



Reversal of a female preference after visual exposure to a predator in the guppy, *Poecilia reticulata*

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Abstract. To test the hypothesis that female choice has been subject to direct selection by predators, it was investigated whether female guppies would switch their choice of mate from more to less conspicuous males after observing a potential predator. Social and sexual preferences of virgin females for each of two males differing in amount of carotenoid pigmentation (an ornamental trait) were measured both before and after visual exposure to a novel predatory cichlid. Females initially showed strong social and sexual preferences for the brighter of the two males. Preferred males also showed lower levels of fluctuating asymmetry in the area of carotenoid pigmentation and displayed at higher rates. After exposure to the cichlid, almost half of the females became sexually unreceptive, and the remainder showed a nearly unanimous sexual preference for the duller male. Control females that did not see the cichlid continued to prefer the brighter male. These results imply that predators have selected against females that mate with conspicuous males. They also suggest that predators can influence sexual selection on male ornaments proximately through their effects on female choice as well as by imposing mortality on conspicuous males. Both conclusions suggest that indirect selection on female preferences may not play a dominant role in this system.

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The effects of predators on the evolution of sexual ornaments and associated male behaviour have been a classic focus in studies of sexual selection (Andersson 1994). For instance, studies of Trinidadian guppies, *Poecilia reticulata*, have shown that males in populations exposed to more severe predation evolve less conspicuous coloration, but those released from predation evolve more conspicuous patterns (Haskins & Haskins 1951; Endler 1980; Winemiller et al. 1990). These patterns are presumed to reflect a shift in the balance between the sexual advantage of conspicuous coloration and the costs of attracting predators. Predation may also select for facultative modulation of male courtship behaviour so that conspicuousness is reduced under threat of predation (Magurran & Seghers 1990; Reynolds 1993).

Much less research has investigated the effects of predation on female choice. In theory, pre-

dation risk could affect the evolution of mate choice in at least three ways. First, where searching for a mate exposes females to increased risk of predation, increasing levels of risk should diminish selectivity (Real 1990). Second, where male courtship is sufficiently conspicuous to attract predators, increased risk should favour female preferences for males that use less conspicuous courtship behaviour and thus make mating less costly for females (Reynolds & Gross 1990). Finally, female preferences against conspicuous males might be indirectly selected via increased mortality on their conspicuous sons (Stoner & Breden 1988).

The guppy is particularly well suited for studying the influence of predation on female choice. The impact of predation on a suite of morphological, life historical and behavioural traits in this species has been extensively documented by selection experiments and comparisons between populations experiencing different predation regimes (Endler 1995). Female preferences for more conspicuously coloured males, typical of low predation populations, are weak or absent in populations experiencing more intense predation

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