
Surviving in southern Mediterranean refugia: Veronica aragonensis, a rare endemic from the Iberian Peninsula

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Abstract

The Mediterranean basin harbours the most important glacial refugia for flora and fauna. In particular, southern mountain systems have played an important role for the survival of plant biodiversity during the Quaternary **glacial** periods. In turn, these mountains provided numerous microhabitats that may help many cold-adapted species to survive to warmer conditions reached during **interglacial** periods. Thus, understanding the adaptive potential of cold-adapted species to respond to climatic oscillations is fundamental to predict the consequences of contemporary global climate change.

The species *Veronica aragonensis* Stroh, endemic to the Iberian Peninsula, was selected as a model for our study. This perennial herb inhabits calcareous scree-slopes from Pyrenees and the Baetic System, usually between 1,000–2,300 m. Microsatellite markers were characterized to investigate genetic diversity and structure of the species. Our main aim was to elucidate how the biological and historical processes shaped the evolutionary history of this cold-adapted species.

Our results suggest the existence of genetic bottlenecks during postglacial colonization together with long periods of isolation and high levels of inbreeding that could affect the future survival of some populations of *V. aragonensis*. Conservation of the evolutionary process that originates genetic variability within the species is the basis for the long-term biodiversity conservation. Thus, our understanding of genetic patterns in *Veronica aragonensis* will help to the implementation of effective conservation plans for this relict species. Additionally, glacial and inter-glacial refugia in which the species could survive to the glaciations have been identified. These southern populations at the edge of the distribution range are clear potential candidates to define microclimatic refuges for cold-adapted species under the present climate-change scenario. Protection of these habitats would allow the conservation of many other threatened taxa which constitute plant communities on this type of rocky mountain habitat.

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