



CHROMOSOMAL ANALYSIS OF CATFISH, *CLARIAS GARIEPINUS* (L.)

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ABSTRACT:

Clarias gariepinus is an African catfish, commonly found in most of the regions of India. This is a fast growing and hardy fish as compared to other indigenous catfishes. In the present investigation, chromosome number and karyotyping of *C. gariepinus* are performed. By using phytohemagglutinin (PHA) activated whole blood cell culture, metaphase chromosomes were isolated and studied. Metaphase shows that it has $2n=54$ number of chromosomes. The chromosomes are further classified as 08 metacentric, 22 submetacentric, 14 subtelocentric and 10 telocentric. This study is important for knowing genomic constitution of this fish as well as it is useful for hybridization with other indigenous catfishes.

Keywords: *Chromosomes, Karyotype, Clarias gariepinus*

INTRODUCTION:

In inland water bodies, carps and catfishes dominate the production but most of the work related to genetics is carried out on carps only (Khuda-Bukhsh, 1980; Manna, 1983) and among the catfishes cytogenetics work on *Clarias batrachus* and *Heteropneustes fossilis* (Dutta-Munshi and Hughes, 1992) is reported. For the viable hybrid progeny, compatibility of diploid ($2n$) number of chromosomes of proposed species is the most important factor. *Clarias gariepinus*, selected for the present study is fast growing fish and is a good model for fish hybridization. Karyotype study of fish is also used in taxonomic arrangement in classification and identification. Karyological studies in fish have shown potentials in increasing knowledge in the fields of genetics, taxonomy, evolution, systematics, mutagenesis, environmental toxicology and aquaculture (Kligerman and Bloom, 1977; Cucchi and Baruffaldi, 1990) In other animals

like aves, 211 species belonging to 99 genera karyologically are known (Mohanty, 2004) but very less information is available on chromosomes of many of the fish species in general including the fish *Clarias gariepinus*. To elucidate the knowledge of chromosomal number and pattern, studies on this fish are carried out.

MATERIAL & METHODS:

Fish were collected from the local market, acclimatized in laboratory conditions for one week, anesthetized with 2-phenoxyethanol and blood was collected from heart by puncturing with needle syringe coated with heparin. Blood was centrifuged in transparent centrifuge tube for 15 min. at 400 g. Plasma was carefully removed without disturbing the interface. Interface was collected with syringe or Pasteur pipette and diluted 1: 1 in a serum free medium. Incubation was done in 2×10^6 cells/ml of the medium, in DMEM/F12/10FB: 50/50

DMEM/Ham's F12 with 10% fetal bovine serum (FBS). Phytohemagglutinin (PHA), 5 μ l/ml (final concentration) was added to stimulate mitosis from 24 to 72 h. Sample was collected at 24, 36, 48, 60, and 72h, and smears were prepared to determine the incubation time. 0.001 μ g/ml (final concentration) of Colecemid was added for 2 h and cells were centrifuged after the Colecemid treatment, pellets were resuspended in 0.075 M KCL for hypotonic swelling, processed for the smear preparation and stained with Giemsa stain.

RESULT & DISCUSSION:

In *Clarias gariepinus*, metaphase chromosome number was observed to be $2n = 54$ (Fig.1). Among 54 chromosomes, 8 metacentric, 22 submetric, 14 subtelocentric and 10 were telocentric. Range of the length of the chromosomes was from 4.96 μ to 1.92 μ (Fig.2, 3). In *C. gariepinus* 24 homomorphic pairs of chromosomes containing 4 pairs of metacentric (M) (numbers 23,24,25, 26,45,49,50), 11 pairs of submetacentric (SM) (numbers,1,2,3,4,5,6,7,8,9,10,11, 12, 13, 14,17,18, 19, 20,27,28,,39,40), 7 pairs of subtelocentric (ST) (numbers 21, 22, 29, 30, 31, 32, 33, 34, 41, 42, 43, 44, 51, 52) and 5 pairs of telocentric (T) (numbers 15,16, 35, 36, 37, 38, 47, 48, 53, 54) (Fig. 2) leading to the chromosomal formula of $N=4M+11SM+7ST+5T$ were identified.

