



Bio-optical consequences of viral infection of phytoplankton: I. Experiments with the cyanobacterium, *Synechococcus* sp.

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ABSTRACT: Four strains of the cyanobacteria, *Synechococcus*, were infected with viruses isolated and purified from coastal waters of the Gulf of Maine. Changes in host and virus concentration were observed in time course experiments, along with associated variability in inherent optical properties. There were strong optical shifts before and after lysis in inherent optical properties on time scales commensurate with the viral infection process. Specifically, both backscattering and absorption (particularly in visible wavelengths) increased slightly after infection, but decreased markedly after lysis. The most rapid optical change was seen in *in vivo* chlorophyll fluorescence, with a slight increase within 2 d after initial infection. Such changes likely reflect fundamental changes in host photophysiology after infection. After host lysis, there was a major drop in bulk Chl *a* fluorescence, synchronous with a major increase in the ratio of free viruses per host cell. The net effect of the changes in fluorescence and host concentration was an increase in the fluorescence per cell. These optical changes were accompanied by major changes in the submicron particle size spectra as cells were lysed, releasing their intracellular contents.

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