



Conference Abstract

Reversibility of the subterranean life-style

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Abstract

The extreme traits of subterranean organisms have traditionally been considered detrimental in the surface environment, thereby permanently restricting them to the dark, fragmented and relatively stable subsurface. Specifically, the loss of eyes and pigment coupled with stenothermy is thought to be disadvantageous in the dynamic surface environment, especially in the face of competition from epigeal counterparts. However, this paradigm has been challenged by several recent studies which indicate that in rare cases, a reversal to surface habitats seems likely. Using the amphipod genus *Niphargus* as a model, I present environmental, life-history, phylogeographic, phylogenetic, trophic and functional morphological data that supports at least two independent reversals to surface environments. The two studied species, *N. hrabei* and *N. valachicus*, have rarely been reported from groundwater, but are common inhabitants of surface rivers, streams and lakes. They have very broad geographical distributions (>1300 km) with modest genetic divergence, indicating wide-scale dispersal and gene-flow via the interconnected surface river network. Molecular phylogenies strongly support their independent origin from groundwater ancestors. In the case of *N. valachicus*, life-history data further supports an epigeal lifestyle due to the strong influence of seasonality, closely matching the patterns observed in surface amphipods. A comparison of functional morphology and trophic niche between this species and two of its most common sympatric surface relatives (*Gammarus dacidus* and *Synurella ambulans*) reveals that it occupies a unique predatory niche, indicating little trophic overlap and decreased competitive pressure. It therefore appears that, under certain circumstances, subterranean species do not only recolonize, but also thrive in surface environments.

Keywords

evolution, reversibility, surface habitat, troglomorphism

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