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Chlorophyll production, degradation, and sedimentation: Implications for paleolimnology¹

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Abstract

Chlorophyll *a* production, degradation, and sedimentation were studied simultaneously during summer stratification in three lakes with contrasting plankton communities. Pigment budgets showed that chlorophyll production and pigment resuspension were both major sources of water column pigments. Photodegradation rates were rapid and indicated that detritus particles that remained in the epilimnion for periods longer than about 3 days lost nearly all detectable pigments. Therefore, only rapidly sinking detrital particles or those produced in deep layers at low light intensity could make appreciable contributions to sedimentary chlorophyll degradation products. Pheophorbide *a*, a grazing indicator, was the dominant chlorophyll *a* degradation product found in sediment traps. Pigment sedimentation increased significantly with mean size of cladocerans and omnivorous copepods. In contrast, sedimentation rates of chlorophyll degradation products did not increase with primary production. In these lakes, the deposition of chlorophyll degradation products in sediments depended primarily on the size and biomass of grazers.