

ECOLOGICAL CONSEQUENCES OF LONG-TERM EXPOSURE OF *ANABAENA VARIABILIS* (CYANOPHYCEAE) TO SHIFTS IN ENVIRONMENTAL FACTORS

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Abstract: Cultures of *Anabaena variabilis* were exposed to different light intensities, and the time course of photoadaptation was measured by photosynthetic rate and changes in pigmentation. A shift down in intensity of $284 \mu\text{Ein} \cdot \text{m}^{-2} \cdot \text{sec}^{-1}$ caused a temporary decrease in the photosynthetic response followed by gradual adaptation to the new conditions. Final chlorophyll *a* and carotenoid concentrations were reached after 1 day, although other physiological indicators showed that adaptation required 4 days. The parameter I_k was shown to be the best indicator of photoadaptation. A shift up in light intensity of the same magnitude also required 4 days for complete photoadaptation by the culture, although chlorophyll and carotenoid concentrations stabilized within 1 day. A shift down in light intensity of $392 \mu\text{Ein} \cdot \text{m}^{-2} \cdot \text{sec}^{-1}$ resulted in a temporary attempt to adapt followed by collapse of the population. This demonstrates an apparent threshold in the magnitude of the shift in light intensity which will permit successful adaptation. Simultaneous changes in light intensity and temperature also adversely affected culture populations. Our observations present a possible cause for the decline or prevention of an algal bloom under a fluctuating light regime and suggest that it may be possible to predict this decline as a result of synoptic weather patterns or hydrodynamic influences.