

## Publication

### A tribal level phylogeny of Lake Tanganyika cichlid fishes based on a genomic multi-marker approach

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The species-flocks of cichlid fishes in the East African Great Lakes Victoria, Malawi and Tanganyika constitute the most diverse extant adaptive radiations in vertebrates. Lake Tanganyika, the oldest of the lakes, harbors the morphologically and genetically most diverse assemblage of cichlids and contains the highest number of endemic cichlid genera of all African lakes. Based on morphological grounds, the Tanganyikan cichlid species have been grouped into 12-16 distinct lineages, so-called tribes. While the monophyly of most of the tribes is well established, the phylogenetic relationships among the tribes remain largely elusive. Here, we present a new tribal level phylogenetic hypothesis for the cichlid fishes of Lake Tanganyika that is based on the so far largest set of nuclear markers and a total alignment length of close to 18kb. Using next-generation amplicon sequencing with the 454 pyrosequencing technology, we compiled a dataset consisting of 42 nuclear loci in 45 East African cichlid species, which we subjected to maximum likelihood and Bayesian inference phylogenetic analyses. We analyzed the entire concatenated dataset and each marker individually, and performed a Bayesian concordance analysis and gene tree discordance tests. Overall, we find strong support for a position of the Oreochromini, Boulengerochromini, Bathybatini and Trematocarini outside of a clade combining the substrate spawning Lamprologini and the mouthbrooding tribes of the 'H-lineage', which are both strongly supported to be monophyletic. The Eretmodini are firmly placed within the 'H-lineage', as sister-group to the most species-rich tribe of cichlids, the Haplochromini. The phylogenetic relationships at the base of the 'H-lineage' received less support, which is likely due to high speciation rates in the early phase of the radiation. Discordance among gene trees and marker sets further suggests the occurrence of past hybridization and/or incomplete lineage sorting in the cichlid fishes of Lake Tanganyika.

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