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Karyotype of Persian Chub, *Petroleuciscus persidis* (Coad, 1981) (Actinopterygii: Cyprinidae) from Southern Iran

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Abstract: The diploid chromosome number of Persian chub, *Petroleuciscus persidis* (Coad, 1981), was 2n = 50, comprising 29 metacentric, 18 submetacentric, and 3 subtelocentric chromosomes and the number of arms was 97. A detailed karyotype of this endemic cyprinid fish of southern Iran was established for the first time in this study.

Key Words: Cyprinid karyology, *Petroleuciscus persidis*, Iran

Introduction

The carp, or minnow family (Cyprinidae), is one of the most widespread and speciose families of fish in the world; certainly the most speciose in freshwater and possibly the largest family of vertebrates (Coad, 2005). This family is found in North America, Eurasia, and Africa. There are over 2100 species, almost 10% of the world's fish (Coad, 2005). In Iran, this family is represented by species found in all the major drainage basins. It comprises about 50% of the Iranian freshwater fish fauna (Coad, 1995) and therefore cyprinid fish represent an important element of the Iranian Ichthyofauna. Cyprinid fish are a taxonomically complex group, due to the high number of endemic species with restricted distribution areas. *Petroleuciscus persidis* (Coad, 1981), an endemic fish restricted to the southern part of Iran, is a member of this complex group. Coad (1981, 1995) and Abdoli (2000) placed this endemic carp of Fars province in the genus *Pseudophoxinus*. In 1998 Coad placed it in the genus *Leuciscus*; but, according to Eschmeyer (2004), *Petroleuciscus persidis* (Caod, 1981) is the correct and the valid name of this cyprinid fish of southern Iran. This fish has been studied mainly on the basis of morphological and anatomical characteristics (Coad, 1981; Abdoli, 2000). The application of non-morphological methods, such as cytogenetic studies, may provide a framework for the correct species identification of this fish. The application of this type of study has received considerable attention in recent years (Ozouf-Costaz and Foresti, 1992; Galetti et al., 2000). Fish chromosome data have great importance in studies concerning evolutionary systematics, aquaculture, and mutagenesis (Al-Sabti, 1991). The increasing importance of chromosomal studies of fish and the lack of data on Iranian fish karyotypes prompted us to do a karyotype study of *Petroleuciscus persidis*. To the best of our knowledge, this is the first report of its kind. Hence, the primary aim of this study was to describe the chromosomes and karyotype of *Petroleuciscus persidis* of southern Iran.

Materials and Methods

Specimens of *P. persidis* were collected from the spring steam system of Ghadamgah (Kor river basin) in Fars province, southern Iran (lat 30º15' N, long 52º25' E) by electrofishing. They were brought to the laboratory and kept alive in a well-aerated aquarium until the time of analysis. Cytogenetic analysis was carried out on 5 specimens as follows: individuals were intraperitoneally injected with doses of 0.02 ml/g of body weight of 0.025% colchicine solution and left for 4-5 h before sacrificing. The gill filaments and kidney tissues were removed and placed in hypotonic 0.36% KCl solution for 45 min. The samples were centrifuged at 1000 rpm for 10 min and were then fixed in fresh, cold Carnoy's fixative (3:1) for 60 min. Staining was performed with

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10% Giemsa in a Sorenson buffer solution for 10 min. Observation was made and microphotographs were taken with an Olympus light microscope. The chromosomes were described according to Levan's terminology (Levan et al., 1964).

Results

Results showed that in 79.2% of metaphases, the chromosome number of *P. persidis* was 2n = 50, (NF = 97), comprising 29 metacentric, 18 submetacentric, and 3 subtelocentric chromosomes. Different chromosome numbers in a total of 20.8% of metaphases were recorded, ranging from 48 to 52. Cells not having normal values were probably caused by losses during preparation or additions from nearby cells. The karyotype of this species is shown in Figure 1.

Discussion

The karyotype, characterised by chromosome number, size, and morphology, is a definitive and constant character of each species. The number, shape, and banding of chromosomes can be determined using various dissecting and staining techniques. Chromosomal taxonomy can be quite useful, both in determining the phylogenetic relationships of the taxa, as well as in the segregation of sibling or cryptic species (Kapoor, 2001). Due to the improved techniques that have evolved during the past 30 years, reliable karyotypes for about 1000 species of mammals and several hundred species of fish, amphibians, reptiles, and birds have been presented. Although the application of fish karyotypes has received considerable attention in recent years in many parts of the world, there are very limited data on karyology of the endemic fish of Iran.

The diploid chromosome number in *Petroleuciscus persidis* is the same as the members of the related genus, *Leuciscus*, and is the same as nearly 70% of cyprinid fish (Khuda-Bakhsh et al., 1986; Collares-Pereira et al., 1998). The majority of cyprinid species have 2n = 50 chromosomes (Al-Sabti, 1991; Gul et al., 2004), while *Cyprinus carpio* has 2n = 98-100, and the polyploid *Barbus* species from southern Africa has 2n = 148 or 150 chromosomes (Oellerman and Skelton, 1990; Al-Sabti, 1991; Gul et al., 2004). The number of arms of different fish species has been presented by many authors (Al-Sabti, 1991; Gul et al., 2004). The number of arms of Persian chub is within the range 70-94, which has been reported for different *Leuciscus taxa* (Collares-Pereira et al., 1988). The results, although, confirm its

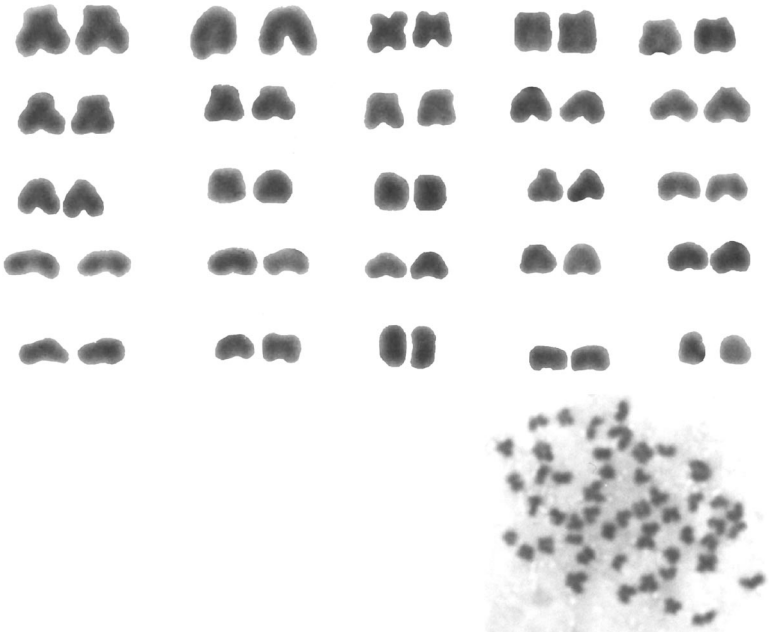

Figure 1. Karyotype of *Petroleuciscus persidis* of southern Iran.

relation to the genus *Leuciscus*, but it shows a tendency for the appearance of a new chromosome structural rearrangement. This may confirm Eschmeyer (2004), who has placed the Persian chub in the genus *Petroleuciscus*. Additional data from this species and related taxa may provide beneficial insights into the value of conventional cytogenetic data for reconstructing cyprinid phylogeny. However, the value of karyological data can be better utilised if combined with the highest possible taxonomic elements for the diagnosis of species.

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