Adaptive phenotypic differentiation of courtship in response to recent anthropogenic disturbance

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ABSTRACT

Background: Anthropogenic activities are causing ecological changes, including eutrophication, which can induce behavioural alterations in animals. Male threespine stickleback, *Gasterosteus aculeatus*, need to increase their courtship intensity to maintain a high mating success in eutrophied habitats.

Question: Has the courtship behaviour of threespine stickleback populations differentiated in response to spatial variation in human-induced eutrophication?

Populations: Parallel pairs of threespine stickleback populations in the Baltic Sea that have been exposed to mild and severe human-induced eutrophication during the last decades.

Methods: Males from mildly and severely eutrophied habitats were allowed to court dummy and live females under standardized conditions. We measured the frequency of different courtship behaviours.

Results: Males from severely eutrophied habitats courted more intensively.

Conclusions: Stickleback populations have differentiated phenotypically in courtship behaviour in response to spatial variation in human-induced eutrophication. The differentiation should improve individual fitness.

Keywords: environmental change, mate choice, parallel divergence, phenotypic plasticity, sexual selection.

INTRODUCTION

Organisms can survive changing conditions in three main ways: they can disperse, adjust through phenotypic plasticity, or adapt through genetic changes. Currently, human activities are altering habitats at an accelerating rate. The first response of animals to these changes is usually behavioural, with the response depending on the animals’ genetically determined behavioural reaction norms and on changes to these norms over their lifetime, through, for instance, learning (West-Eberhard, 2003; Sih et al., 2011; Tuomainen and Candolin, 2011). Over time, genetic changes may gradually accumulate and result in the evolutionary adaptation of the population to the new conditions, depending on evolutionary constraints (Futuyma, 2010).
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