

**Absence of evidence
for viral infection
in colony-embedded
cyanobacterial isolates
from the Curonian
Lagoon***

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The aim of the present study was to assess the frequency of viral infections in colony-embedded cells of the cyanobacteria *Aphanizomenon flos-aquae* and *Microcystis aeruginosa* collected from the brackish Curonian Lagoon. Natural and mitomycin C-treated *A. flos-aquae* and *M. aeruginosa* samples were examined for the presence of viruses and lysis by a combination of light-, epifluorescence and transmission electron microscopy techniques. Here we report a lack of evidence for virus infection, progeny formation and cell lysis in colony-embedded cells of *A. flos-aquae* and *M. aeruginosa*. These results indicated that viruses contribute little to the mortality of these cyanobacteria when the latter occur in colonies. Consequently, the results supported the hypothesis that colony formation can, at least temporarily, provide an efficient strategy for protection against virus-induced mortality. Finally, assuming that grazing has a negligible effect on colony-embedded cells in the Curonian Lagoon, we propose that most of the cyanobacterial biomass produced is lost from the pelagic food web by sedimentation.

Communication

Cyanobacterial blooms frequently occur in fresh and brackish waters of the coastal lagoons of the Baltic Sea. Filament and/or colony formation prevents the grazing of cyanobacteria populations by other organisms (Callieri 2010, Yang & Kong 2012), eventually leading to depressed ecotrophic efficiency of the microbial food web during conditions that favour bloom formation (Sellner et al. 1994, Jürgens & Güde 1994). Although colony formation has also been proposed as a strategy that enables populations to escape viral attacks (Hamm et al. 1999, Jacobsen et al. 2007), some studies based on isolated phage-host systems indicate that viruses are capable of successfully infecting and lysing embedded colonies and mucus-producing cells (Baudoux & Brussaard 2005) by means of, for example, phage enzyme activity (Hughes et al. 1998). Cell lysis may also occur in cells of embedded colonies upon induction of lysogenic cells (Hewson et al. 2004). In the present study, the colony-embedded cyanobacteria *Aphanizomenon flos-aquae* and *Microcystis aeruginosa* were isolated from the Curonian Lagoon, and natural and mitomycin C-treated samples were examined for virus infection and virus production.

In eutrophic aquatic ecosystems, cyanophages (viruses that infect cyanobacteria) contribute significantly to the control of cyanobacterial blooms (Jassim & Limoges 2013). For example, Coulombe & Robinson (1981), based on long-term observations, argued that viruses are among the key factors that terminate blooms of *A. flos-aquae* in nutrient-rich lake

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