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Individual differences in gill-cover erection among wild type and domesticated fighting fish males offer insight into biological bases of aggression

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For the study of the biological bases of aggression, an animal in which aggression is present in both a natural and exaggerated form can serve as a useful model. Compared to the wild type, domesticated fishes might represent the aggressive, risk-taking end of the behavioural spectrum. This may be particularly the case for domesticated fighting fish of the genus *Betta*. In Thailand, considerable sums of money are wagered on the outcome of fights between Bettas that are selectively bred for fighting. In our research we compare and contrast the natural and exaggerated forms of aggression shown by the wild type and fighter strains of Bettas. In this work we focus on gill-cover erection. Gill-cover erection is an especially good subject for comparative research on fighting fish aggression. Gill-cover erection is the best predictor of the outcome of actual fights and is easily elicited in the laboratory. The neural pathways associated with gill-cover erection are known, and studies of evoked potentials from optic tectum suggest that *Betta* males pay particular attention to this visually striking display. Gill-cover erection is costly because it limits the ability of fish to ventilate their gills to extract oxygen from water, and is therefore most likely an honest signal of aggressive vigour. In this paper we summarize results from a series of studies in which we used video-playback, mirror stimulation, and mutual-viewing tests to compare and contrast individual differences in gill-cover extension among wild type *Betta splendens* and domesticated strains of *Betta splendens* selectively bred for cockfight-like contests and appearance. We will discuss the biological significance of our main findings to date that show that both selective breeding and rearing condition affect the use of gill-cover erection as a key component of aggression among fighting fish.

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