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Phage-host interactions in *Flavobacterium psychrophilum* and the potential for phage therapy in aquaculture

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The aim of the study was to investigate the potential of bacteriophages to control the fish pathogen *Flavobacterium psychrophilum*. The aquaculture industry is troubled by disease problems, like rainbow trout fry syndrome (RTFS) caused by *F. psychrophilum*, which cause considerable economical losses in salmonid aquaculture worldwide. Antibiotic treatment is currently used to treat *F. psychrophilum* infections, but the growing emergence of resistant bacteria calls for alternative treatments. In order to examine the potential for phage control of the host, and the development of phage resistant strains, phage-host interactions were studied in three growth experiments with the pathogenic *F. psychrophilum* strain 950106-1/1 and various host specific phages. After 16 hours of incubation phages were added in 3 different concentrations (Low, Medium and High) as single phages or as phage-cocktails consisting of 3 and 10 phages. Phage production and growth of the host was examined using OD₅₂₅ measurements and flow cytometry, and resistant host strains were isolated for characterization of phage susceptibility patterns and physiological fingerprint. Phage effects were highly dependent on initial phage concentration. At the highest phage concentration phages were able to completely control the host population and prevent growth of phage resistant strains, whereas the low phage concentrations did not show any controlling effect. Addition of phages in cocktails had a more significant effect than when added as individual phages. A host range study of the isolated phage-resistant strains showed several unique patterns of susceptibility to the 22 phages used, indicating that different resistant strains developed during incubation.