A visual audience effect in a cavefish

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Summary

Audience effects occur when an observing (by-standing) animal influences the behaviour of an observed individual. A recent study (Plath, M., Blum, D., Schlupp, I. & Tiedemann, R., Anim. Behav. 75, 21-29 (2008)) has demonstrated an effect of a visual audience male on male mating preferences in the surface form of a livebearing fish, the Atlantic molly (*Poecilia mexicana*). Surface dwelling *P. mexicana* are highly aggressive; hence, males dedicating simultaneous attention to mate choice and aggressive interactions may explain this audience effect. Here we examined the effect of an audience on male mate choice in the cave form of that species, which — unlike other cavefishes — have maintained eyes and still respond to visual cues under experimental conditions. Cave mollies were especially interesting to study, because they have reduced aggressive behaviour. We gave males an opportunity to choose between two females, and we repeated the tests with an audience male present. The focal males tended to divide their attentions more equally between the two females when an audience male was presented. The observed effect did not statistically differ between surface and cave dwelling *P. mexicana*, suggesting that (1) the response to a visual audience is maintained in this cavefish and (2) the described audience effect is largely independent of aggressive interactions among males. Generally, its adaptive significance may be linked to the avoidance of sperm competition when males sharing the same (innate) preferences compete for mates. Moreover, males may conceal their preference to prevent other males from copying their mate choice.

Keywords: cavefish, communication networks, mate choice, aggressive behaviour, sperm competition.

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Introduction

In many species mate choice occurs in a social environment, such that choosing a mate can be viewed as part of a larger communication network that involves more individuals than just the choosing individual and its potential mating partners (Danchin et al., 2004; Earley & Dugatkin, 2005; Matos & Schlupp, 2005). Generally, two forms of information exchange in animal communication networks have been particularly thoroughly examined. (1) Eavesdropping occurs when a receiver extracts information from a signaling interaction in which it has not taken part (McGregor, 1993; Oliveira et al., 1998; Doutrelant & McGregor, 2000; Johnstone, 2001; McGregor et al., 2001; Peake et al., 2001; Mennill & Ratcliffe, 2004; Naguib & Kipper, 2006). (2) Audience effect: the presence of an observing ('by-standing') individual can influence the behaviour of a pair of communicating individuals (Zajonc, 1965; Evans & Marler, 1991; Baltz & Clark, 1997; Doutrelant et al., 2001; Oliveira et al., 2001). In the context of mate choice, several studies have examined socially influenced (non-independent) mate choice of an observing individual in a communication network (Pruett-Jones, 1992; Kirkpatrick & Dugatkin, 1994; Westneat et al., 2000; for a review see Earley & Dugatkin, 2005). For example, eavesdropping may influence mate choice decisions, if females evaluate the quality of a male after the observation of male–male interactions (e.g., Otter et al., 1999; Doutrelant & McGregor, 2000; Mennill et al., 2003). Numerous studies have shown that individuals may also alter their mate choice decisions after they had seen other members of their own sex sexually interact with a potential mating partner (mate choice copying: e.g., Dugatkin, 1992, 2007; Dugatkin & Godin, 1992; Schlupp et al., 1994; Briggs et al., 1996; Witte & Ryan, 1998, 2002; Munger et al., 2004; Godin et al., 2005; Hill & Ryan, 2005; Widemo, 2006).

It is largely unknown whether or not, and to what extent, the mere presence of an audience affects the expression of mating preferences. In a recent study, males of a livebearing fish, the Atlantic molly (*Poecilia mexicana*), were given a choice between two females, and another (audience) male was presented visually during the second part of the trials. In that study, males spent significantly less time near the initially preferred female and spent more time near the initially rejected female when another (conspecific) male was present. No change was observed when no audience male was presented ('control'), and only a weak effect was found when a heterospecific male