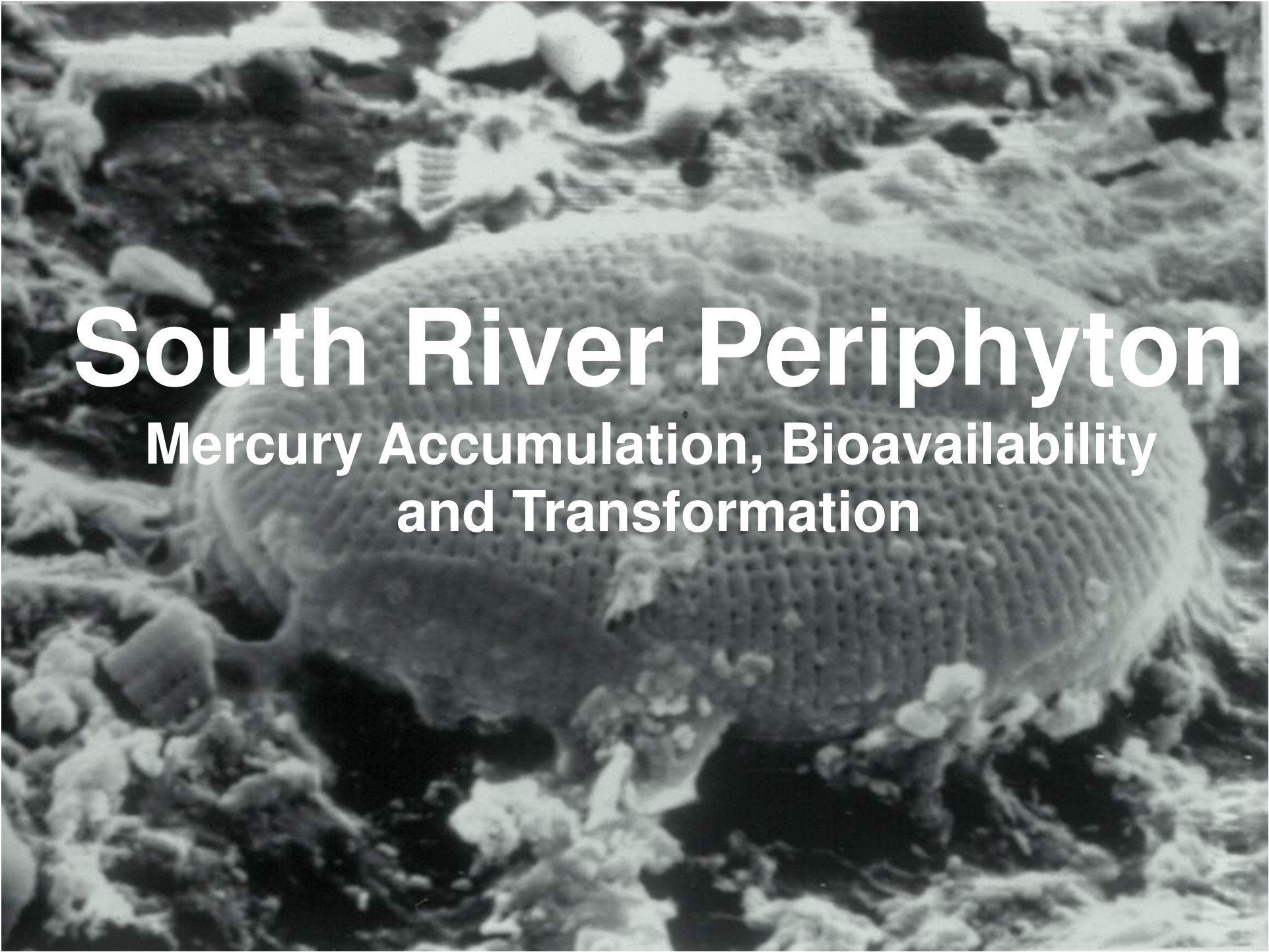
