

Patterns of genetic differentiation and population history of endemic isopods (Asellidae) from ancient Lake Ohrid: combining allozyme and mtDNA data

Research Article

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Abstract: Ancient lakes as places of extensive speciation processes have been characterized by a high degree of endemism and biodiversity. The most outstanding European ancient lake is the oligotrophic and karstic Balkan Lake Ohrid. The lake is inhabited by a number of endemic species, but their evolutionary history is largely unresolved. In the present study, the genetic structure, gene genealogy and demographic history of the representatives of the Ohridian endemic *Proasellus* species were studied using both biparentally (allozyme loci) and maternally (partial mitochondrial cytochrome oxidase subunit I gene) inherited markers. Both data sets gave similar results and supported discrepancies among genetic differentiation, the current morphology-based taxonomy and bathymetric segregation. Horizontal distribution of endemic *Proasellus* species (Lake Ohrid vs adjacent feeder springs) within the lake presumably promote parapatric speciation whereas the main role of vertical barriers into diversification processes was not fully supported. The analyses of demographic history suggested the decline of endemic isopod populations. The radiation of endemic *Proasellus* populations within the lake could have started from the sublittoral/profundal zone towards the littoral or in the opposite direction – from the littoral to the profundal. Our analyses did not exclude both possibilities.

Keywords: COI • Endemic • Isopods • *Proasellus* • Species Flock • Speciation

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1. Introduction

Some places in the world, known as “hot spots of evolution”, are areas of more extensive speciation processes than others and are characterized by an exceptionally high degree of endemism and biodiversity. Ancient lakes are an example of such places [e.g. 1,2]. As these lakes are sometimes even 30 million years old, ancient lineages can be preserved there. Moreover, in such stable environments freshwater fauna can diversify into so-called “species flock”. Most studies of ancient lakes have concentrated on a relatively small subset of these lakes – the East African Great Lakes and Lake Baikal in Russia.

Knowledge of the fauna of other equally interesting lakes is currently lacking.

In Europe, the oligotrophic and karstic Lake Ohrid, is situated around a latitude of 41° in the Southern Balkans. Lake Ohrid originated within the Pliocene, approximately two to five million years ago [reviewed in 3]. Considering the surface area (358 km²) and the average rate of endemism (36%), it is probably the most diverse lake in the world [3]. Moreover, on the contrary to some other ancient lakes, the environmental conditions in Lake Ohrid seem to have been stable for most of its long history (only limited lake level fluctuations are believed to have occurred), enabling the preservation of relict species and the evolution of intralacustrine species

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