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Conference Abstract

On climate change and subterranean spiders

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Abstract

Subterranean ecosystems offer intriguing opportunities to study mechanisms underlying responses to changes in climate because species within them are often adapted to largely constant temperatures. However, responses of specialized subterranean species to anthropogenic climate warming are still largely undiscussed. We combined physiological tests, species distribution models and genetic data to investigate the potential effect of raising temperatures on subterranean coenosis. We used spiders of the genus *Troglohyphantes* Joseph, 1881 (Araneae: Linyphiidae) as model organisms, focusing on a coherent biogeographic area of the Western Alps in which the distribution of these spiders has been well documented. Thermal tolerance experiments in climatic chambers pointed at a reduced physiological tolerance to temperature fluctuations at increasing levels of troglomorphism. This result suggests that, during their subterranean evolution, spiders have progressively fine-tuned thermal tolerance to the constant and narrow temperature ranges of their habitats. Further evidence of the sensitivity of our model species to temperature increase derives from species distribution models projected onto different climate change scenarios. Model projections point toward a future decline in habitat suitability for subterranean spiders. Moreover, genetic data at the population/species interface are suggestive of limited gene flow between subterranean populations, testifying reduced dispersal capacity and habitat connectivity. In light of these results, we predict the potential extinction of the most restricted endemic species. Our findings therefore emphasize the importance of considering subterranean organisms as model species for ecological studies dealing with climatic changes, and to extend such investigations to other subterranean systems worldwide.

Keywords

Global Warming, Subterranean Biology, Thermal niche

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