



## Living in transparent lakes: Low food P:C ratio decreases antioxidant response to ultraviolet radiation in *Daphnia*

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**ABSTRACT:** We experimentally tested the effect of food quality (phosphorus [P] : carbon [C] ratio) on the response of antioxidant enzymes to ultraviolet radiation (UVR) in *Daphnia commutata* fed with *Chlamydomonas reinhardtii*. Algal cultures were grown at different concentrations of phosphorus and light intensities, resulting in significant differences in the P :C ratios (mmol P[ $\mu$ mol C]<sup>-1</sup>; 6.05, 1.70, and 0.83). After 12 d of *D. commutata* growth under these three food quality treatments, we observed significant differences in individual biomass and protein content of *Daphnia*. Subsequently, we carried out an ultraviolet exposure experiment to determine if stoichiometric constraints imposed would limit enzymatic defenses against UVR oxidative stress. The UVR-exposure experiment consisted of a factorial design with three levels of food P :C (low, medium, and high) and two levels of UVR (exposed and protected). The activities of glutathione S-transferases (GST) and catalase (CAT), enzymes involved in protection and repair of damage caused by UVR, were determined. Enzyme activities in the animals exposed to or protected from UVR showed a direct relationship with food P :C ratio that fit exponential models. Although GST and CAT differed slightly in their response to UVR, both enzymes were significantly affected by food quality: In low P :C treatments, there was significantly lower enzyme activity in response to UVR for both enzymes. Low food quality (less P for biosynthesis) may also impose a weaker antioxidant response on the organisms, a response of considerable ecological relevance in transparent Andean lakes which combine high UVR intensities with low seston P :C ratios.

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