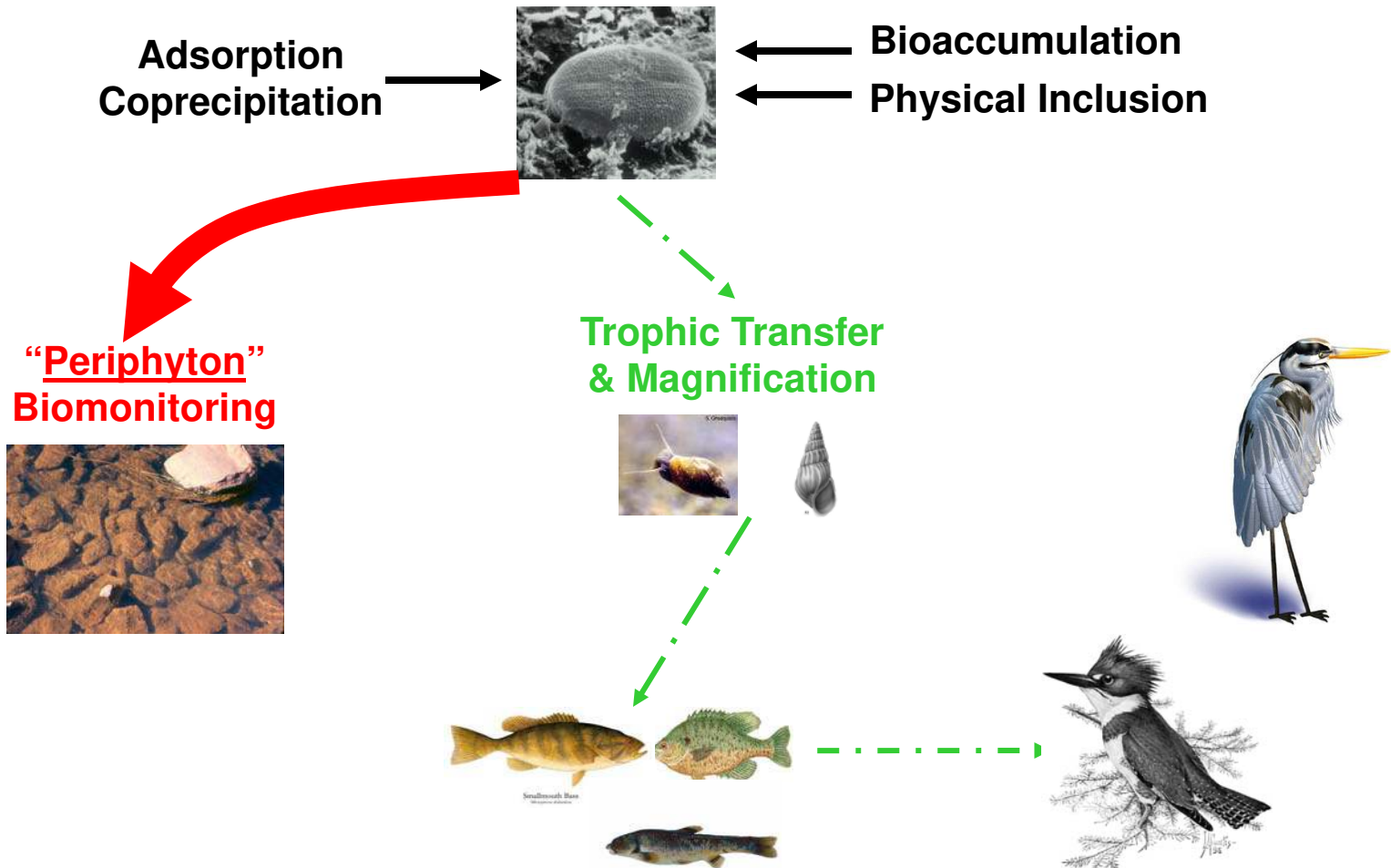


