Improving the methodology of chironomid deformation analysis for sediment toxicity assessment: a case study in three Danish lowland streams

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With 8 figures and 6 tables in the text

Abstract: This paper aims at improving the methodology of chironomid deformation screening as a biomonitoring tool in sediment toxicity assessment. Head capsule deformities were investigated in *Chironomus riparius* larvae in three contaminated Danish streams. A new scoring system for deformities of the mentum, mandibles and pecten was designed, in order to objectify and improve previously published scoring methods. A comparison of this new scoring system with deformation frequencies indicated that the more laborious scoring of deformities did not result in a higher resolution than the simple frequency counts of deformed larvae. However, the different mouthparts seem to react independently to pollution stress and display specific deformation frequency profiles. Hence, a separate calculation of their deformation frequencies remains essential for a correct evaluation. Using cluster analysis, all mouthpart deformation frequencies were combined into one sediment classification scheme. This classification could be adequately explained by the different levels of sediment contamination, as indicated by metal analyses and site-specific pollutant sources. However, when only mentum deformation frequencies were used, an almost identical classification was obtained. Deformation in mandibles, pecten, premandibles and antennae did not display a consistent relationship with sediment contamination by the paper mill. Hence, in the present study, a simple calculation of the frequencies of mentum deformation was the most efficient strategy for sediment toxicity assessment.

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