

## Abstract

High mountain systems are important areas for divergence and speciation. These topographically diverse structures have strongly influenced the evolution of mountain biota. Alps, as the largest European high mountain system, form a major feature in moulding the phylogeography of many species and they are specific in a high number of endemic species. Scorpions are generally well known mainly as inhabitants of arid and semi-arid areas but some of them also contribute an important element of mountain biota in which is the case of subgenus *Alpiscorpius* within European genus *Euscorpius*. Three endemic cryptic species have been recognised from Alpine mountain system, these are *E.(A.) alpha*, *E.(A.) germanus* and *E.(A.) gamma* at this moment. They were elevated to species rank about 15 years ago as a result of pilot molecular phylogenetic studies using molecular markers, mitochondrial 16S rDNA and nuclear allozymes.

I examined these species from 35 different alpine populations using cytogenetic methods and detected unsuspected great karyotype variability among them. In *E. (A.) alpha* there was reported occurrence of three distinct karyotypic races ( $2n=60$ ,  $90$ ,  $54$ ). Similarly, within species *E. (A.) gamma* there was found existence of two highly different karyotypic races ( $2n=58$ ;  $88$ ). Interestingly, among populations of *E. (A.) germanus* with the largest area of distribution was identified only one conservative karyotype with the lowest number of chromosomes ( $2n=46$ ) and total absence of one-armed chromosomes. For detecting specific chromosomal rearrangements I applied Fluorescence in situ hybridization using 18S rDNA probe for visualization of nucleolus organizer regions in genome of studied species. For proposing a basic scheme of karyotype evolution in alpine species I linked observed karyological data with our results of molecular phylogenetic analysis using two mitochondrial markers, genes for 16S rRNA and COI. Differences of karyotypes are in agreement with specific phylogenetic lineages and the distribution of karyotype races does not overlap and corresponds to the geographic barriers that have been playing an important role during the karyotype differentiation.

**Key words:** cytogenetics, molecular phylogeny, scorpions, *Alpiscorpius*, FISH, 18S rDNA, Alps, karyotype evolution