



Audience effect alters mating preferences in a livebearing fish, the Atlantic molly, *Poecilia mexicana*

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Audience effects occur when an observing (by-standing) animal influences the behaviour of an observed individual. We examined whether audience effects influence mate choice decisions in a livebearing fish, the Atlantic molly, *Poecilia mexicana*. We gave males an opportunity to choose between a conspecific and a heterospecific, *Poecilia formosa*, female (experiment 1) or a large versus small conspecific female (experiment 2), and we determined the males' association times near the two types of females. During the second part of each test we visually presented an audience male to the focal male, and we compared male association times between the two parts. In both experiments the focal males spent less time near the initially preferred female, and spent more time near the initially nonpreferred female when we presented a conspecific audience male during the second part of the tests. When we presented a heterospecific, *Xiphophorus hellerii*, male instead, the change in male preferences was significantly weaker. Male preferences were highly consistent when we presented no audience male during the second part of the tests (control). Our study highlights that the social environment has an important effect on male mate choice decisions, and even the mere visual presence of a conspecific competitor can affect the expression of mating preferences.

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Communication events often occur in a social context, so that information exchange is not binary, but rather several individuals may interact and form communication networks (Oliveira et al. 1998; McGregor & Peake 2000; Earley & Dugatkin 2005; Matos & Schlupp 2005; Peake 2005). Even when only two individuals communicate directly, the presence of neighbouring individuals can affect the behaviour of the signaller and/or the receiver (Earley & Dugatkin 2005; Matos & Schlupp 2005). Animal decision making often includes a communication component and occurs in a social environment, such that decision making can be influenced by the behaviour of surrounding individuals (see Danchin et al. 2004 for 'public information'). Most studies on information exchange in

animal communication networks have either focused on (1) how an individual observing two or more other communicating individuals alters its behaviour in relation to the observed communication event (eavesdropping; McGregor 1993; Oliveira et al. 1998; Doutrelant & McGregor 2000; Johnstone 2001; McGregor et al. 2001; Peake et al. 2001; Naguib & Kipper 2006) or (2) how the observing ('by-standing') individual influences the behaviour of a pair of communicating individuals (audience effect; Zajonc 1965; Baltz & Clark 1997; Doutrelant et al. 2001; Oliveira et al. 2001).

In the context of mate choice, several studies have examined socially influenced (nonindependent) mate choice of an observing individual in a communication network (Pruett-Jones 1992; Kirkpatrick & Dugatkin 1994; Westneat et al. 2000; White 2004; Earley & Dugatkin 2005). For example, eavesdropping may influence mate choice decisions, whereby females learn to evaluate the quality of a male after observing male–male interactions (e.g. fighting fish, *Betta splendens*: Doutrelant & McGregor 2000;

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great tits, *Parus major*: Otter et al. 1999; chickadees, *Poecile atricapillus*: Mennill et al. 2003; Japanese quail, *Coturnix japonica*: Ophir & Galef 2003). Numerous studies have shown that individuals may also base their mate choice decisions on whether they have seen other members of their own sex sexually interact with a potential mating partner (mate choice copying; e.g. Japanese quail, *C. japonica*: Galef & White 1998), and several studies have examined mate choice copying in livebearing fish (Poeciliidae; e.g. guppy, *Poecilia reticulata*: Dugatkin 1992; Dugatkin & Godin 1992; Godin et al. 2005; sailfin molly, *Poecilia latipinna*: Schlupp et al. 1994; Witte & Ryan 1998, 2002; Hill & Ryan 2005).

To date, audience effects (i.e. the effect of an observing animal on the behaviour of another individual) have been examined primarily in a nonsexual context and in triadic interactions. For example, a female or a male audience may influence the intensity of aggressive male–male interactions (Zajonc 1965; Doutrelant et al. 2001; Oliveira et al. 2001; Matos & McGregor 2002; Matos et al. 2003; Dziewczynski et al. 2005, 2006). Whether and how the presence of an audience influences mate choice decisions has been little investigated (Baltz & Clark 1997; for reviews see Earley & Dugatkin 2005; Matos & Schlupp 2005). In this study, we examined whether the presence of an audience, a conspecific male as a potential competitor, affects male mate choice (measured as association preference) in a livebearing fish, the Atlantic molly, *Poecilia mexicana*. We gave males an opportunity to choose between two females, and we then observed whether males alter their initial association preference when another (audience) male was present. Examining the influence of an audience on mate choice decisions in this set-up includes interactions between four individuals: the choosing (focal) male, two stimulus females, and the audience male. In our set-up, all individuals could visually interact, but all except the focal male were confined to a defined location. Hence, the audience male could not approach the stimulus females to directly interact with them, so that any effect of the audience male on the focal male's behaviour would not be due to male mate choice copying (see Schlupp & Ryan 1997).

