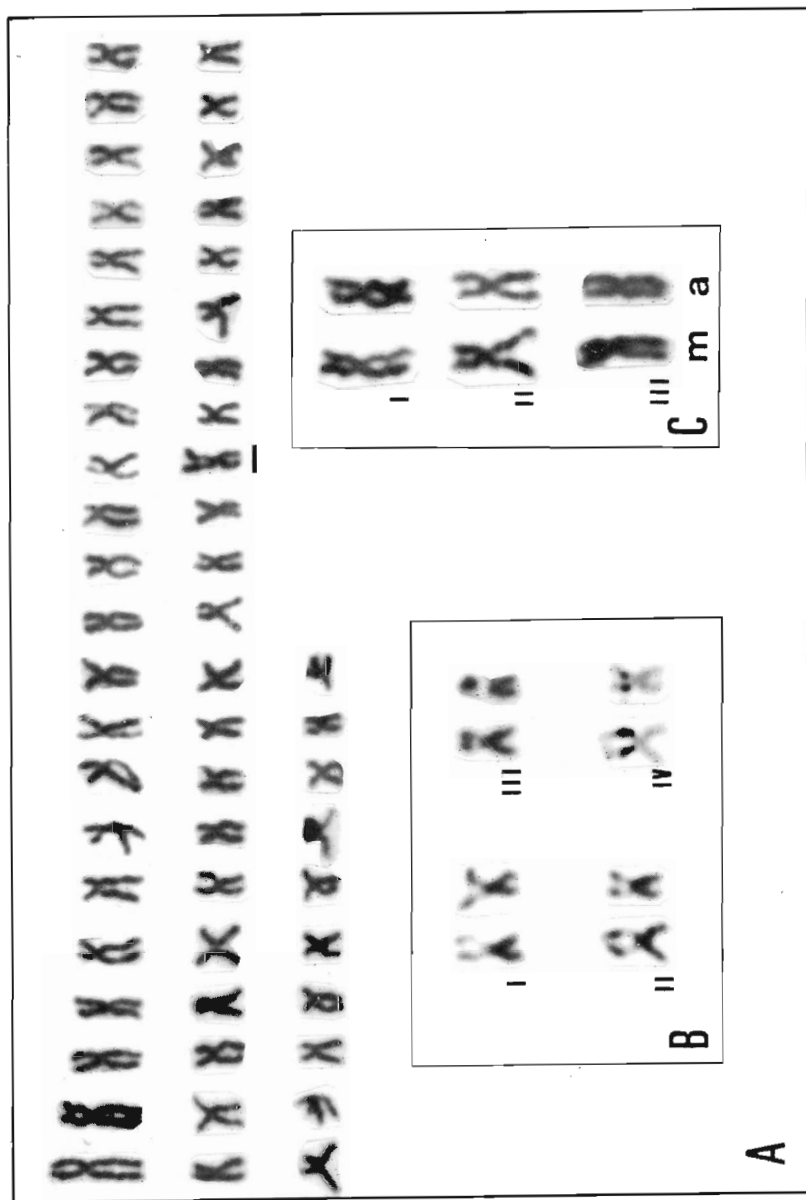


Figure 1 - A, Mitotic chromosome complement of the hybrids studied ($2n = 54$); a bar indicates a chromosome with a secondary constriction and satellites; B, chromosomes with conspicuous secondary constrictions and satellites obtained from three distinct Giemsa-stained metaphases (I, II, III) and from a silver-stained metaphase (IV) showing the Ag-NOR sites; C, the largest homeologous elements in the hybrid complement obtained from three different cells (I, II, III); chromosomes from the *Prochilodus marginavii* (m) and *Prochilodus affinis* (a) parents.

of the analyses performed, between the complements of the hybrid products of the reciprocal crosses. The difference observed between the two largest chromosomes in the hybrid complement is explained by the fact that this element has a slightly less centralized centromere in *P. marggravii* than in *P. affinis* (Pauls, 1985). This difference, although subtle, may be an indicator of the fact that hybridization did occur. The combination of the hormonal induction and hybridization techniques practically eliminated the ecological and behavioral barriers that normally act in the regulation of hybridization in nature. Thus, the development of hybrid products must have been exclusively determined by the genetic and/or cytological relations existing between the parental species. The great karyotypic similarity observed between the parental *Prochilodus* species doubtlessly favored the success of this hybridization.

In view of these results, basic cytogenetic studies may be very useful tools not only by helping to establish hybridization programs but also for the follow-up of the resulting hybrid products. However, when planning new hybridization programs, and especially interspecific hybridization, the potential risk of these techniques should be kept in mind. In induced hybridization, the genetic-cytological components are the only regulators of the process and may not be sufficient to avoid extensive mixture of the elements of the Brazilian fish fauna at a time when the consequences of this process are still not fully understood.

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RESUMO

Foram estudados os cromossomos mitóticos de peixes híbridos resultantes de cruzamentos induzidos entre *Prochilodus marggravii* e *Prochilodus affinis*. As preparações foram obtidas a partir de células renais e coradas por Giemsa convencional e por nitrato de prata para identificação das regiões organizadoras de nucléolos. Todos os híbridos analisados evidenciaram $2n = 54$. Os elementos homeólogos deste complemento são praticamente idênticos, o que impossibilita a identificação de evidentes marcadores das espécies parentais. O alto grau de compatibilidades genética e citológica deve ser o fator decisivo do sucesso da hibridização.

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