POSTER PRESENTATION

DIATOM MIGRATION PATTERNS BETWEEN EPIBENTHOS AND PLANKTON IN A FIFTH ORDER HARDWATER STREAM (IOWA USA): USING LIFESTYLE TO TRACK 40 YEARS OF CHANGING N:P AND HYDROLOGY

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Plankton diatoms in all waters move between the water column and surfaces in response to seasonal changes. Numerous structural and physiological adaptations permit suspension or attachment as the dominant lifestyle for each diatom taxon.

The headwaters of the Cedar River lie in recent glacial till; the floodplain was mostly prairie two centuries ago. The waters have probably always been nutrient rich and also well buffered by the carbonate-rich bedrock frequently exposed in the riverbed.

This 40-year retrospective study of the Cedar River in Waverly, Iowa, compares relative abundances of epibenthic surface diatoms with quantitatively sampled plankton diatoms. Samples from 1990 to 2016 were analyzed to sort river diatom taxa into four lifestyle preferences: edaphic, epibenthon, tychoplankton, or euplankton. Tychoplankton are diatoms that become plankton when epibenthon slough off or erode during increased discharge. Obviously, all river diatoms end up in either location depending on the circumstances. The fourth category (edaphic) includes soil and wetland diatoms that wash into rivers during major run-off events. This lifestyle classification is used to assess effects of a continued reversal of the Redfield ratio (N:P) that began in the 1980s and to evaluate a simultaneous increased discharge trend as climate has changed.

Lifestyle preferences of the 100 most abundant diatom taxa were 14 plankton, 43 tychoplankton, 41 epibenthon, 2 edaphon. Most centrics (12) were plankton. Thirty-two taxa showed at least a 10-fold increase in abundance after 1990 but only three a similar decrease. The greatest change in diatom population size was that of *Diatoma moniliformis*, which was not observed prior to 1990 but has since become 23rd in total abundance. No diatom taxa have disappeared.

The proportions of diatom lifestyles in the plankton vary predictably with flood intensity. Increased summer flood discharge reduces water temperatures to favor diatoms over planktonic greens, dinoflagellates, and cyanobacteria. Increased summer discharge appears to counteract any effect of the changed N:P.

Diatoms mounted on glass slides provide a usable archive for re-examining environmental changes, including floods. Matching diatom distribution and abundance to relevant water quality physical and chemical data archives is critical.