DO FEMALE STICKLEBACK CARE ABOUT MALE COURTSHIP VIGOUR? MANIPULATION OF DISPLAY TEMPO USING VIDEO PLAYBACK

by

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(With 4 Figures)
(Acc. 22-IV-1995)

Summary

Reproductive ♂ and ♀ threespine stickleback *Gasterosteus aculeatus* were presented with a videotaped sequence of a zigzag dancing ♂ played back at normal (T), half (0.5T), one-and-a-half (1.5T), double (2T) and triple (3T) tempo. Playbacks were displayed pairwise (T/0.5T; T/1.5T; T/2T; T/3T) on monitors placed at opposite ends of the test tank. Each playback pair was displayed to subjects for 4 min, with display locations switched to opposite ends of the test tank at 2 min to control for position preference. Both ♂ and ♀ subjects responded to playback images much like they do to live ♂♂, demonstrating the potential of video playback for analysing visual communication in stickleback. Male and ♀ subjects contacted 1.5T and 2T images as much as images moving at normal tempo but they contacted 0.5T and 3T images less. Thus, subjects were more attracted to ♂♂ displaying at normal to slightly faster tempo than to ♂♂ displaying outside that range. The stabilizing selection that such effects might impose on animals could contribute to the typical intensity that characterizes much of their display behaviour.

Introduction

Movement is a crucial component of display in animals. It can be used to encode information or to enhance the stimulatory effect and detectability of color, shape or other aspects of a signal (HAILMAN, 1977; SMITH, 1977). It is now recognized that the information animals obtain from a display

[1]) I thank M. EVCES for assistance in conducting the test trials and C. BAUBE and M. HOSKING for assistance in collecting fish. D. MCMULLEN and the Center for Innovative Computer Applications at Indiana University helped produce the modified playback tapes. M. HOSKING, T. BAKKER and P. SEVENSTER provided helpful comments on the manuscript. This study was partly supported by a NSF Research Training Grant to the Center for the Integrative Study of Animal Behavior at Indiana University and from a research grant from the Indiana Academy of Sciences to the author.

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may determine the further course of action that they employ during social interactions. For example, information gained during an agonistic encounter may lead ♂♂ to either escalate or end an encounter, depending on whether they perceive their opponent's resource holding power – 'RHP' – as less or greater than their own (PARKER, 1974). To this end, ♂♂ should attend to traits that reliably indicate an opponent's RHP. Similarly, the information ♀♀ acquire when courting a prospective mate might help them to decide whether to accept or reject him (see ANDERSSON, 1994 and references therein). Females should therefore attend to traits that reliably indicate the ♂'s quality as a mate.

Rapid and repeated movements, especially in an aquatic environment, are energetically costly and difficult to perform. The tempo of display may therefore serve as a reliable indicator of a displayer's physical condition. Indeed, courtship display rate correlates with mating success or attractiveness to ♀♀ in some birds (*e.g.* GIBSON & BRADBURY, 1985; ANDERSSON, 1991) and in the guppy (FARR, 1980; BISCHOFF *et al.*, 1985; KENNEDY *et al.*, 1987; but see HOUDE, 1988). Moreover, MAGNUS (1958) was able to create a more effective ('supernormal') stimulus for ♂ sexual pursuit in fritillary butterflies (*Argynnis paphia*) by increasing the wingflap rate of dummy ♀♀ beyond that of real ♀♀; this effect continued until the flicker fusion rate was reached and response ceased.

GROSS & FRANCK (1979) and RIDLEY (1986) reported that ♀ threespine stickleback (*Gasterosteus aculeatus*) prefer ♂♂ that zigzag at a higher rate, and that they are more likely to mate with these 'more energetic' ♂♂ (RIDLEY, 1986). Subsequent studies, however, failed to confirm this (WARD & FITZGERALD, 1987; JAMIESON & COLGAN, 1989; MILINSKI & BAKKER, 1990). I therefore investigated whether ♀ stickleback from a Long Island population would respond selectively when presented with zigzag displays of different tempo and if they, like fritillary butterflies, preferred displays of supernormal tempo. This could thus provide selection pressure for increased courtship tempo in ♂ stickleback.

Video technology now makes it possible to modify a videotaped behaviour sequence so that the tempo of activity is increased or decreased during playback. Moreover, reproductive threespine stickleback respond to video images of conspecifics much as they do to live conspecifics in adjoining tanks (ROWLAND *et al.*, 1995a,b). I therefore used video play-