On the origin and phylogenetic position of Arctic charr (Salvelinus alpinus complex, Salmonidae) from Lake Cherechen’ (middle Kolyma River basin): controversial genetic data

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Abstract Within the Arctic charr complex (Salvelinus alpinus complex), many different populations and forms with disputable origin and systematic status have been described. Some of them, such as the charr from Lake Cherechen’ (middle Kolyma River basin), combine characters of different phylogenetic groups, representing a possible consequence of former hybridization. The data on 32 allozyme loci and on nucleotide sequences of 501-bp fragments of the mtDNA control region as well as of 899-bp fragments of exon 2 of the RAG1 gene were used for the analysis of the origin of Lake Cherechen’ charr and their phylogenetic relationships with other representatives of the Arctic charr lineage. As was shown previously, the dwarf and large forms of charr from this lake are morphologically similar to other charr populations from the upper Kolyma River, but bear the mtDNA haplotype of northern Dolly Varden Salvelinus malma malma, not of Taranets charr Salvelinus alpinus taranetsi. The analysis of the allozymes and RAG1 gene confirms the affinity of the Lake Cherechen’ charr to the Arctic charr lineage, but it is insufficient to unambiguously attribute them to the Eurasian or Taranets group. The presence of mtDNA of northern Dolly Varden in Lake Cherechen’ Arctic charr and the replacement of their native mtDNA are the result of the introgressive hybridization with S. m. malma. An alternative explanation connected with incomplete lineage sorting seems highly improbable. Our study confirms a postglacial secondary contact of the representatives of different phylogenetic groups of the S. alpinus-S. malma species complex in the Kolyma basin and in the area from Taimyr to Chukotka. It also indicates the need for more thorough analysis of the morphological and genetic diversity of charr from this region as well as caution in taxonomic decisions.

Keywords: Allozymes · Mitochondrial DNA · RAG1 gene · Arctic charr lineage · Hybridization · Introggression · Systematics

Introduction

Arctic charr Salvelinus alpinus (L. 1758) is widely distributed in the lakes and rivers of the Arctic and Atlantic Ocean basins, being represented by the anadromous and resident forms. Several sympatric forms, sometimes reproductively isolated, are found in some water bodies (e.g., Savvaityova and Maksimov 1980, 1991; Viktorovsky et al. 1981; Savvaityova 1991; Gudkov 1993; Osinov et al.