

Effects of dissolved organic matter and ultraviolet radiation on the accrual, stoichiometry and algal taxonomy of stream periphyton

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SUMMARY

1. We investigated the effects of dissolved organic matter (DOM) and ultraviolet-B (UVB) radiation on periphyton during a 30-day experiment in grazer-free, outdoor artificial streams. We established high [10–12 mg carbon (C) L⁻¹] and low (3–5 mg C L⁻¹) concentrations of DOM in artificial streams exposed to or shielded from ambient UVB radiation. Periphyton was sampled weekly for ash-free dry mass (AFDM), chlorophyll (chl) *a*, algal biovolume, elemental composition [C, nitrogen (N) and phosphorus (P)], and algal taxonomic composition.

2. Regardless of the UVB environment, increased DOM concentration caused greater periphyton AFDM, chl *a* and total C content during the experiment. Increased DOM also significantly increased periphyton C : P and N : P (but not C : N) ratios throughout the experiment. Algal taxonomic composition was strongly affected by elevated stream DOM concentrations; some algal taxa increased and some decreased in biomass and prevalence in artificial streams receiving DOM additions. UVB removal, on the other hand, did not strongly affect periphyton biomass, elemental composition or algal taxonomic composition for most of the experiment.

3. Our results show strong effects of DOM concentration but few, if any, effects of UVB radiation on periphyton biomass, elemental composition and algal taxonomic composition. The effects of DOM may have resulted from its absorption of UVA radiation, or more likely, its provision of organic C and nutrients to microbial communities. The strong effects of DOM on periphyton biomass and elemental composition indicate that they potentially play a key role in food web dynamics and ecosystem processes in forested streams.

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