METHODS

Study Organism and Fish Maintenance

Poecilia mexicana is widespread in Mexican and Middle American freshwaters. Males use their transformed anal fin, the gonopodium, to transfer sperm, and fertilization is internal (Constanz 1984). Males typically form dominance hierarchies, where dominant males (typically the largest males) aggressively defend shoals of females (Parzefall 1969). While females have a cryptic coloration, large males show conspicuous black vertical bars, and dominant males may even become completely black, with yellowish to orange margins of the dorsal and anal fins. Smaller males are typically considerably less conspicuous in coloration, and use a sneak-like mating tactic. Generally, *P. mexicana* males do not court females, and mating is initiated by males only (Plath et al., in press). *Poecilia mexicana* males almost constantly engage in either defending females

from other males, or attempting to mate (Parzefall 1969; M. Plath & I. Schlupp, personal observation in nature).

To examine whether the presence of an audience male affects male mate choice in *P. mexicana*, we carried out two simultaneous choice experiments using two different choice criteria. In each experiment we tested whether males alter their initial mating preference in the presence of another (audience) male. In the first experiment, we gave males the opportunity to choose between a conspecific female and an Amazon molly, *Poecilia formosa*. Amazon mollies are a clonal, all-female species, which depend on sperm from 'host species' (*P. mexicana*, *P. latipinna* or *Poecilia latipunctata* males) to trigger embryogenesis, but the male's genes are not used (gynogenesis; Schlupp 2005). Since mating with Amazons provides no obvious benefits to males of the host species (but see Schlupp et al. 1994 for benefits by heterospecific mate choice copying), we predicted focal males to show a preference for the conspecific female (e.g. Ryan et al. 1996; Schlupp 2005).

In our second experiment, we presented males with a large and a small female. Male mate choice for large female size has recently been shown for *P. mexicana* (Plath et al. 2006). We therefore predicted *P. mexicana* males to prefer to associate with the larger of two simultaneously presented females.

The mollies used in this study (*P. mexicana* and *P. formosa*) were descendants of fish collected in coastal brackish ditches near Tampico in central Mexico, where *P. mexicana* naturally coexists with *P. formosa*. Test fish came from large, randomly outbred single-species stocks maintained at the Institute of Biochemistry and Biology in Potsdam. We reared stocks comprising both sexes in aerated and filtered 150- to 200-litre aquaria at 27–29°C. Aquaria were well equipped with live and artificial plants and stones. Fish were fed twice daily with commercially available flake food, fish food tablets, and live red and white chironomid larvae. We isolated focal males in 25-litre tanks for 24 h before the tests to ensure that they were motivated to mate (Schlupp & Plath 2005). We tested each focal male only once; however, because of the limited number of males available from our stocks, some males were also used as audience males some days after they were used as a focal male. Heterospecific audience males (green swordtails, *Xiphophorus hellerii*) were obtained from a commercial supplier and were kept like the mollies. Visual contact between the different stock tanks was not possible.

Choice Tests

We divided the test tank (80 cm length × 30 cm width × 30 cm height) into five sections of equal size: two lateral compartments were divided by transparent Plexiglas partitions to hold the stimulus fish, the remainder was visually divided by marks drawn on the front into a central 'neutral zone' and two lateral 'preference zones' (Fig. 1). Black plastic covered all sides except the front wall. We filled the tank to 15 cm with aged tap water of 27–28°C. A 40-W incandescent lamp 35 cm above the tank and the room illumination (two 100-W fluorescent light fixtures on the ceiling of the experimental room)

