

琉球大学学術リポジトリ

Speciation of medaka fishes endemic to an ancient lake system in Sulawesi Island

メタデータ	言語: 出版者: 琉球大学 公開日: 2021-04-15 キーワード (Ja): キーワード (En): 作成者: メールアドレス: 所属:
URL	http://hdl.handle.net/20.500.12000/48170

Speciation of medaka fishes endemic to an ancient lake system in Sulawesi Island

(スラウェシ島の古代湖群に固有メダカ科魚類の種分化)

ABSTRACT

Adrianichthyids endemic to Sulawesi, an island in the Indo-Australian Archipelago, are known to have diverged within the island from a single common ancestor. It has been demonstrated that the divergence of major clades from this common ancestor largely reflects the complex geological history of this island. Especially, most species in late-branching lineages are endemic to a single tectonic lake or lake system in central Sulawesi, suggesting that habitat fragmentation due to the final collision/juxtaposition processes of tectonic subdivisions in this island since the Pliocene and the resultant lake formations are the primary factors promoting the diversification of these lacustrine lineages and shape their current distributions. However, it remains unclear in most cases how species within each lineage have diverged. In this study, I investigated how adrianichthyids of the genus *Oryzias* endemic to Malili Lake system in central Sulawesi diverged.

First, I examined *O. dopingdopingensis*, which was described from Doping-doping River, a river that shares an estuarine region with drainage from the lake system. *Oryzias dopingdopingensis* is distinguished from lacustrine congeners in Malili Lakes by a combination of several morphological characters. Analyses of mitochondrial sequences revealed that *O. dopingdopingensis* does not hybrid with the Malili lacustrine species in spite of water connection. Instead, *O. dopingdopingensis* is in a monophyletic group with *O. sarasinorum* and *O. eversi* in western Sulawesi.

Second, I examined how lacustrine *Oryzias* endemic to Malili Lake system diverged. Phylogenetic and population-structure analysis using genome-wide single-nucleotide polymorphisms revealed that they were basically differentiated among lakes, indicating that allopatric speciation is the primary mode of speciation of this species complex. Two sympatric species, *O. profundicola* and *O. marmoratus*, in Lake Touwti are phylogenetically sister to and substantially reproductively isolated from each other. Molecular clocks suggested that their divergence occurred after formation of this tectonic lake, suggesting that these two species in Lake Touwti diverged in sympatry. Analyses of differential admixture suggested that substantial introgression from the common ancestor of the Malili species complex occurred just before the sympatric divergence, suggesting that this introgression became a trigger for the sympatric divergence.

Sympatric speciation is considered to be quite difficult to occur without such introgression from outgroups. Admixture between geologically and phylogenetically distant *Oryzias* species are suggested to have occurred throughout Sulawesi. It is the complex geological history of this island that enabled such island-wide admixture events of aquatic organisms, for which migrations are usually restricted. These repeated admixtures and isolations of populations or species may have promoted diversification of *Oryzias* species and other freshwater taxa on this island.