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Assessment Of Hplc Methods To Trace Phytoplankton Pigments In The Food Web Of Lake Erie And Lake Ontario

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For virtually all organisms, including humans, carotenoids are known to have a variety of beneficial health effects, most notably as antioxidants and as precursors to vitamin A. However the carotenoids must be acquired from the diet: in terrestrial plants and algae, carotenoids are produced as accessory pigments for photosynthesis. A greater diversity of carotenoids exists in the diet of aquatic organisms than in the human diet. Our primary interest is in tracing algal pigments in the food web of Lake Erie and Lake Ontario: for this purpose, the merits of the existing HPLC methods are determined primarily by their ability to separate carotenoids, which bioaccumulate in tissues of aquatic organisms. The ternary solvent gradient developed by Wright, Jeffrey and coworkers (1991), as well as the binary solvent gradient developed by Van Heukelem and Thomas (2001), have been verified to give excellent separations of at least 22 carotenoids, which can differentiate seven divisions of phytoplankton. Analyses of dreissenids from Lake Erie have revealed the presence of zeaxanthin, indicating ingestion of cyanobacteria, as well as an abundance of fucoxanthin from diatoms. For these samples, the Van Heukelem Thomas solvent gradient has the advantage of separating zeaxanthin from lutein, a classic interference, produced by chlorophytes. However, in Lake Ontario, cyanobacteria are less abundant than in Lake Erie, whereas cryptophytes are more abundant. Wright and Jeffrey's conditions to resolve alpha-carotene from beta-carotene are more useful for Lake Ontario, since alpha-carotene is an important cryptophyte pigment, whereas beta-carotene is ubiquitous.