

COMPETITIVE ADAPTATION IN ISOLATED SELECTION LINES OF FEMALE MEDAKA (*ORYZIAS LATIPES*)

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Introduction

Medaka are model organisms in mating systems for many species, including humans. However, studies on female behaviour is either neglected or characterized by male behavioural standards^{2,1,5}



4 isolated selection lines of medaka have been maintained in different sex ratio environments for 8 generations. In this study, we compare their behaviours against that of first-gen females initially placed in these sex ratios (SRs).

This study aims to identify the adaptation capacity of female medaka in differing competitive environments and characterize the unique behavioural strategies of females

Questions & Hypotheses

- Do female medaka from different sexual selection lines exhibit different competitive behaviours according to their population's sex ratio?**

I hypothesized that reproductive strategies characteristic of each SR would have intensified, or increased in frequency after several generations of selection pressure

- Does sex ratio influence whether females rely on more overt or subtle competitive behaviours?**

I hypothesized that females in equal or male-dominated environments would exhibit higher rates of subtle aggression, while those in female-dominated environments would resort to more overt aggression to monopolize limited access to desirable mates

Predictions

Table 1: Predicted response of isolated selection lines of female medaka (*Oryzias latipes*) after 8 generations in uneven sex ratios

	Male-Female Conflict	Female-Female Competition	Most Common form of Female-Female Competition	Relative Subtlety of Female-Female Competition
Male-Dominated Populations	↑	↓	Subtle	↑
Female-Dominated Populations	↓	↑	Subtle	↓

Methodology

I.D. and Placement

- Individuals identified with subcutaneous elastomer paint
- Placed in same SR as previous generations

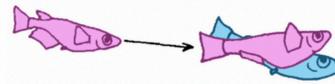


Competition:

Female-Female Aggression

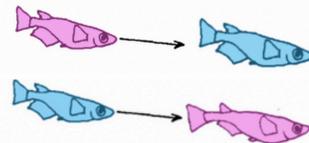


Mating Interference

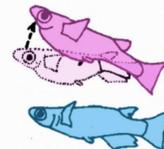


Conflict:

Female-Male Aggression



Head-Up Rejection



Graphics Credit: Amanda Gove, edited from Ono Y, Uematsu T. 1957.

Observation Periods

- Observations of each individual carried out in 2-minute windows
- 3 rounds of observations per individual over a two-month period

Definitions

Competitive behaviours: Intrasexual aggressive/dominance behaviours between females

Conflict behaviours: Intersexual aggressive/rejection behaviours

“Overt” competition/conflict: Behavioural displays involving rapid, aggressive chasing/bumping

“Subtle” competition/conflict: Subdued behaviours involving slow approaches causing the recipient to flee, crowding into and taking over recipient's space

Analysis

Comparison of 1st gen and 8th gen: mixed linear model, with sex ratio as a fixed effect and tank as a random effect

Tendency towards overt vs subtle competition: mixed model with binomial distribution

Preliminary Results

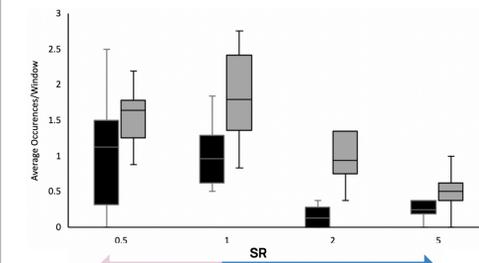


Figure 1: Average occurrence of intrasexual competitive behaviours between female medaka (*Oryzias latipes*) in 2-minute observation windows

Trends

- Subtle competition consistently more common than overt
- Females in male-dominated environments exhibit lower intrasexual competition than those in female-dominated environments

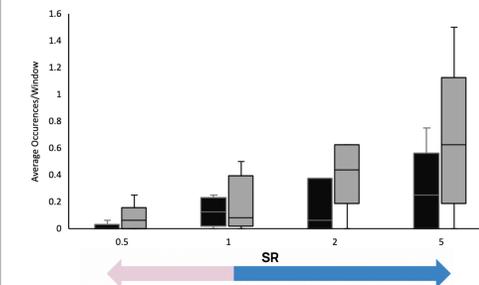


Figure 2: Average occurrence of female-initiated intersexual conflict behaviours in medaka (*Oryzias latipes*) in 2-minute observation windows

Trends

- Subtle competition consistently more common than overt
- Females in male-dominated environments exhibit greater intersexual conflict than those in female-dominated environments

Future Steps?

- Testing statistical significance of preference for subtle behavioural strategies over overt
- Comparison of current results* with that of first-gen females to assess if adaptation has occurred

*As first-generation females were only assessed through the lens of overt aggression, we will only compare overt results with previous data

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