



Chromosome mapping of 18S rDNA and 5S rDNA by dual-color fluorescence *in situ* hybridization in the half-smooth tongue sole (*Cynoglossus semilaevis*)

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ABSTRACT. Half-smooth tongue sole (*Cynoglossus semilaevis*) is an important aquaculture flatfish in China. Cytogenetic analysis has revealed that its sex determination system is female heterogametic (ZZ/ZW). The W chromosome is morphologically larger and has been considered evolutionarily younger than any other chromosome in the set. However, the genetic origin and evolution process of this neo-chromosome remains unclear. In this study, 2 tandem arrays of rRNA genes were chosen to address this question. Both the major rDNA (18S rDNA) and the minor rDNA (5S rDNA) were located on the *C. semilaevis* chromosomes by fluorescence *in situ* hybridization (FISH). Six 18S rDNA signals were observed on the centromeric regions of 3 pairs of autosomes in both males and females. In females, there was an additional 18S rDNA signal mapping to the telomeric region of the W chromosome long arm. With respect to the 5S rDNA, 12 signals were mapped to the centromeric regions of six pairs of autosomes. Two-color FISH further confirmed that the two pairs

of the 5S rDNA signals were correspondingly located at the same positions of the same autosomes as those of the 18S rDNA signals. These results allowed us to speculate about the evolution process of the W chromosome. Chromosome fusions and repetitive sequence accumulations might have occurred in *C. semilaevis*. The synteny and non-synteny of *C. semilaevis* 18S rDNA and 5S rDNA might imply the original and evolutionary characteristics of this species. These findings will facilitate studies on karyotype evolution of the order Pleuronectiformes.

Key words: Fluorescence *in situ* hybridization; Major rDNA; Minor rDNA; Pleuronectiformes; Sex chromosome; *Cynoglossus semilaevis*