# Mercury Distribution in the Hellgrammite (Corydalus cornutus)

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## Introduction:

- Measuring mercury concentrations of organisms is essential to understanding the movement of this ecotoxin through environments.
- Knowing how mercury is distributed within organisms will help researchers determine where to obtain representative samples.
- There are also practical limits to the amount of tissue that can be analyzed by most mercury methods, and this is certainly true for methods of total mercury measurement, e.g., direct mercury analysis.
- Our objectives were to determine: a) if any variation in mercury concentration occurred within the body of hellgrammites (*Corydalus cornutus*, Fig. 1) collected from the Susquehanna River, and b) which segments of the body could be used for representative mercury sampling.


Photo by Tom Mangan

**Figure 1.** The hellgrammite or juvenile stage of the dobsonfly, *Corydalus cornutus*. Red lines delineate the segments used in our analysis

## Acknowledgements:

- We are grateful to the Degenstein Foundation and the Susquehanna River Heartland Coalition for Environmental Studies for their support of this research.
- We thank Dr. Ronald Supkowski of the King's College Chemistry Department for his help and support with mercury analysis.

## Materials and Methods:

- Hellgrammites
  - Hellgrammites were collected from each of two sites along the Susquehanna River near Bloomsburg and Sunbury, PA (Fig. 2).
  - Ten hellgrammites from each site were chosen for analysis based on similar head-capsule width, and dissected into 10 sections for analysis (Fig. 1).
- Lab Analysis
  - Mercury burden was determined with a direct mercury analyzer for each section (detection limit = 0.005 ng total Hg).
- Statistical Analysis
  - Each section contained representative samples of 20 individual hellgrammites and were tested by ANOVA on ranked data and Dunn's Multiple Comparison Test. Alpha for both tests was set at 0.05.

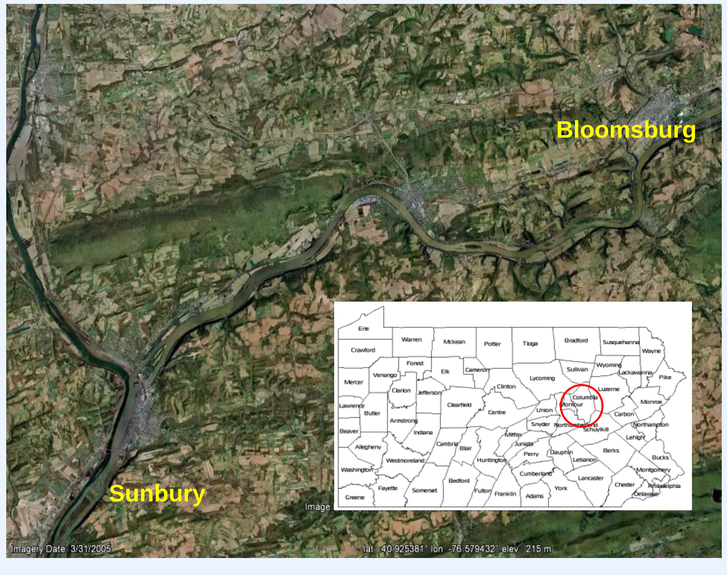


**Figure 2.** The locations of the Bloomsburg and Sunbury collection sites along the Susquehanna River.

## Results and Conclusions:

- Median total mercury concentration was significantly greater in the hellgrammite head-capsule than in any of the abdominal segments analyzed ($P<0.001$, Fig. 3).
- There were no statistically significant differences in mercury between the head and thorax, or the thorax and abdominal segments ($P>0.05$).
- Variation in total mercury within body segment groups was small; standard deviations ranged from 0.005-0.008.
- In general, our results suggest that any of these body segments would be viable representative samples of total mercury in hellgrammites.
- However, the body segment chosen for analysis could vary with the questions asked by the researcher. For example, head-capsules would be the segment of choice to determine the highest concentration of total mercury in hellgrammites. But given the likely difficulty of some predators to digest the sclerotized, chitinous head-capsule, one of the softer abdominal segments might be preferable to better determine how much mercury might be made available in food-web studies.
- More research is needed to determine how mercury concentrations might vary among hellgrammites of different sizes.

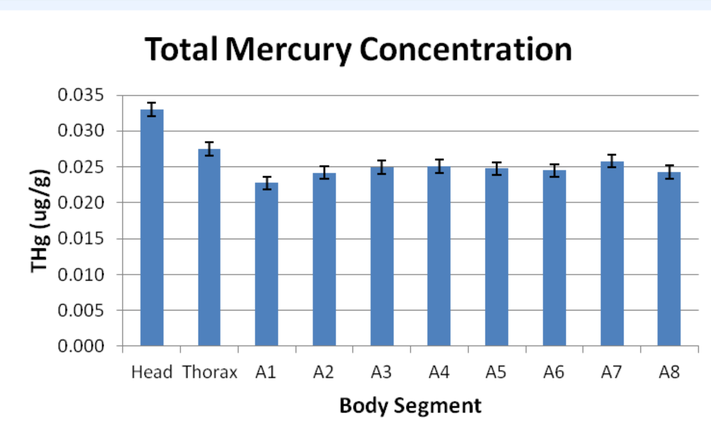


**Figure 3.** Total mercury concentrations in each of the body segments analyzed from hellgrammites collected from the Susquehanna River near Bloomsburg and Sunbury, PA.