

Population dynamics of *Chaoborus flavicans* and *Daphnia* spp.: effects on a zooplankton community in a volcanic eutrophic lake with naturally high metal concentrations (L. Monticchio Grande, Southern Italy)

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ABSTRACT

The response of Daphnia populations to invertebrate predators involves morphological or behavioural changes. Few studies suggest that contaminant aqueous metals, like Cu or Ni at environmentally relevant concentrations, interfere with invertebrate chemical communication systems, such as that which operates between Daphnia and Chaoborus. The objective of our study was to determine if this interference could be also observed in lakes naturally rich in dissolved metals, such as volcanic lake (Lago Grande di Monticchio). This study aimed to assess if natural dissolved metals (e.g., Fe, Mn and Sr) could impair the ability of Daphnia pulex and D. galeata × hyalina × cucullata 'complex' populations to respond to Chaoborus kairomones by producing morphological defenses against potential predation, and to understand how Chaoborus predation might affect zooplankton community composition and overall zooplankton density. The predator impact did not result in: i) any morphological changes; ii) any apparent shift in body size pattern of the prey population; iii) any shift in life history traits. Chaoborus accounted for high mortality rates in Cladocera and strongly reduced the chance of individuals to reach maturity. Moreover, highly significant negative correlations between abundance of dominant taxa of zooplankton and C. flavicans were found. The last larval instars of C. flavicans seem to reduce the number of crustaceans, particularly cladocerans and copepod adults and could play an important role in structuring zooplankton communities. Our results suggest that metal inhibition of defence strategies induction probably occurs along the signal transduction pathway in Lake Grande di Monticchio. Impairment of chemosensory response to predatory chemical cues may have widespread ecological consequences in aquatic systems. Chaoborus predation effects can greatly affect both zooplankton biomass and community composition, impact interactions at lower trophic levels and generate an ecological cascade leading to a rapid eutrophication.

Key words: predator-prey system, zooplankton, metal inhibition, volcanic lake
