Abstract

Teleosts represent more than half of the extant vertebrate species. They show a wide range of mechanisms driving both sex determination and sex differentiation, including nine sex chromosome systems described to date. Teleost sex chromosomes are generally considered as evolutionarily young, therefore they are suitable for an analysis of the early stages of evolution of these unique genomic regions. The aim of the current thesis was to analyze the presence and degree of differentiation of sex chromosomes in two *Nothobranchius* killifish species and one *Bunocephalus* banjo catfish representative using conventional and molecular cytogenetic methods. Different populations of *N. kadleci* and *N. furzeri* analysed in this thesis shared anXY sex chromosome system. Despite the obvious heteromorphy of their sex chromosomes, comparative genome hybridization (CGH) did not show any region of differentiation. Analysis of synaptonemal complexes by immunostaining coupled with the mapping of 18S rDNA and telomeric repeats using fluorescent *in situ* hybridization (FISH) showed mainly standard pairing with the contribution of synaptic adjustment. Pachytene spreads of females from one *N. furzeri* population contained a small supernumerary chromosome which was not present in metaphases of studied somatic cells. Distribution of recombination foci was slightly different between sexes in our limited sampling: male crossover sites were located more towards the terminal parts of chromosomes compared to females. All studied individuals of the genus *Bunocephalus* were identified as *B. aloikae* and they displayed extensive inter-individual karyotype differences with their diploid chromosome number (2n) varying from 47 to 51. I observed a tetravalent (i.e. pairing of four chromosomes) in meiosis of some male individuals whichformed due to a reciprocal translocation as proven by chromosome painting. By using FISH with repetitive sequences and chromosome painting probes I uncovered an extraordinarily high rate ofchromosomal rearrangments (especially translocations, centric fusions and fissions) and aneuploidies among studied individuals. Although the tetravalent was not consistently present among the analysed males, CGH method revealed a male-specific accumulation within this formation. The results imply the presence of a rare sex chromosome system $X_1Y_1X_2Y_2$ at least in some males of *B. aloikae*. This system was suggested among fishes so far only in closely related *B. coracoideus.* In other males, CGH method pointed on a possible XY sex chromosome system but the results obtained from females were unclear. My work contributed to better understanding of sex chromosome evolution in genera *Nothobranchius* and *Bunocephalus*.

Keywords: CGH, karyotype rearrangements, killifish, karyotype variability, cryptic species, sex chromosomes, repetitive DNA, synaptonemal complexes, banjo catfish, WCP