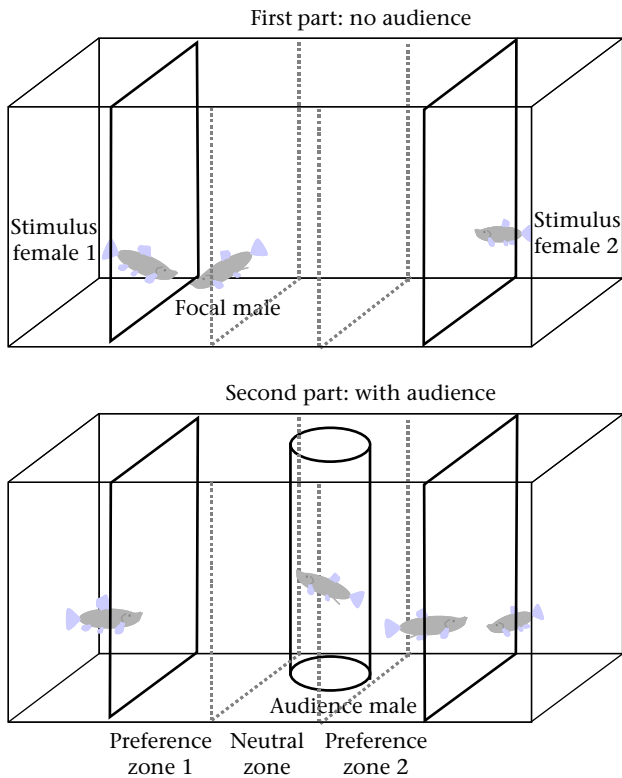


Figure 1. Experimental set-up. During the first part of a trial, a focal male could choose between two simultaneously presented females. During the second part, another (audience) male was visually presented in the neutral zone. For display purpose, fish are depicted at a supernatural size.

provided light during the tests. Prior to a test, we chose two stimulus females from a stock tank and introduced them into one of the two stimulus compartments each. Then, we introduced a focal male into a transparent Plexiglas cylinder (10 cm diameter) in the centre of the neutral zone and left the fish undisturbed for 5 min. After the habituation period, we gently lifted the cylinder and we initiated measurement of male preferences. In our set-up, we measured male mating preferences as association times. A previous study found that association times in this experimental situation directly translate into actual mating attempts in this species (Plath et al. 2006). We measured the times that the male spent in each of the two preference zones, that is, near both types of females during a 5-min observation period. To account for potential side biases, we placed the male into the cylinder again after the first observation period. We interchanged the two stimulus females, and after another habituation phase of 5 min, we repeated measurement of male preferences for another 5 min. The two test units are henceforth called the first part of a trial. We summed the times spent near both kinds of females during two tests units.

Directly thereafter, we repeated measurement of male association times, but we presented an audience male (second part of a trial; Fig. 1). To initiate the second part of a trial, we introduced the focal male into his cylinder again. We then placed an audience male in another transparent cylinder in the central back of the neutral zone,

equidistant to the two females. The audience male was confined in his cylinder throughout the experiment. Thus, chemical and physical interactions were ruled out. We carried out habituation, measurement of male association preferences and switching of side assignments of the stimulus females between the two measurements as described above. Again, we summed association times near either kind of females during the two test units of the second part of a trial. In both experiments (mate choice for conspecific versus heterospecific females or large versus small conspecific females), the focal males experienced one of the following three treatments.

Treatment 1: during the second part of the tests we presented a conspecific audience male.

Treatment 2: we conducted one control experiment to determine whether any effect detected was due to motivational changes over the time of an experiment. For this control we used only an empty cylinder and no audience male during the second part.

Treatment 3: we tested whether any effect is specific to a conspecific male or simply due to the presence of any other male in the tank. In this control we used green swordtail males, *X. hellerii*, as audience males. This species is a distantly related poeciliid fish and allopatric with the population of Atlantic mollies tested in this study.

