Does the toxic effect of *Microcystis aeruginosa* on *Daphnia galeata* depend on microcystin ingestion rate?

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With 2 figures and 2 tables

**Abstract:** The aim of this study was to test the hypothesis that toxicity of *Microcystis aeruginosa* to *Daphnia galeata* can be explained by microcystins. For that purpose, the relationship between the strength of toxic effect and microcystin ingestion rate (amount of microcystins ingested per time with the respective food) by the animals was analysed. Of the tested *Microcystis* strains, only those containing microcystins, were poisonous to daphnids. It was, furthermore, shown that toxicity was closely related to the microcystin ingestion rate. Thus, the results support the hypothesis that microcystins are the most likely cause of daphnid poisoning, and they also emphasise that the toxicity of a *Microcystis* strain depends on both, the cellular microcystin content and the rate with which it is ingested by the animals. The data also demonstrate that the feeding activity of *D. galeata* is not correlated to the microcystin content of the *Microcystis* culture fed. This may indicate that the strain-specific differences in feeding on *M. aeruginosa* are not due to the microcystins. As toxicity was also observed when colony-forming strains with a mucilage sheath were offered, it seems likely that microcystin release in the gut is not actually hindered by mucilage and that toxicity can occur even under natural conditions.

**Introduction**

Microcystins, primarily found in cells of several *Microcystis aeruginosa* strains, are known to be responsible for most of the reported cyanobacteria poisonings of mammals (cf. CARMICHAEL 1986). This effect is ultimately caused by their ability to inhibit protein phosphatases (e.g. MACINTOSH et al. 1990) and to damage liver cells (CARMICHAEL 1986). Nevertheless, toxicity to