

## The evolutionary history of the Alpine-Appenninic troglomorphic *Pimoa* spiders, an integrative approach

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Long term climatic changes, such as the Pleistocene glaciations and other large-scale climatic upheavals, profoundly shaped present-day biogeographic patterns, especially concerning the cave-dwelling endemic biocenosis. Pulses of population expansions and contractions happening during Pleistocene left their stamp on local genetic diversity and current population structure.

We studied the phylogeography of *Pimoa rupicola* (Araneae, Pimoidae), an endemic Alpine-Appenninic species preferably found in caves and other shaded humid habitats. We sampled several populations in caves and similar habitats across the known geographical range of the species in the Western Italian Alps. By coupling phylogeographic analysis on DNA sequence markers (*cox1* and *ITS2*) and Ecological Niche Modelling (ENM) techniques, we reconstructed the population history of *Pimoa* and unravelled the factors that shaped its present-day geographic range. We uncovered two well-supported, deeply divergent lineages within *P. rupicola*, one including all northernmost populations (from the Graian to the Cottian Alps) and a second one comprising the remaining populations on the south (down to the French and Italian Riviera). Based on our time estimates, northern and southern lineages split at the end of the Miocene, when increasing seasonality replaced from a subtropical climatic conditions. Around 1 Mya the two lineages underwent strong bottlenecks, consistent with the Quaternary glacial cycles. Extinction driven by glacial maxima left their fingerprint in population expansions detected by the genetic data. By projecting ENMs into the paleoclimatic reconstruction of the Last Glacial Maximum, we identified several areas devoid from glaciers that may have acted as glacial refugia for few surviving populations within the two lineages. Subsequently, the dynamic of recolonization followed a south-north path, finally leading to the distribution ranges that we observe nowadays. Nowadays, northern and southern populations are adapted to slightly different environmental conditions. The observed niche partitioning between the two *Pimoa* lineages probably explain their present geographic segregation.