Karyology of *Puntius sophore* (Pisces, Cypriniformes) from the Brahmaputra River, Assam, India

Bandita Talukdar, Sangeeta Mili, Himangshu Kr Kalita and Dandadhar Sarma*

Department of Zoology, Gauhati University, Assam, India

*Corresponding author: Dandadhar Sarma, Department of Zoology, Gauhati University, Assam, India, Tel: +91 94353 14768; E-mail: sarma_dandadhar@yahoo.com

Received date: September 24, 2016, Accepted date: October 06, 2016, Published date: October 13, 2016

Abstract

In this investigation karyotypes of *Puntius sophore* from the Brahmaputra River (Assam, India) are presented. Chromosome preparations were made using anterior parts of the kidney cells. The karyotype of the population under study consisted of 48 diploid chromosomes with fundamental arm number 54. The chromosomal divergences in *P. sophore* with different ecology and geographical distribution are discussed.

Keywords: Karyotypes; *Puntius sophore*; Brahmaputra river; Assam

Introduction

The pool barb *Puntius sophore* (Hamilton, 1822) is a freshwater to brackish water cyprinid widely distributed in inland water of Asia, including Bangladesh, Pakistan, India, Nepal, Myanmar, Bhutan, Afghanistan and China. This fish is benthic-pelagic (demersal) and inhabits rivers, streams and ponds of plains and submontane regions [1]. Due to the complicated geological history of the Brahmaputra basin (associated with significant geomorphological changes as a result of tectonic activity), and the extensive geographical distribution of *P. sophore*, we have accomplished a karyological study of the species from an unstudied locality. The main goal of this study was to analyze karyotypes of *P. sophore* from the river Brahmaputra in Assam, India.

Twenty five (18 males, 7 females) mature healthy fish specimens weighing 4-12 g were collected from Guwahati (26°11′10.2″N 91°45′03.6″E) with the help of local fishermen. Specimens were identified up to species level following taxonomic keys [2-4]. For karyotype analysis, cells were used from the front part of the kidney. Chromosome preparations made using standard flame drying techniques and were stained with 5% Giemsa solution (concentrate, Merck) and a total of 200 metaphase plates were studied. Chromosomes were classified according to the system of Levan [5] with calculation of the centromeric index using Leica Application Suite V3.3.0. Chromosome spreads were studied using a Leica DM 3000 microscope. Photos of mitotic chromosomes were taken with camera fitted with microscope.

Karyological studies of *P. sophore* revealed a chromosomal complement containing 2n=48, NF=54 (Figure 1A) without any sex differentiation. The karyotype consists of 2 pairs of meta and 1 pair of subtelo and 21 telocentric chromosomes (Figure 1B). The largest chromosomes in the *P. sophore* karyotype is presented by pairs of subtelocentric chromosome.

**Figure 1:** (A) Mitotic chromosomes (at metaphase) of *P. sophore* from the Brahmaputra River. (B) Karyotype of *P. Sophore*. Numerals indicate the paired chromosomes; m: metacentric chromosome, sm: submetacentric chromosomes, t: telocentric chromosomes. Bar=5 μm.
The smaller size and usually abundant and more contracted structures of chromosome, studying and measuring fish chromosomes is somewhat more difficult than those of mammals [6]. Besides, identification of fish chromosomes is difficult due to the lack of any standard karyotype of fishes, polymorphism exists not only among various fish species but also within species [7]. The most commonly occurring diploid number in family cyprinidae is 50, considered to be the modal number in case of this family [8,9]. According to the studies performed by various researchers on Puntius species across India [10-12], it seems that 2n=50 in the genus Puntius, as in many other cyprinids [13].

The main objective of karyotyping is to throw some light in classification, evolution and heredity of the concern species. The cytogenetic techniques are considered as authentic tools for species and have extensively been used to resolve taxononomic ambiguities in closely related species. The ancestral karyotype for P. sophore probably contained 2n=50 chromosomes [10]. But after that, it was changing and remains constant. Previously, the karyotype of P. sophore was studied in only three localities across India (Table 1). In only one population different diploid number of chromosomes was reported (Table 1) though karyotype formula was found to be different in all the studied populations. However, similar structure of the karyotype observed between some populations, could be due to intrapopulation differentiation. Chromosomal variability may be associated with rearrangements, leading to a change of the position of the centromere.

<table>
<thead>
<tr>
<th>Locality</th>
<th>2n</th>
<th>Haploid karyotype</th>
<th>Information source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi (Western Jamuna Canal), India</td>
<td>50</td>
<td>12m+20sm+10st+8t</td>
<td>Nayar [10]</td>
</tr>
<tr>
<td>Orissa, India</td>
<td>48</td>
<td>2m+46t</td>
<td>Biswai et al., 2010</td>
</tr>
<tr>
<td>Central India</td>
<td>48</td>
<td>4m+2st+42t</td>
<td>Saroniya et al., 2013</td>
</tr>
<tr>
<td>Assam, India</td>
<td>48</td>
<td>4m+2st+42t</td>
<td>This report</td>
</tr>
</tbody>
</table>

2n: number of chromosomes in a diploid set (m, sm, st, and t: meta, submeta, subtelo, and telocentric chromosomes respectively).

Table 1: Karyotype characteristics in P. sophore from different localities of India.

Thus, the karyotypes of all studied P. sophore populations from the Brahmaputra River have almost stable numbers of chromosomes. Further karyological study of P. sophore populations will probably allow us to reveal chromosomal variability associated with the rearrangements that change the structure of separate chromosomes without changing their number.

Acknowledgement

Authors are thankful to Department of Zoology, Gauhati University, India for providing laboratory facilities to carry out the investigation.

References