

Abstract

Gobiidae is one of the largest families of teleost fishes with nearly 2000 species currently recognized. They have a worldwide distribution with exception of Arctic and Antarctic areas, inhabiting marine, brackish and freshwaters. Mostly, they are small-sized and live inconspicuously on the bottom. Their phylogeny has been studied only partially. In Europe, three independent lineages of gobies exist (Gobius-, Aphia- and Pomatoschistus-lineage), most of the species of these lineages are marine. In this work, I performed a multilocus study of the *Gobius*-lineage encompassing the majority of the species. Mitochondrial (*cytochrome b* and *cytochrome c oxidase I*) as well as nuclear (*rhodopsin* and *recombination activating gene*) markers were used. 480 individuals of 30 species were analyzed in the laboratory and sequences of further 25 - 32 species were downloaded from the Genbank and added to a dataset of each marker according to availability. Mitochondrial markers were more informative than the nuclear ones. *The usefulness of cytochrome c oxidase I* for studying phylogenetic relationships of gobies was compared with *cytochrome b*. *Cytochrome c oxidase I* showed to be useful for identification of the species, but has some limitations in resolving deeper phylogenetic relationships in gobies. *Cytochrome b* showed to be more suitable for complex phylogenetical studies.

The results show that the genus *Gobius* is not monophyletic. It is divided into two, well-supported groups, of which one is a sister group to Ponto-Caspian gobies. One of the groups includes also *Zosterisessor ophiocephalus*, while in the other one *Mauligobius maderensis* is included. Genus *Vanneaugobius* is polyphyletic, as *Vanneaugobius canariensis* and *Vanneaugobius dollfusi* do not cluster together. One of the species clustered with *Wheelerigobius wirtzi* and the other with *Odondebuena balearica*. A revision of this genus is necessary, as well. The results further showed that the gobies identified as *Gobius kolombatovici* from the west Mediterranean populations (published data) are not related to the populations of this species from its type locality in northern Adriatic and in fact belong to an unknown species, which is related to *Gobius gasteveni*. An unknown species of the genus *Chromogobius* was revealed and confirmed by all molecular markers. It was shown that two species currently assigned to the genus *Padogobius* are not related to each other, one of the species (*Padogobius nigricans*) falls within *Neogobius* species.

A switch to freshwaters occurred twice in the evolution of the *Gobius*-lineage, while the cryptobenthic way of life evolved at least six times in this lineage.

Key words: evolutionary relationships, marine fishes, gobies, multilocus approach, nuclear markers, adaptation