Incorporating the entire life cycle of aquatic insects into urban stream ecology

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The ontogenetic shift between aquatic and terrestrial habitats is a key feature of aquatic insect life cycles, yet its role in population and community dynamics of urbanized streams has received little attention. Poor in-stream habitat quality lowers larval survival for intolerant species in urban streams, but impacts to adults and their movement in the landscape may constrain recruitment of the next generation of larvae and intensify the impact of watershed urbanization. We first present a synthesis of current research examining the effects of watershed urbanization on fitness and dispersal of adults. Our review indicates that there is potential for watershed urbanization to decrease fitness of adults and constrain dispersal, but that further research is required. In addition, we present data from collections of caddisfly adults (Trichoptera) at urban headwater streams to evaluate the level of dispersal to urban headwater streams. We found a greater number of taxa in the adult assemblage than the larval assemblage at the urban headwaters, and that the adult assemblage did not include all taxa found in surveys of rural headwater streams in the region. This suggests that local, in-stream habitat quality is preventing many species from colonizing the stream, but also that lack of dispersal and the life history traits of adults may contribute to the loss of taxa and limit the colonization of urban headwater streams.

Saliva of potato leafhopper (Empoasca fabae) affects the physiological response of legumes

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Salivary symbionts in the potato leafhopper, Empoasca fabae

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The potato leafhopper, Empoasca fabae, feeds on a wide range of agricultural crops, including potato, alfalfa and soybean. The saliva of the potato leafhopper has previously been shown to play a role in hopperburn, a disease characterized by the yellowing and eventual necrosis of susceptible plant leaves. In an attempt to understand the components of the leafhopper’s saliva, we isolated leafhopper salivary glands and screened them for symbiotic bacteria. Diagnostic polymerase chain reaction showed the presence of Baumannia cicadellinicola, a species of symbiotic bacteria reported near the midgut of other leafhopper species, in the salivary glands of the potato leafhopper. Insect-bacteria symbioses are common in the Hemiptera, where the bacteria often provide novel compounds to their insect host. The discovery of salivary symbionts in the potato leafhopper could lead to a better understanding of compounds present in the leafhopper’s saliva and how these components interact with a plant to produce the symptoms of hopperburn.

Macroinvertebrate community assemblages of agricultural drainage ditches on Maryland’s Eastern Shore

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