Phylogenetic diversity of water scorpions (*Nepa* spp., Insecta, Hemiptera)

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Abstract

Water scorpions belonging to the genus *Nepa* are predatory freshwater aquatic insects of the order Hemiptera. There are currently five accepted species, with a Holarctic distribution: *N. cinerea* (Eurasia and Northern Africa), *N. sardiniensis* (Sardinia and Corsica), *N. anophthalma* (endemic to Movile Cave, Romania), *N. apiculata* (North America) and *N. hoffmanni* (Eastern Asia). Mitochondrial and nuclear genetic markers indicate a correlation between genetic diversity and geographic distribution. Analyses also reveal a cryptic diversity in the Western Mediterranean basin, with specimens of the *cinerea* clade being assigned to the *sardiniensis* clade. The cave-adapted *N. anophthalma* is genetically closest to *N. cinerea*, suggesting surface populations of *N. cinerea* as possible ancestors. *N. cinerea* samples from three cave systems in Italy indicate various degrees of gene flow between surface and subterranean populations and an instance of a possible incipient speciation event. Despite the overlap in distribution range in mainland Eastern Asia between *N. cinerea* and *N. hoffmanni*, there is a high genetic distance between the two species. A similar value of genetic distance is found between *N. cinerea* and *N. apiculata*, but also between *N. hoffmanni* and *N. apiculata*, suggesting the assignment of *N. hoffmanni* and *N. apiculata* to different genera. The single species currently considered as stygobiotic, *N. anophthalma*, deserves more research to understand the timing of colonization of Movile groundwater by its surface ancestors.

Keywords

Nepa, Nepa anophthalma, water-scorpion, Movile Cave, cryptic diversity

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