A scanning electron micrograph (SEM) showing a large, oval-shaped periphyton cell with a highly textured, ribbed surface. The cell is surrounded by a complex, granular matrix of organic and inorganic material, including smaller debris and fibers. The overall appearance is that of a biological structure in a natural, possibly aquatic, environment.

South River Periphyton

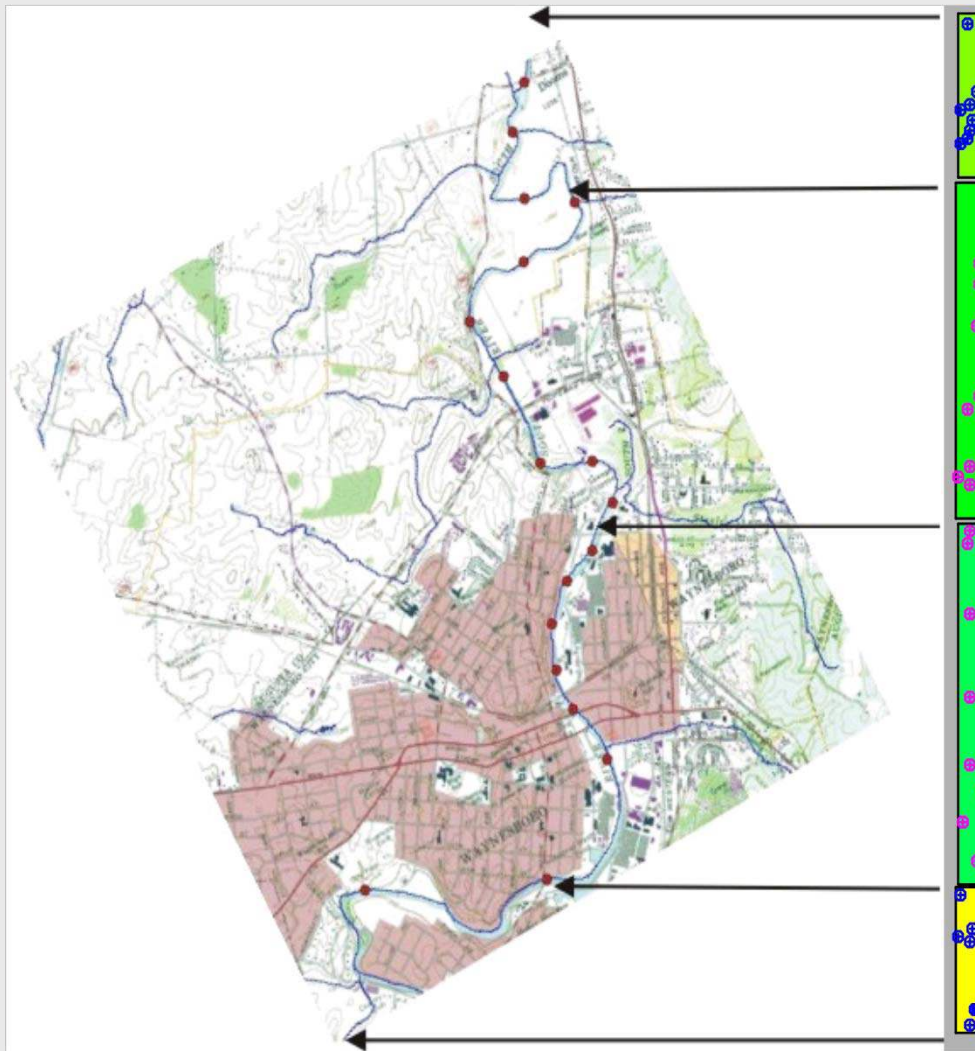
Mercury Accumulation, Bioavailability and Transformation

Biogeochemically Very Dynamic Ecosystem Component



Define & Test [Hg] Differences

SURVEY



SP3
(n=8)

- Align with *Corbicula* work
- Sampling design using Battelle's VSP software

SP2
(n=8)

- Differences in mean total Hg in natural materials
 - Equal means?
 - Set α , power, cost
 - random design

SP1
(n=8)

- Covariate regressions made most convenient with random sampling design within segments

Ref
(n=14)

