

Arthropod communities and drivers of their species diversity and composition in caves

Raluca Ioana Băncilă[‡], Augustin Nae[‡], Andrei Giurginca[‡], Ioana Nae[‡], Eugen Nitzu[‡], Popa Ionuț[‡], Stefan Cătălin Baba[‡], Rodica Plăiașu[‡]

[‡] "Emil Racoviță" Institute of Speleology of Romanian Academy of Sciences, Bucharest, Romania

Corresponding author: Raluca Ioana Băncilă (bancila_ralucaioana@yahoo.com)

Abstract

Understanding the drivers of diversity patterns in ecological communities remains a major challenge in ecology. Moreover, few studies have considered invertebrate or subterranean communities and little is known about which factors are responsible for structuring arthropod communities in caves. In this study we:

1. assessed the abundance, richness, and composition of arthropod communities from eight caves located in Banat and Mehedinti region, Romania; and
2. determined whether altitude, cave physical characteristics (temperature, relative humidity, light intensity) and features (cave extension, height, width, heterogeneity, substrate (wall versus floor)) influence cave arthropod communities along the horizontal development of the cave (i.e. from the cave entrance, through the intermediate zone, to the aphotic zone).

Overall, 89 species were found, of which three were obligate subterranean dwellers and 17 were endemic species. Species abundance distributions showed evident variation in species numbers among cave zones and between the wall and floor substrate. Species abundance was influenced by cave extension, relative humidity and light intensity. Species richness was related to cave extension while relative humidity and cave heterogeneity affected the species diversity. The results also indicated differences in species abundance, richness and diversity among cave zones and between substrate types. The arthropod community structure and composition was determined by altitude, relative humidity, temperature and substrate. The floor and wall substrate had different species composition while the species composition of the three cave zones largely overlapped. We conclude that several biotic and abiotic factors explain the diversity and composition of cave arthropods communities and that our results may be relevant to other types of island-like habitats.

Keywords

arthropods species richness, abundance, cave development, substrate, cave zones, island-like habitats

Presenting author

Raluca Ioana Bancila

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