# B chromosomes under the systems biology perspective

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## Abstract/Resumo

Chromosomes are major components of cells, packing the genetic material in a perfect organized structural and functional pattern. However, the chromosomes behavior during cell cycle is subjected to genomic rearrangements producing a wide variety of functional consequences with impact in cell disorders and also generating evolutionary novelties. Although several factors that mediate genomic rearrangements are now known, there are still many unanswered questions. In the light of high throughput era in generation of biological data, chromosome studies have also advanced to a higher level exploring high scale analyses of DNA, RNA, and proteins, and their interactive networks. Therefore, we have explored B chromosomes as a model to investigate the structural and functional nature of chromosomal rearrangements and polymorphisms during evolution. Hundreds to thousands of reports have described the distribution of B chromosomes among diverse eukaryote groups, however a comprehensive theory of their biological role has not yet clearly emerged. B chromosomes are classically understood as a sea of repetitive DNA sequences that are poor in genes and are maintained by a parasitic-drive mechanism during cell division. In this way, we have analyzed B chromosomes in the light of massive molecular data obtained from the cichlid fish model *Astatotilapia latifasciata*, in order to advance in the identification of origin and fate of chromosome changes and to comprehend their evolutionary consequences. Based on recent developments in high-throughput DNA/RNA analyses we have increased the resolution of B chromosome biology beyond those of classical and molecular cytogenetic methods; B chromosomes contain many transcriptionally active sequences, including genes, and can modulate the activity of autosomal genes. Furthermore, the most recent knowledge obtained from omics analyses, which is associated with a systemic view, has demonstrated that B chromosomes can influence cell biology in a complex way, possibly favoring their own maintenance and perpetuation.

Keyword/Palavras-chave: Cromossomos supernumerários; Genoma; miRNoma; Transcriptoma, Proteoma

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