

Carp genomes uncover speciation and chromosome evolution of fish

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Carp jumping out of water. Credit: IHB

In a study published online in *Molecular Ecology Resources*, a research team led by Prof. He Shunping from Institute of Hydrobiology (IHB) of the Chinese Academy of Sciences and collaborators have revealed the evolutionary history of East Asian cyprinids, and further explored the evolution and speciation of the silver carp and bighead carp, as well as genomic differentiation between the populations.

By integrating short-read sequencing and genetic maps, Prof He's team presented chromosomal-level genome assemblies with high quality and contiguity for the silver carp and the bighead carp.

They sampled 20 silver carp (seven from the Pearl River, four from the Amur River and nine from Yangtze River) and 22 bighead carp (eight from the Pearl River, four from the Amur River and 10 from Yangtze River) for re-sequencing, and found that an East Asian cyprinid genome-specific chromosome fusion took place ~9.2 million years after this clade diverged from the clade containing the common carp and *Sinocyclocheilus*. The result suggested that the East Asian cyprinids may possess only 24 pairs of chromosomes due to the fusion of two ancestral chromosomes.

Additionally, through [phylogenetic analysis](#), the researchers found that the bighead carp formed a clade with the silver carp, with an estimated divergence time of 3.6 million years ago. Population genetics and introgression indicated that silver carp and [bighead carp](#) were highly divergent, yet introgression between these species was detected in population analysis. They then identified the regions which might be associated with divergence or speciation.

The result showed that genes associated with the divergent regions were associated with reproductive system development and the development of primary female sexual characteristics; the divergent regions might influence early speciation, reproductive isolation and environmental adaptations between the two species.

"These genomic data are important resource for further study of these East Asian cyprinids on their evolution, conservation and commercial breeding," said Yang Liandong from Prof. He's team.

More information: Jianbo Jian et al. Whole genome sequencing of

silver carp (*Hypophthalmichthys molitrix*) and bighead carp (*Hypophthalmichthys nobilis*) provide novel insights into their evolution and speciation, *Molecular Ecology Resources* (2020). [DOI: 10.1111/1755-0998.13297](https://doi.org/10.1111/1755-0998.13297)

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