Out of the blue – the phylogeographic tale of freshwater amphipods (Malacostraca) from the Mediterranean Islands

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Abstract

Malacostraca is a highly diversified and very speciose class of crustaceans. Out of the estimated 26,000 malacostracan species described so far, about 6,000 inhabit various freshwater habitats worldwide. The Mediterranean region has been recognized as one of the 25 most important biodiversity and endemism hotspots worldwide and its islands are considered to be the natural laboratories of the evolution. Even though, the Mediterranean region is housing roughly 6% of world freshwater taxa, the knowledge about the freshwater fauna of the Mediterranean basin is incomplete and the studies upon the freshwater biota on the Mediterranean Islands very scarce. The majority of the insular freshwater malacostracans is comprised of amphipods. In particular, family Gammaridae is known to be a major component of the epigean freshwater communities, playing a key trophic role in the freshwater communities in the Mediterranean Region. More than 600 individuals from nearly 150 sites from the Mediterranean Region were amplified for several mitochondrial and nuclear markers, which revealed an extraordinary level of yet undiscovered biodiversity with more than 50 distinct entities, tripling the number of currently described insular species. The reconstruction of time-calibrated phylogeny have supported the assumption that the evolution of the freshwater gammarid amphipods is strongly connected with the geological history of the region with many lineages present on the islands already for millions of years. Our studies on various islands like Sicily, Crete, Sardinia, Mallorca and Aegean islands, confirmed high level of overlooked diversity in the insular fresh waters. Given that the Mediterranean Islands are housing more than 25% of freshwater malacostracans of the entire Mediterranean Region,

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with more than a half of them being insular endemics and considering that the ongoing climate change and heavy anthropogenic activities makes the freshwater ecosystems the most vulnerable and prone to mass extinctions, we point out that there is an urgent need for raising the public awareness about the level of insular freshwater biodiversity, which should be one of the focal points of the island biology.

Keywords: Mediterranean islands, freshwater, Amphipoda, Malacostraca, Crustacea