To avoid potentially confounding effects of familiarity on male preferences (e.g. Croft et al. 2004), we took all fish involved in a trial from different stock tanks. We measured all fish for standard length to the nearest mm after the trials (focal males: 36.5 ± 0.5 mm; conspecific audience males: 36.9 ± 0.8 mm; swordtail males: 38.5 ± 0.8 mm; preference for conspecific females, *P. mexicana* females: 42.9 ± 0.9 mm; *P. formosa* females: 42.2 ± 0.6 mm, mean size difference: 0.7 ± 0.5 mm; preference for large female body size, large females: 43.9 ± 0.9 mm; small females: 31.8 ± 0.5 mm, mean size difference: 12.1 ± 0.8 mm). In experiment 1, we conducted $N = 20$ trials for treatment 1 and $N = 10$ trials for the other two treatments. In experiment 2, we conducted $N = 21$ trials in the case of treatment 1 and $N = 10$ trials for the other two treatments.

Statistical Analysis

In one analysis, we examined the overall direction of male preferences in the absence of an audience male, that is, during the first part of the trials. We compared the times (absolute association times) spent near the conspecific and the heterospecific female (experiment 1) and near the large and the small female (experiment 2) using paired *t* tests.

Our main question was whether the focal males altered their individual association preferences when we presented an audience male. The statistical analyses were therefore based on a comparison of individual association times between the first and second part of a trial (before and after presentation of an audience male). Because we predicted the focal males to spend more time in the neutral zone and thus to spend less time in the preference zones when we presented an audience (second part), we did not use absolute association times for the statistical analysis. Instead we calculated relative association times as [time spent

near female A/(time spent near female A + time spent near female B)], where A is the female that the male had preferred during the first part of a test (henceforth called the 'initially preferred female'). In our first analysis, we compared the relative times males spent near the initially preferred female during the first and second part of a trial within each test series using paired *t* tests.

For a comparison between experiments and treatments, we calculated a score as the difference between the relative association time near the initially preferred female without an audience (first part) and the relative association time near the initially preferred female with an audience (second part), such that no change in male association times would lead to a score of zero, negative values would indicate that the focal males spent less time near the initially preferred female in the second part of a trial and positive values would indicate that males spent relatively more time near the initially preferred female. We compared the score using generalized linear model (GLM), in which we included 'experiment' (mate choice for heterospecific females or mate choice for larger females) as a between-subjects factor, and 'treatment' (conspecific audience, no audience or heterospecific audience) as a within-subjects factor. The interaction term was not significant ($F_{2,75} = 0.076$, $P = 0.93$), so we analysed only the main effects.

To test whether relatively larger audience males had a stronger effect on male association preferences, we conducted another GLM using the subset of data from treatments 1 and 3 while including the difference in standard lengths (SL) between the focal and the audience male (SL focal male – SL audience male) as a covariate into the model (size range; preference for conspecific females, treatment 1: –13 to +15 mm; treatment 3: –8 to +8 mm; preference for large females, treatment 1: –13 to +15 mm; treatment 3: –13 to +4 mm). The interaction terms were not significant in the GLM ($F < 0.70$, $P > 0.41$), so we analysed only the main effects.

We also examined whether the focal males spent more time in the neutral zone when we presented an audience male. We compared the difference in times that the focal males spent in the neutral zone during the first and second part of the trials (time spent in neutral zone during second part – time in neutral zone during first part) using GLM, in which we included 'experiment' and 'treatment' as factors. The interaction term was not significant ($F_{2,75} = 0.38$, $P = 0.68$), and consequently we analysed only the main effects.

Data are generally given as mean \pm standard error. We tested for normality using Kolmogorov–Smirnov tests. We arcsine transformed all relative data prior to statistical analysis. Unless noted otherwise, we conducted all other tests on nontransformed data.

RESULTS

Direction of Male Association Preferences

Experiment 1: preference for conspecific females

We tested for an overall preference of the *P. mexicana* males for the conspecific female during the first part of

the tests, in the absence of an audience. Contrary to our prediction, males showed no directional preference and spent 246.9 ± 26.8 s near the conspecific female and 315.4 ± 26.8 s near the Amazon female (paired *t* test: $t_{39} = -1.28$, $P = 0.21$). Seventeen males preferred the conspecific female and 23 males preferred the Amazon molly female. However, males clearly showed individual association preferences and spent on average $75.0 \pm 2.5\%$ of their time near one of the two females (Fig. 2).

