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COMPARATIVE KARYOTYPE STUDY OF AN EXOTIC CICHLID *PTEROPHYLLUM SCLARE* WITH TWO NATIVE SPECIES *ETROPLUS SURATENSIS* AND *ETROPLUS MACULATUS*

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Abstract: Cichlid fishes have been subject of increasingscientific interest because of their rapid adaptive radiation which has led to an extensive ecological diversity and their enormous importance to tropical and subtropical aquaculture. The chromosome number and morphology of commonly occurring cichlids *Etroplus suratensis* and *Etroplus maculaus* collected from AshtamudiLake and *Pterophyllum scalare* an aquarium cichlid fish and their karyotype comparison were done to know how much genetically they are related, in the present study. The method of Klingerman and Bloom was followed for preparation of Chromosomal spreads and spreads were counted, photographed and measured. Karyotype of three species was prepared and compared. The chromosome compliment of *E. suratensis* consists of 2n=48 acocentric and *E. maculatus* consist of 2n=38, 6 pairs of metacentric and 13 pairs of acrocentric. The chromosome compliment of *Pterophyllum scalare* was 2n=44 acrocentric. The first pair of metacentricchromosome of *E.maculatus* identified as marker chromosome. Primitive fishes have higher chromosome numbers and fewer metacentric chromosomes than more advanced relatives. Karyotype diversification seems to have occurred through several chromosomal rearrangements involving fission, fusion and inversion.

***Key words**:* Karyotype, Teleost, Cichidae, chromosome, acrocentric, inversion

INTRODUCTION

Fishes are of particular interest to ichthyologists as well as cytogeneticsts, as they occupy a very important systematic position from the point of view of differentiation of vertebrates. Consequently an accurate cytogenetic survey of fishes become increasingly important in order to establish chromosomal relations between the teleosts, to have a glimpse of relations between chromosomal evolution and differentiation of vertebrate species.Teleost fishes have successful history of diversification over the past 200 million years. The 23000 species of teleost make up almost half of all living vertebrates (Helfman *et al.,* 1997). Perciformes represents the largest order of vertebrates with approximately 9,300 species. It include more than 3,000 species of the family Cichlidae (Salzburge and Mayer, 2004), one of the most species rich families of vertebrates(Nelson, 2006).

Cichlid fishes have been a subject of increasing scientific interest because of their rapid adaptive radiation which has led to an extensive ecological diversity and their enormous importance to tropical and subtropical aquaculture.The chromosome number and morphology of commonly occurring cichlids *Etroplus suratensis* and *Etroplus maculaus* collected from Ashtamudi Lake Kerala and *Pterophyllum scalare* an aquarium exotic cichlid fish selected for the present study. The karyotype analysis of these species is a preliminary attempt to know how much they are genetically similar.

MATERIALS AND METHODS

The method of Klingerman and Bloom (1977) was followed for preparation of Chromosomal spreads and spreads were counted, photographed and measured.Classification of chromosomewas followed by the method of Levan *etal*. (1964).

RESULTS

Karyotype of three species was prepared and compared. The chromosome compliment of *E. suratensis* consists of 2n= 48 acrocentric (Fig. 1)

