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Sex chromosome evolution in Poeciliid fish

The outstanding diversity of sex determination mechanisms and the plasticity of the underlying molecular pathways is a hallmark of fish biology. In a few species the description of the varying mechanisms and pathways has already proceeded to high resolution. However, neither the biological meaning of this diversity nor the evolutionary forces, which drive it, are understood. So far, our information mainly comes from a handful of species representing distant branches of the fish tree of life. To contribute the databases on which hypotheses can be built, we are studying sex determining mechanisms and sex chromosome structures in closely related species of three genera of Poeciliids: *Poecilia*, *Gambusia* and *Xiphophorus*. For our comparative work we are using RAD-sequences, pool sequencing, whole genome assemblies and RNA-seq. We find independent development of separate pairs of ancestral chromosomes to opposing heterogametic sex determination mechanisms in two sister species of *Gambusia* with strongly differing effects on sex chromosome evolution. In the genus *Xiphophorus*, the same ancestral chromosome pair became the sex chromosome in all species analysed so far. Surprisingly, this chromosome pair acts as WZ in some species, as XY in others, and as W, X and Y in the platyfish, *Xiphophorus maculatus*. Looking at candidate sex determination genes and sex chromosome-linked genes, we aim to reconstruct the evolution of sex chromosomes on a micro-evolutionary scale.

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Paradigm shift in sex chromosome evolution

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