Experiment 2: preference for large females

Poecilia mexicana males showed a strong preference for the larger conspecific female during the first part of the tests. The focal males spent 393.7 ± 22.3 s near the larger female and 110.3 ± 20.4 s near the smaller female (paired *t* test on square-root-transformed data: $t_{40} = 6.85$, $P < 0.0001$). Thirty-four males preferred the larger female and seven males preferred the smaller female.

Effect of an Audience

Pairwise comparisons of association times before and after presentation of an audience

Pairwise comparisons of the relative times that males spent near the initially preferred female before and after we presented an audience male revealed that the focal males altered their association preferences with a conspecific audience male during both experiments (Table 1, Fig. 2). We detected no change in male association preferences in treatment 2, where we presented no audience male. When we presented a heterospecific (swordtail) male during the second part of a trial (treatment 3), the focal males did not significantly alter their association preferences in experiment 1, but spent significantly less time near the initially preferred female in experiment 2 (Table 1, Fig. 2).

Comparison of male association preferences between experiments and treatments

There was no statistically significant difference between the two experiments (Table 2). 'Treatment' had a significant effect on the change in male association preferences (Table 2). A post hoc test revealed that the decrease of the strength of male association preferences was significantly stronger when we presented a conspecific audience male (treatment 1) than without an audience male (treatment 2; Fisher's protected least significant difference: $P < 0.0001$) and was also stronger in treatment 1 compared with the treatment using a heterospecific audience (treatment 3; $P = 0.015$), whereas treatments 2 and 3 did not significantly differ ($P = 0.051$; Fig. 3). There was no statistically significant effect of body size (Table 3).

Time spent interacting with the audience male

In both experiments, the test males spent more time in the neutral zone interacting with the conspecific audience male (treatment 1), as compared with the part of the experiment without an audience. These interactions were limited to visual aspects, as we presented the audience male in a Plexiglas cylinder. Interactions often included