- Supplement with SEM/EDAX microanalysis for confirmation

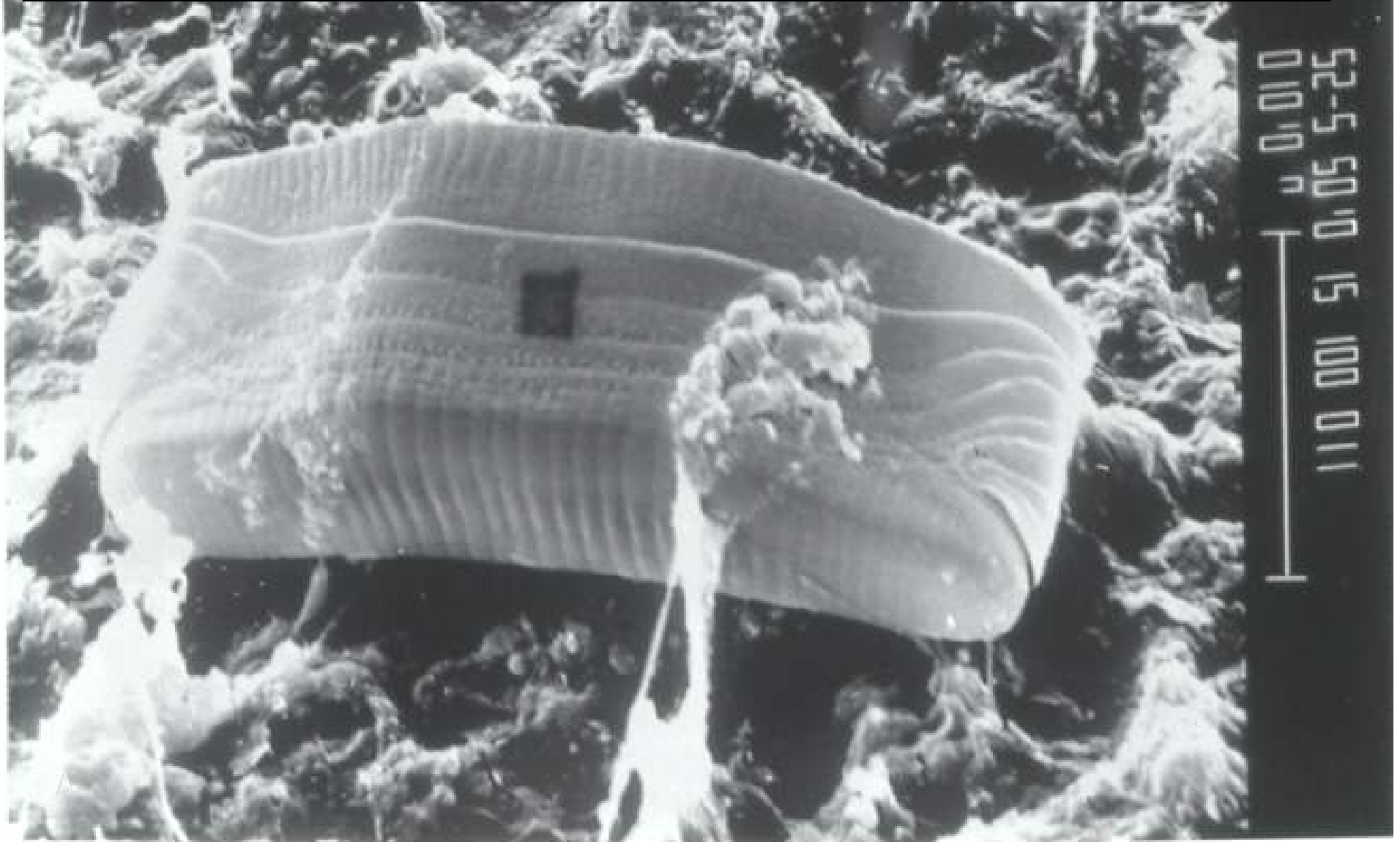
Mercury in Site Periphyton

PRELIMINARY SURVEY

- Define total Hg concentration in periphyton
- Test for significant difference from reference (upstream)
 - Minimally Wilcoxon Rank Sum
 - Optimally Dunnett's or Similar Test
- Multivariate Regression
 - $[Hg] = f(x_1, x_2, \dots)$
 - location
 - organic carbon (LOI or OC)
 - iron
 - manganese
- Concordance with *Corbicula* and fish concentrations
 - Parametric or Nonparametric correlation

The Composition of the Materials?

SEM/EDAX Visual & Elemental Characterization



Trophic Transfer Via Grazers

In situ regression via Isotopic Discrimination Technique

Isotopic discrimination tends to reduce the amount of lighter isotopes (^{12}C , ^{14}N , or ^{32}S) in organisms relative to the heavier isotopes (^{13}C , ^{15}N , or ^{34}S)

Nitrogen isotopes work best for trophic position

$$\delta^{15} N = 1,000 \left[\frac{(^{15} N_{\text{sample}}) / (^{14} N_{\text{sample}})}{(^{15} N_{\text{air}}) / (^{14} N_{\text{air}})} - 1 \right]$$

Hg Accumulation and Trophic Transfer

1. Define the Mercury in Site Periphyton

- How high are periphyton mercury concentrations?
- How high relative to other components, e.g, fish, clams, sediments, water?
- How are periphyton mercury concentrations distributed in the study area?
- Is there a strong correlation between periphyton mercury and mercury in other system components?
- Within a sampling reach, do organic carbon, Mn, and Fe concentrations correlate with mercury concentration?

2. Quantify Methylmercury in Periphyton (Collect Samples)

- Previously locations in study area. Samples analyzed in Year 1 by other?

3. Begin to Define Mercury within Trophic Web

- Preliminary samples of periphyton, grazers, grazer consumers, predators
- Several locations within study area
- N (and C) isotopes for quantifying trophic position
- Prepare for Year 2 regression models predicting mercury from trophic status