

Tailoring Fish Genomes and Chromosomes as Exemplified by Mud Loach (*Misgurnus mizolepis*)

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Fish has received increasing attention as a useful model system for transgenic and genomic studies of vertebrates. Use of fish system as laboratory animal models in certain research areas can significantly reduce the labor, decrease costs and speed up the research process. Not surprisingly, many fish species have been subjected to various transgenic and genomic researches with particular attention on (1) studying gene regulation by investigating the function of different genetic elements and (2) the production of commercially valuable broodstock with desirable characteristics. Furthermore, the novel transgenic fish strains are believed to play an important role in future bio-industries as a potential biofactory to produce useful biomolecules such as therapeutic proteins. Mud loach, *Misgurnus mizolepis* a small freshwater species has many attractive and advantageous merits as a good candidate model system for genetic studies of vertebrates in both theoretical and practical aspects. This presentation describes briefly the recent and on-going progress on the genetic manipulation of mud loaches, especially with respect to (1) discovery of novel genes and functional studies of selected promoters for transgenic manipulation, (2) ecotoxicogenomic challenge with the characterization of relevant gene transcripts, (3) various experimental transgenesis including transgene delivery, genomic integration, expression and germ line transmission, (4) characterization of fast-growing autotransgenic mud loach carrying homologous GH gene at both geno- and phenotypic levels, and finally (5) molecular genetic breeding of transgenic mud loaches based on the multiple combinations of transgenic technology with chromosome-set manipulations.