
The importance of ecology, evolution and development in shaping biodiversity of threespine stickleback: Long term monitoring in the dynamic Lake Mývatn Iceland

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Abstract

A major challenge facing societies is the protection of biological diversity, which is critical for ecosystem functioning and services. Biodiversity is under serious threats from human activities and we lack understanding of the processes that shape contemporary biodiversity. Lake Mývatn in NE Iceland offers a unique valuable system to study the interaction of ecological, evolutionary) and developmental processes in generating and maintaining biodiversity. The lake is spatially diverse comprising five different benthic habitats that differ in temperature, vegetation and invertebrate composition. Furthermore, the ecology of the lake is highly temporally variable. The density of important animal populations fluctuates often by orders of magnitude across years. Threespine stickleback populations of the lake have been monitored since 1986, with an increased effort since 2008. We have collected stickleback to estimate population densities, and measured important phenotypic traits with a specific focus on trophic morphology. Our result show that there is considerable phenotypic variation across habitats, seasons and years. In the warm lava habitat the stickleback population seem to be diverging from other sticklebacks. We have studied this divergence using rearing experiments, where life history and behavior traits have been studied. Our findings show the importance of detailed long term monitoring combining ecological and evolutionary observations for understanding biodiversity.

Keywords: Iceland, morphology, genetics, phenotypic plasticity

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