

## Genetic diversity and structure patterns of the Pyrenean brook newt (*Calotriton asper*)

Valbuena-Ureña E\*<sup>1,2</sup>, Soler-Membrives A\*<sup>1</sup>, Oromi N<sup>3</sup>, Carranza S<sup>4</sup>, Amat F<sup>5</sup>, Camarasa S<sup>3</sup>, Denoël M<sup>6</sup>, Sanuy D<sup>3</sup>, Steinfartz S<sup>7</sup>

<sup>1</sup>Unitat de Zoologia, Facultat de Biociències, Universitat Autònoma de Barcelona, 08193 Cerdanyola del Vallès (Barcelona), Catalonia, Spain/ <sup>2</sup>Centre de Fauna Salvatge de Torreferrussa (Catalan Wildlife Service – Forestal Catalana). Finca de Torreferrussa, Crta B-140, Km 4,5. 08130, Santa Perpètua de la Mogoda, Barcelona, Catalonia, Spain/ <sup>3</sup>Departament de Ciència Animal (Fauna Silvestre), Universitat de Lleida, Avinguda Rovira Roure, 191, 25198, Lleida, Catalonia, Spain/ <sup>4</sup>Institut de Biologia Evolutiva (CSIC-Universitat Pompeu Fabra), Passeig Marítim de la Barceloneta 37-49, 8003 Barcelona, Spain/ <sup>5</sup>Àrea d'Herpetologia, Museu de Granollers, Ciències Naturals, Francesc Macià 51, 08402 Granollers, Catalonia, Spain./ <sup>6</sup>Laboratory of Fish and Amphibian Ethology, Behavioural Biology Unit, Freshwater and Oceanic Science Unit of Research (FOCUS), University of Liège, 22 Quai van Beneden, 4020 Liège, Belgium/ <sup>7</sup>Department of Evolutionary Biology, Zoological Institute, Technische Universität Braunschweig, Mendelssohnstr. 4, 38106 Brunswick, Germany

\*the first two authors contributed equally to this work.

The Pyrenees are an excellent natural laboratory for biogeographic, evolutionary and ecological research of mountain faunas as a result of the great variety of environments and the profound effect of the glacial and interglacial periods. The endemic Pyrenean brook newt (*Calotriton asper*) is an excellent model organism to understand how diversity has been generated and maintained under high altitude conditions and to study the impact of the main geological and glacial events on the demography of its endemic fauna. This study analyzes the genetic patterns of diversity and structure of *C. asper* along its distribution range, with special emphasis on the distinct habitat types, and the altitudinal and geographical ranges. A total of 900 individuals from 44 different localities were analyzed using a total set of 19 microsatellite loci. The mean allelic richness ( $A_r$ ) was 2.89, and mean values of  $H_E$  and  $H_O$  were 0.51 and 0.52, respectively. Evidence of a negative longitudinal and positive altitudinal gradient of genetic diversity in *C. asper* populations was detected for  $A_r$ ,  $H_E$  and  $H_O$ , so the levels of genetic variation were markedly higher westwards and at high altitudes. Regarding the distinct habitat types, caves had significantly lower values of genetic diversity compared to streams or lakes. The mean  $F_{ST}$  value was relatively low (0.304). However, very high values were found between certain localities, reaching 0.771. STRUCTURE detected a peak at  $K = 2$ . The eastern populations (cluster 1) remained grouped into two clusters and the central-western Pyrenees (cluster 2) into three clusters. The increase of isolation with geographical distance is consistent with the population structure detected. The fact that western populations were in general more genetically diverse than those from the central or eastern Pyrenees is in accordance with other Pyrenean species. Also, the structure into two genetically distinct groups is not exclusive for this species. But the impact of altitudinal gradient on the genetic diversity seems to differ from other species, and mainly from mostly of

amphibians. We suggest that lower altitudes can act as a barrier probably because the lowlands do not provide a good habitat for the species. For example, in low altitudinal lakes the presence of introduced fish compromises the viability of newts. Briefly, *C. asper* species seems to be adapted to high altitudinal mountain habitats that can act as a reservoir of genetic diversity.



## ABSTRACT BOOK

**Simposi sobre l'ecologia del tritó pirinenc (*Calotriton asper*): coneixements, conservació i reptes futurs**

**Studies on the ecology of the Pyrenean newt (*Calotriton asper*): knowledge, conservation and future challenges.**

**Institut d'Estudis Catalans, 15 de maig de 2017, Barcelona**

