

# Change in filter-screen morphology and depth selection: Uncoupled responses of Daphnia to the presence of filamentous cyanobacteria

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ABSTRACT: In many eutrophic lakes, ability to cope with filamentous cyanobacteria is crucial to *Daphnia* fitness, as the filaments can reduce food intake by interference with food-particle retention. Two basic mechanisms were proposed to explain food collection by *Daphnia*: mechanical sieving, in which filtering appendages act as sieves, and direct interception, in which appendages act as paddles and water does not pass through. As was recently suggested, both mechanisms may be active, and their relative importance is determined by the Reynolds number on filtering appendages. Mechanical sieving seems particularly sensitive to the interference from filamentous cyanobacteria, which can clog the meshes while passing through the filtering chamber. We therefore hypothesized that in the presence of filaments, *Daphnia* minimizes the interference with filtration by decreasing the Reynolds number on the filters and by thus reducing the relative importance of sieving. To test this hypothesis, we examined the responses of nine clones of the *Daphnia longispina* group to the presence of nontoxic, filamentous cyanobacteria. The presence of cyanobacteria triggered in *Daphnia* responses of both behavioral (descending to deep, cold waters) and morphological nature (decreased intersetal and intersetular distances in the filtering apparatus). Both responses led to a decrease in the Reynolds number on the filters. Moreover, the two responses were inversely correlated: individuals with larger meshes descended to colder strata than did those with smaller meshes. These modifications of phenotype are regarded as adaptive, since they allow for minimized filamentinduced interference with the filtration process.

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