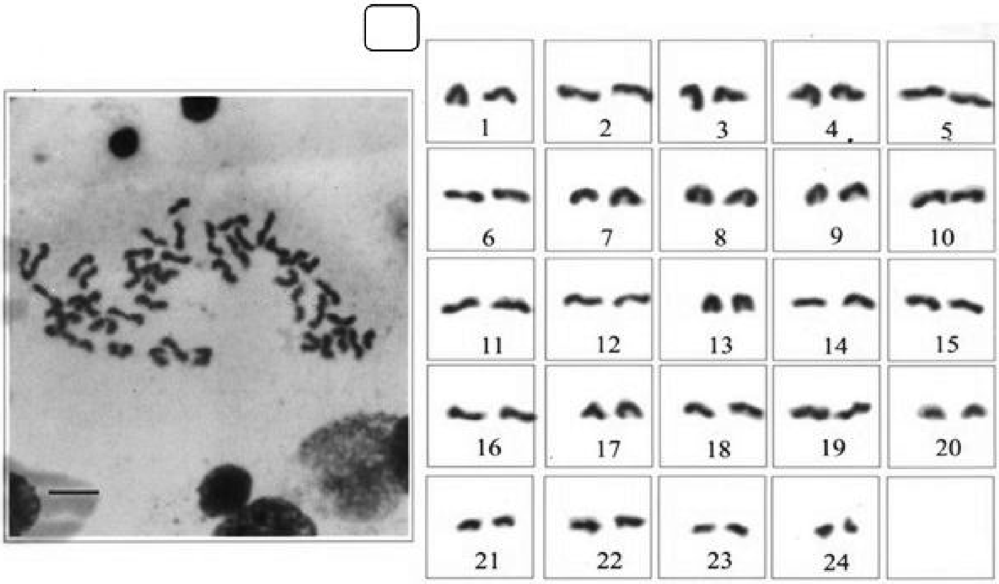

Fig. 1. Karyotype of *Etroplus suratensis*(Bloch)

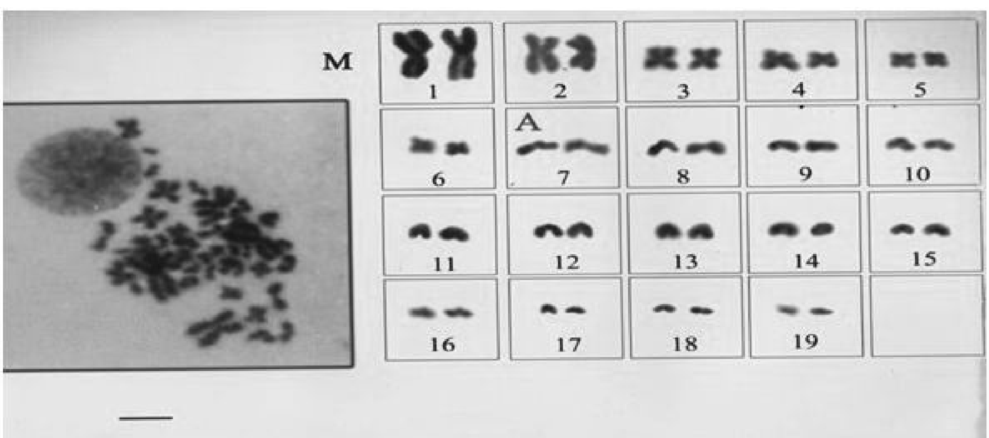

Fig. 2. Karyotype of *Etroplus maculatus* (Bloch)

and *E. maculatus* consist of 2n=38, 6 pairs of metacentric and 13 pairs of acrocentric (Fig. 2). The chromosome compliment of *Pterophyllum scalare*was 2n =44 acrocentric (Fig. 3).The first pair of metacentric chromosome of *E.maculatus* was identified as marker chromosome.

DISCUSSION

Genetic diversity is the basis of the fundamental processes of biological change, adaptation and evolution. Present study revealed the chromosome types and numbers of certain cichilids. The investigation on three species*E. susratensis*, *E. maculatus* and *P. scalare* reveals the number of chromosome per cells as well as karyotypic configuration vary in three species. In general 2n =48 chromosome are most prevalent among the fish species studied cytologicaly so far and are believed by many to represent the primitive fish karyotype (Klinkhardt, 1998). Karyotypes of more than 135 species of cichlids have been determined. Although most species present a karyotype within 2n= 48, diploid number ranges from 2n=32 to 2n= 60 (Feldberg *et al*., 2003). Teleost fishes show primitive diploid number of 46 to 50 (Nayyar, 1966) and widely recognized as 48 (Fitzsimons, 1972).