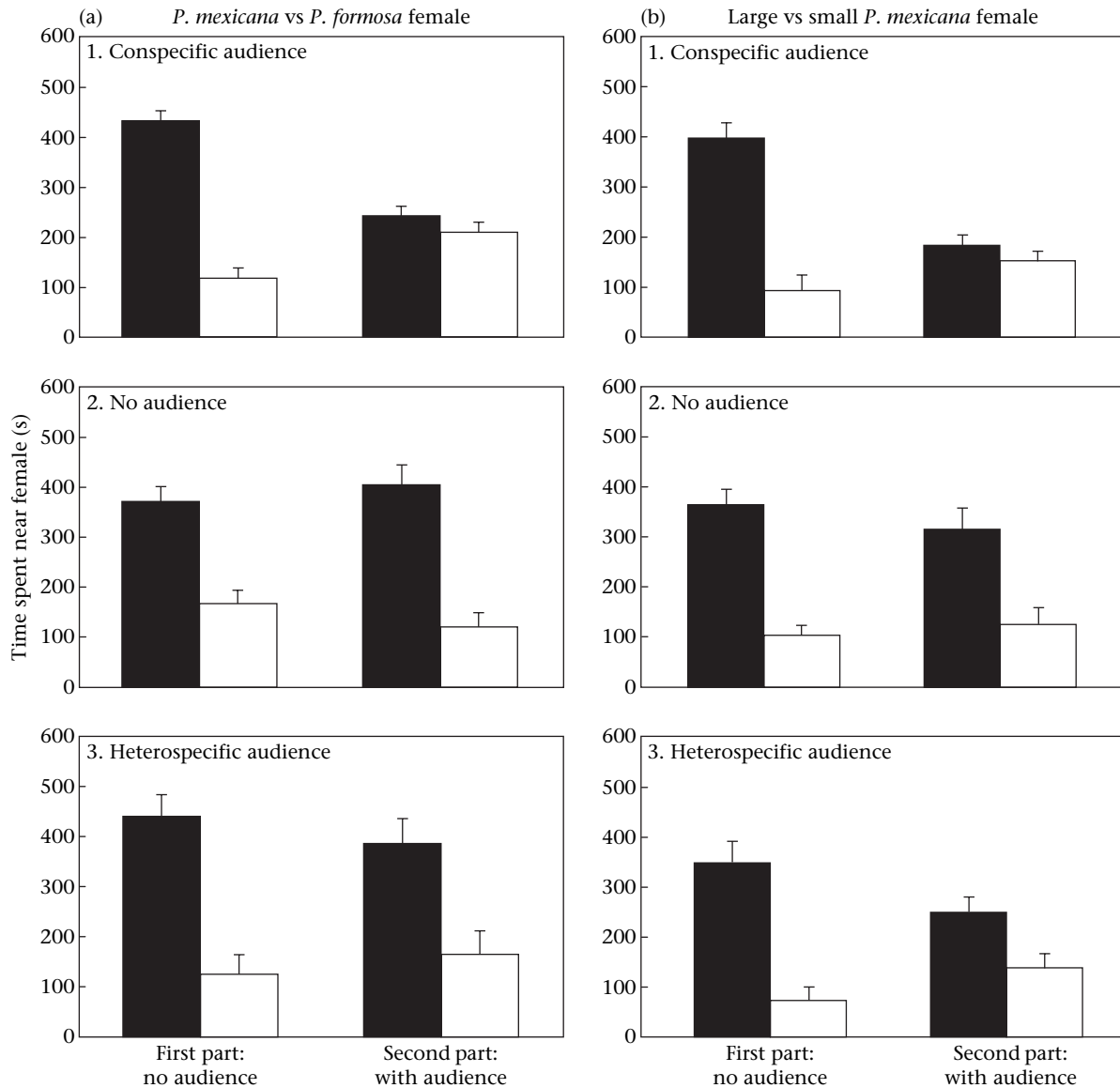


Figure 2. The time that *Poecilia mexicana* males spent associating with one of the two females ((a) experiment 1, conspecific versus *Poecilia formosa* stimulus females; (b) experiment 2, large versus small conspecific females). During the first part, the male was alone in the test tank, during the second part, an audience male was visually presented. In treatment 1, a conspecific male was used as audience male; in treatment 2, no audience male was presented ('control') and in treatment 3, a swordtail male was the audience. Black bars indicate time spent near the initially preferred female, open bars indicate time spent near the initially nonpreferred female. Note that absolute association times (s) are presented here, whereas the statistical analysis is based on relative association times (see Fig. 3).

synchronized swimming up and down by both males, whereas we observed aggressive displays only in very few trials (experiment 1, treatment 1: 3 cases; experiment 2, treatment 1: 5 cases; treatment 3: 1 case).

We detected no statistically significant difference in time spent in the neutral zone (second part – first part) between experiments (Table 2). There was a highly significant effect of the factor 'Treatment' (Table 2). A post hoc test (Fisher's PLSD) revealed that the increase in the time spent in the neutral zone in treatment 1 (conspicuous audience, $+130.4 \pm 18.3$ s) differed significantly from that in treatment 2 (no audience, $+21.2 \pm 21.6$ s; $P < 0.001$) as well as from treatment 3 (heterospecific audience,

$+25.2 \pm 28.1$ s; $P < 0.001$), whereas treatments 2 and 3 did not significantly differ ($P = 0.91$).

DISCUSSION

We gave Atlantic molly, *P. mexicana*, males an opportunity to associate with either a conspecific or a comparably sized heterospecific (*P. formosa*) female, or a large versus small conspecific female, and we repeated the choice tests while an audience male was visually presented. Focal males switched their initial preferences in the presence of an audience, and a conspecific audience had a greater effect on

Table 1. Pairwise comparison of male association times (% time near the initially preferred female) between the two parts of a trial (without and with audience)

	Experiment 1: conspicuous vs heterospecific female		Experiment 2: large vs small female	
Treatment 1: conspicuous audience	$t_{19}=4.70$	$P<0.0001$	$t_{20}=6.04$	$P<0.0001$
Treatment 2: no audience	$t_9=-0.95$	$P=0.37$	$t_9=0.55$	$P=0.60$
Treatment 3: heterospecific audience	$t_9=1.21$	$P=0.26$	$t_9=3.26$	$P=0.010$

Paired t tests on arcsine-transformed data. Significant P values are in bold.

the behaviour of the focal male than a heterospecific audience.

