



Species diversity and abundance of plant-dwelling chironomids across hierarchical habitat and seasonal scales in the oxbow lakes of River Tisza, Hungary

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With 6 figures and 4 tables

Abstract: In temperate regions, plant-dwelling chironomids can be considered as cyclic colonizers that inhabit seasonally ephemeral submerged and floating-leaved macrophytes. In this study, patterns of abundance and species richness of plant-dwelling chironomids were investigated within and among stands of three macrophyte species in oxbow lakes along the River Tisza (Hungary). Chironomids colonized macrophytes rapidly and most species occupied the habitat before it had completely developed in June. Assemblage structure and abundance of particular species varied considerably between plant species, oxbow lakes and summer months in a characteristic succession from June to August indicating the presence of dynamic selection mechanisms. Abundance of most species, except *Endochironomus tendens*, total chironomid abundance, within-sample and total species diversity were highest on the submerged plant *Ceratophyllum demersum*, and most species occurred at the beginning of the colonization succession, in June. The contribution of oxbow lakes (20.3 %) and the month sampled (20.3 %) to total chironomid diversity was higher than would be expected by chance alone and the contribution of within (19.7 %) and between samples (13.5 %) to total chironomid diversity was lower than would be expected by chance alone. We conclude that regional biodiversity conservation action plans should include multiple habitats. Moreover, the significant seasonal species turnover proved the need for seasonal sampling to assess accurately the total diversity of chironomids in the system.

Key words: Chironomidae, cyclic colonization, diversity partitioning, balanced hierarchical sampling design, macrophytes, spatio-temporal pattern.

Introduction

Submerged and floating-leaved macrophytes are the preferred habitat of many aquatic macroinvertebrates. Macrophytes provide living space, shelter from predators and physical disturbances, a substrate for prey (e.g. algae, bacteria, fungi, and small animals), and food for some macroinvertebrates (review in Papas 2007). The presence of macrophytes influences both macroinvertebrate diversity and abundance (Papas 2007, Żbikowski & Kobak 2007, Tarkowska-Kukuryk

2010). The composition and the abundance of plant-dwelling macroinvertebrate communities is also influenced by the architectural and chemical composition, density and structural complexity of macrophyte stands (Cheruvilil et al. 2002, Bogut et al. 2007, Cremona et al. 2008, Hinojosa-Garro et al. 2010, Matias et al. 2010, Tóth et al. 2012).

In temperate regions, submerged and floating-leaved macrophytes are present only at certain times of the year. These plants generally develop from spring to the end of the summer when they collapse

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