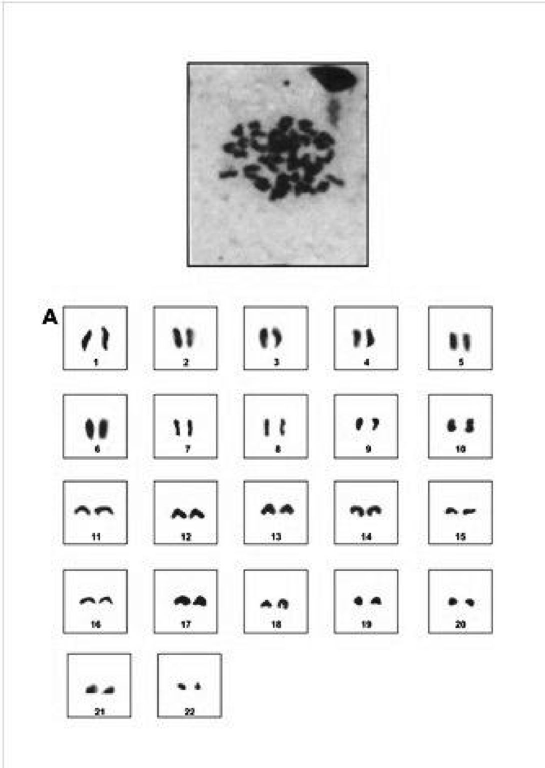

Fig. 3. Karyotype of *P. scalare* (Schultze)

E. maculatus exhibited a karyotype strikingly different from those noticed for *E. suratensis*. Chromosome pair 1 was larger than others and easily distinguishable in *E. maculatus* and designated as 'marker chromosome'. Primitive fishes have higher chromosome number and fewer metacentric chromosome than more advanced relatives (Mayers and Roberts, 1969; Ohno, 1970). The decrease in chromosome number is attributed by Robertsonian fusion (Vitturi *et al*., 1993).

Most of the cichlid species from Africa showed chromosome number 2n=44 (Poletto *et al*., 2010). Leveque(1997) added that the karyotype seems to be relatively stable among cichlids of Africa. It is certain that the karyotypical diversity of exotic fish is quite different from the endemic fishes examined.Karyotype diversification seems to have occurred through several chromosomal rearrangements involving fission, fusion and inversion that occurred during the evolutionary history of cichlids.

REFERENCES

Feldberg, E., Porto, J.I.R. and Bertollo, L.A.C. 2003. Chromosomal changes and adaptation of cichlid fishes during evolution. In:. Val, A. L., Kapoor, B. G. (eds),*fish adaptation*. New Delhi &New York Science pub., pp. 285-308 .

Helfman G.S.,Collette, B.B. and Facey, D.E. 1997. *The diversity of fishes.* Black well Science, Malden, U.S.A. 528 pp.

Kilingerman,A.D. and Bloom, S.E. 1977. Rapid chromosome preparation from solid tissue of fishes. *J. fish. Res. Bd.Can*., 34: 266-269.

Klinkhardt,M.1998. Some aspects of Karyoevolution in fishes. *Anim. Res. Dev.* 47: 7-36.

Levan,A.K., Fredga and Sandborg, A.A. 1964. Nomenclature for centromeric position of chromosome. *Heretidas*. 52: 201.

Leveque,C. 1997.*Biodiversity dynamics and conservation*: *The fourteen fishes of tropical Africa*. Cambridge Uni. Press. 438pp.

Mayers,L.J. and Roberts,F.L. 1969. Chromosomal homologenecity of five populations of Alewives. *Copeia*, 2: 313-317.

Nayyar,R.P.1966. Karyotype studies of thirteen species of fishes. *Genetica*, 37: 89-92.

Nelson, J.S. 2006. *Fishes of the world*, 4th ed. John Wiley & sons Inc. Hoboken, New York, 601 pp.

Ohno,S. 1974 . Enormous diversity in genome sizes of fishes as a reflection of natures extensive experiments with gene duplication. *Trans. Am. Fish, Soc*., 1 : 120-130.

Poletto, A.B.,Ferrreira, I.A. and Cabral, D.C. 2010. Chromosome differentiation pattern during cichlid fish evolution. *BMC Genetics,* 11: 50-62.

Salzburger,W. and Mayer,A. 2004. The species flocks of East African Cichlids fishes recent advances in molecular phylogenetics and population genetics. Naturwissenschaften, 91: 277-290.

Vitturi,R.E., Catalano and Colombera, D. 1993. Chromosomal analysis of Bothus podas (Pisces, Pleuronectiformes) from the Meditaranian Sea. *J. Fish. Biol*., 43: 221-227.