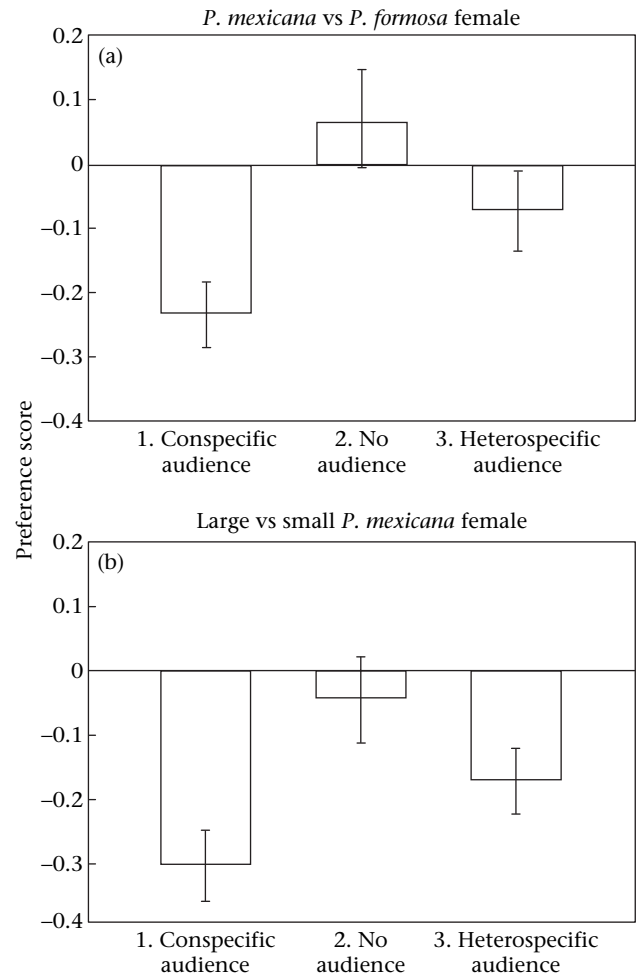
Several studies on the influence of public information on male mate choice decisions have examined how the choosing male alters its choice decisions as a result of mate choice copying (Schlupp & Ryan 1997). Likewise, several studies have documented female mate choice copying, especially in poeciliid fish (e.g. guppy: Dugatkin & Godin 1992; sailfin molly: Schlupp et al. 1994; Hill & Ryan 2005). Our experimental design was fundamentally different from those used to examine mate choice copying in that the choosing male did not observe the audience male sexually interact with the stimulus females. We presented the second (audience) male during the second part of the tests, and we did not place the audience in close proximity to one of the females. Therefore, changes in mate choice decisions of the focal males can be attributed to the mere presence of the other (audience) male.

An effect of an audience male on male mating behaviour has been shown in male three-spined stickleback, *Gasterosteus aculeatus*, which court a dummy female less intensely when another male is visible (Dzieweczynski &

Table 2. Generalized linear models using experiment (conspicuous/heterospecific or large/small stimulus females) as between-subjects factor and treatment (conspicuous audience, no audience or heterospecific audience) as within-subjects factor

	df	Mean square	F	P
(1) Change in male association preferences				
Experiment	1	0.17	3.60	0.062
Treatment	2	0.57	11.98	<0.0001
Error	77	0.048		
(2) Change in time spent in neutral zone				
Experiment	1	32 875.95	2.56	0.11
Treatment	2	115 422.72	8.98	<0.0001
Error	77	12 857.70		

The dependent variable was (1) the change in male association preferences (% time near preferred female during first part – % time near the same female during second part of a test) and (2) the change in time spent in the neutral zone (time in neutral zone during second part of a trial – time in neutral zone during first part). Significant P values are in bold.

**Figure 3.** The difference in male association preferences (preference score = % time spent near preferred female (first part) – % time near initially preferred (second part)). Values close to zero indicate consistency of male preferences between the two parts of a trial (without, or with an audience male); negative values indicate that males spent relatively more time near the initially nonpreferred female during the second part.