In the present karyotypic study *Clarias gariepinus* shows $2n = 54$ number of chromosomes but in *Clarias batrachus* $2n=52$ or $2n=50$ and in *Heteropneustes fossilis* $2n=58$ or $2n=56$ number of chromosomes as reported by Vasudevan et al. (1973) and Datta-Munshi and Hughes (1992). Diploid number in fishes ranges from 12 or 16 to 239. The highest number of 239 has been recorded in *Acipenser naccarii* (Fontana and Colombo, 1947). In *C. batrachus*, chromosomal formula is $18M+20SM+8ST+4T$, in *H. fossilis* chromosomal formula is

$14M+26SM+16ST+00T$ (Datta-Munshi and Hughes, 1992) and in *C. gariepinus* chromosomal formula is worked out as $8M+20SM+12ST+14T$.

CONCLUSION:

Thus species-specific differences in chromosome number, type of chromosomes and their pattern is observed. In carps, number of chromosomes is almost similar throughout different species and in *Labeo dero* $2n=54$ (Khuda-Bukhsh and Chanda, 1989). For hybridization of fish, knowledge of karyotype of chromosome is important. Such work is carried out in carps (Manna, 1983) but such studies are lacking in catfishes, so present attempt is made to explore this knowledge.

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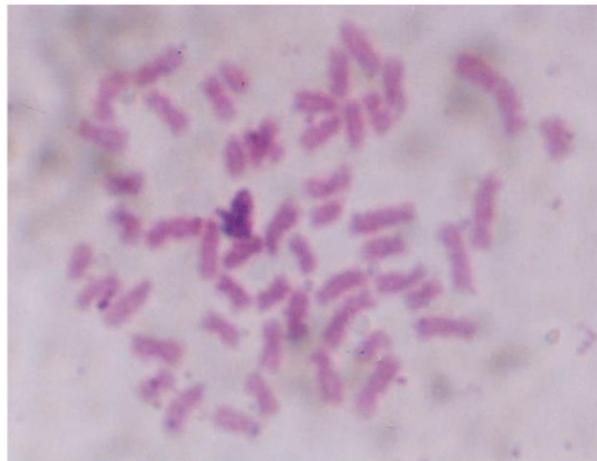


Fig.1 Metaphase in *Clarias gariepinus* showing 54 chromosomes 1800X

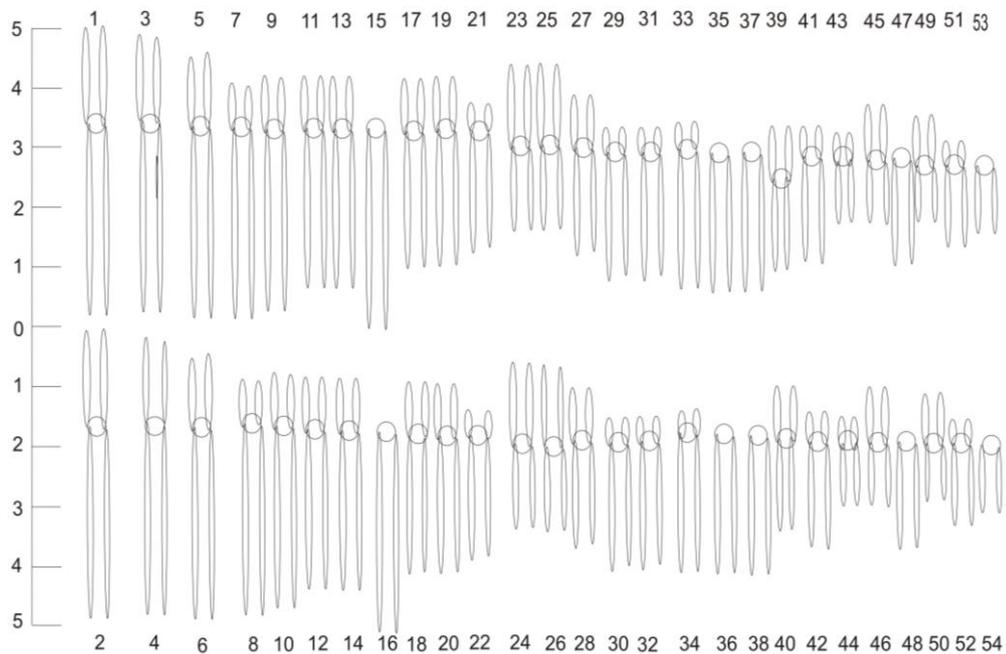


Fig. 2 Diagrammatic representation of idiogram of *Clarias gariepinus* 1 div = 1 μ

