
Intra- and transgenerational carry-over effects on behavioural reaction norms of the freshwater snail *Physa acuta* in response to predation

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Abstract

Behaviour is a labile and reversible trait allowing a rapid response to environmental changes. Evidence is accumulating that individuals differ in the degree and extent of behavioural plasticity, even within a same population. What is the role of past environmental conditions on between-individual differences in this form of phenotypic plasticity is still not well understood. Although previous environments experienced by animals themselves can be a source of between-individual difference in behavioural responses, less is known about the effect of ancestral environment. Ancestral environment can indeed have long-lasting effects on offspring phenotype (e.g. morphology) and some studies showed such effects on average behavioural responses. These transgenerational carry-over effects (called transgenerational plasticity) could also influence the between-individual variation in behavioural plasticity. In this context, we used the concept of behavioural reaction norms to study how intra- and transgenerational carry-over effects influence between-individual variation in both personality and level of behavioural plasticity (respectively intercept and slope of the behavioural reaction norm). We investigated the behavioural reaction norms of the freshwater snail *Physa acuta* in response to predator cues according to past (intra- and transgenerational) experience of predation risk. This species is known to increase its survival by expressing anti-predator behaviours (especially crawling-out the water) when the predator is detected. Moreover, as this species has a short generation time, parental environment should be a good proxy of offspring environment in the wild, and transgenerational carry-over effects should have been selected. Two generations (parental and offspring generations) were raised in control or predator-cue environments. We then measured in all mature offspring two behavioural traits in control and in predator-cue environments: exploration (total distance crawled in the water) and escape behaviour (time to crawl out the water).

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