Rowland 2004). Male birds can modulate their acoustical repertoire used to communicate with their mate in response to an audience (Striedter et al. 2003; Vignal et al. 2004). However, the present study is, to our knowledge, the first to show that the sole presence of a conspecific audience male can alter male mate choice decisions. In

Table 3. Generalized linear model using experiment (conspicuous/heterospecific or large/small stimulus females) as between-subjects factor, treatment (conspicuous audience or heterospecific audience) as within-subjects factor, the size difference between the focal and the audience male as a covariate and the change in male association preferences as dependent variable

	df	Mean square	F	P
Experiment	1	0.11	2.32	0.13
Treatment	1	0.27	5.68	0.021
Size difference	1	0.016	0.33	0.57
Error	57	0.048		

Significant P values are in bold.

a nonsocial context, the temporary modification, whether loss or even reversal, of a directional mating preference can be caused by the presence of predators, which may share preferences with the choosing individual (Berglund 1993; Godin & Briggs 1996; Johnson & Basolo 2003). However, it seems unlikely that the *P. mexicana* males could have mistaken swordtails for predators. Moreover, we detected the most pronounced audience effect when we presented a conspecific male; swordtails had a significantly weaker effect on the change in male association preferences, suggesting that the observed audience effect was due to the presence of a perceived conspecific competitor. The size difference between the focal male and the audience male had no significant effect on the change in the focal males' preferences. Apparently, the observed audience effect is independent of the perceived relative physical strength of the audience male.

Similar results have been found in sailfin mollies (I. Schlupp et al., unpublished data). Several explanations are possible: first, altering mate choice behaviour in the presence of a competitor may be adaptive. The evolutionary significance of this behaviour may be linked to the increased risk of sperm competition when a male competitor is present, because the competitor is likely to show the same intrinsic mating preferences. Dosen & Montgomerie (2004) found guppy, *P. reticulata*, males to alter mating preferences in binary choice tests in response to the risk of sperm competition. Possibly, *P. mexicana* males also respond to the perceived risk of sperm competition by showing less pronounced mating preferences in the presence of a conspecific male. In addition, moving away from a female would be a strategy to avoid costly fights (Ribowski & Franck 1993).

Alternatively, Atlantic molly males may not be able to dedicate simultaneous attention to mate choice and the male competitor, leading to a motivational conflict. Guppy, *P. reticulata*, males did not alter their mate choice decisions when they were presented with another male that could not sexually interact with the females (Dosen & Montgomerie 2004), but also spent less time associating with females in the presence of male competitors (Magellan et al. 2005). Generally, *P. mexicana* males are considerably more aggressive than guppy males, and aggressive interactions clearly play a more important role in *P. mexicana* (Parzefall 1969; M. Plath, personal observation).

Male mate choice is critical for the maintenance of gynogenetic systems, because in such systems the clonal species relies on sperm of 'host' males, in this case *P. mexicana* males, whereas the host males do not transfer genes to future generations (Schlupp 2005). *Poecilia mexicana* males should therefore be selected to avoid mating with other than conspecific females (Schlupp 2005). In fact, several studies found a preference of host males (*P. mexicana* and *P. latipinna*) for conspecific females (Schlupp et al. 1991; Ryan et al. 1996; Gabor & Ryan 2001; Schlupp & Plath 2005), but other studies failed to detect a preference (Heubel & Schlupp 2006; this study). One possible explanation for the discrepancy among studies on male mate choice for conspecific females is that males' ability for species discrimination may differ between populations.

The focal males spent more time associating with the larger of the two females in experiment 2, suggesting that they have an intrinsic mating preference for large female size, but social context can modify this preference. Male mating preferences for large female size are especially well documented in poeciliid fish (guppies, *P. reticulata*: Herdman et al. 2004; Magellan et al. 2005; sailfin molly, *P. latipinna*: Ptacek & Travis 1997; *P. mexicana*: Plath et al. 2006). Since there is a positive correlation between fecundity and female body size in poeciliid females (e.g. *P. latipinna*: Travis et al. 1990; *P. mexicana*: R. Riesch et al., unpublished data), mating with larger females enhances male reproductive success because they fertilize a greater number of ova.

In summary, male Atlantic mollies altered their individual mate choice decisions in the presence of a conspecific audience male and spent less time near the initially preferred female. Many studies examine mate choice behaviour under standardized laboratory conditions, neglecting the social context in which mate choice naturally occurs. Our study therefore represents a starting point for future studies examining mate choice behaviour under more natural conditions and in a social context.

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