Inhibition of Photosynthesis in Natural Asssemblages of Lake Erie Phytoplankton by Photoinduced Toxicity from Intact and Photomodified Polycyclic Aromatic Hydrocarbons in Sunlight.

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The toxicity of polycyclic aromatic hydrocarbons (PAHs) to photosynthesis in natural assemblages of Lake Erie phytoplankton was examined using chlorophyll fluorescence. Phytoplankton collected from various stations on Lake Erie were exposed in situ to three intact PAHs (anthracene, phenanthrene and fluoranthrene), and three abundant photoproducts (anthraquinone, phenathrenequinone, and 1,2-dihydroxyanthraquinone) for 30 minutes in 50% sunlight. Pulse-amplitude modulated chlorophyll fluorescence, measured from phytoplankton concentrated onto filters, was used to estimate the efficiency of photosynthetic electron transport. Both intact and photomodified PAHs diminished photosynthesis at low, environmentally relevant concentrations. Anthracene, fluoranthene and phenanthrenequinone diminished chlorophyll fluorescence in sunlight at concentrations below 300 F g/L. In addition, phenanthrenequinone also inhibited photosynthesis in phytoplankton exposed to the chemical in the dark. When transferred to low light environments for six hours, phytoplankton exposed to all PAHs except phenanthrenequinone demonstrated recovery.