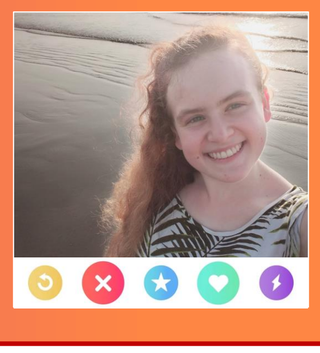
What characteristics drive mate choice and sexual selection in swordtail fish?

Kathryn Bullough, George Hancock, Bram Kuijper, Laura Kelley
kb574@exeter.ac.uk @KathrynBullough

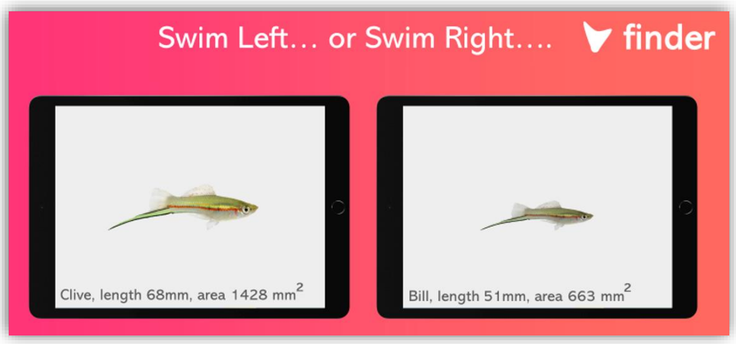


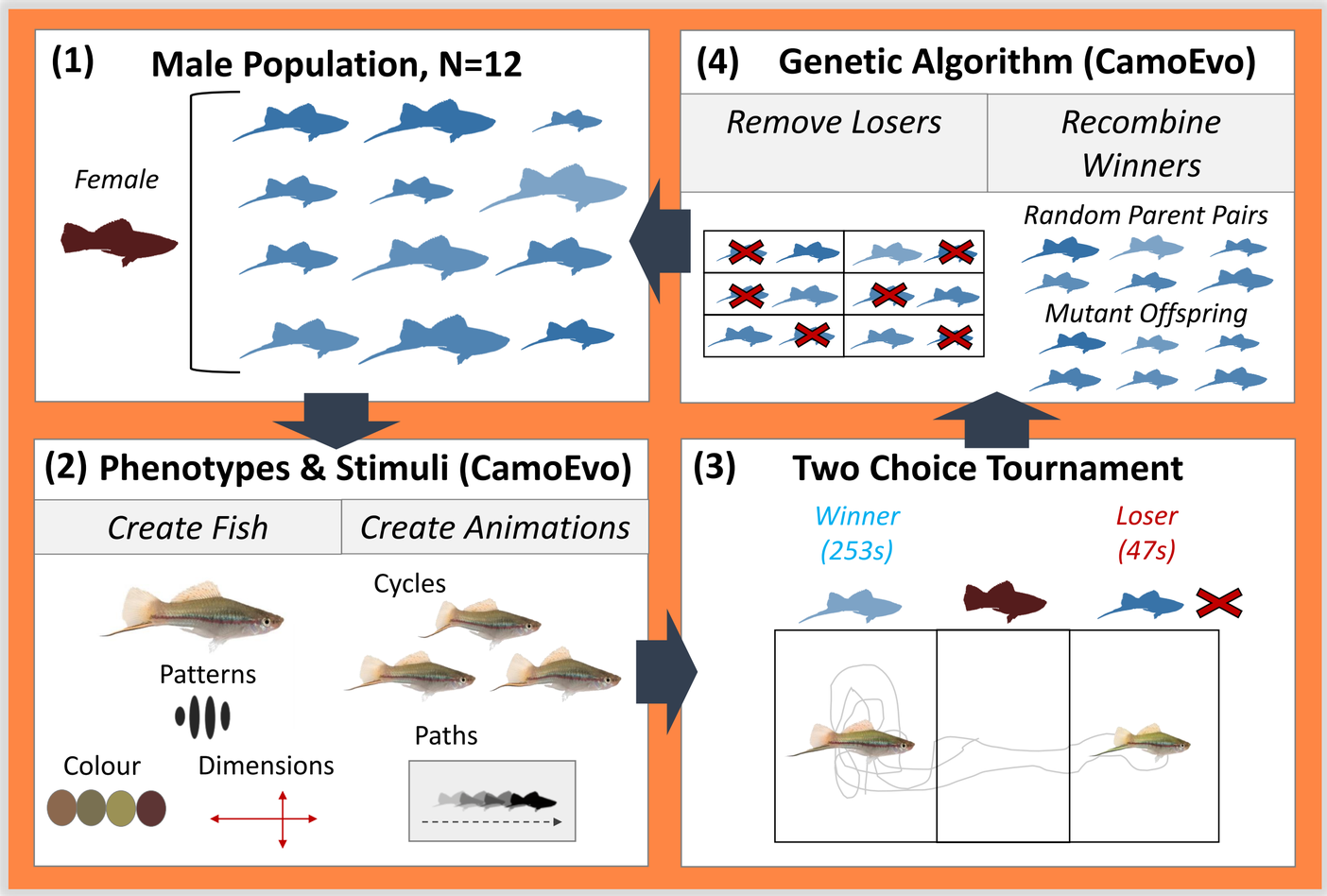
1 Background

- Traditional tests on female mate preference present females with **two males in a simultaneous choice behavioural paradigm**.
- If female choice was **allowed to evolve freely**, what would females prefer?
- Would a **whole population evolve the same preferences**, or would **individuals make unique choices** on male traits?
- In populations of green swordtails, females are thought to prefer longer tails and larger males, however this doesn't appear to be the case in our population – so **what do the females like**?

2 Creating *Find*er A genetic algorithm for fish sexual selection

- Virtual male stimuli were encoded with a genetic algorithm using **16 genes relating to various traits** such as body colour, tail length, and body pattern.
- In **two-choice trials**, males with whom the female spent the most amount of time with 'won' and were pooled using **recombination and mutation to create the next generation**.
- This was repeated for 10 generations, resulting in **independent evolutionary lines of sexually selected male traits** for each individual female (N=12).





3 Individual dating preferences

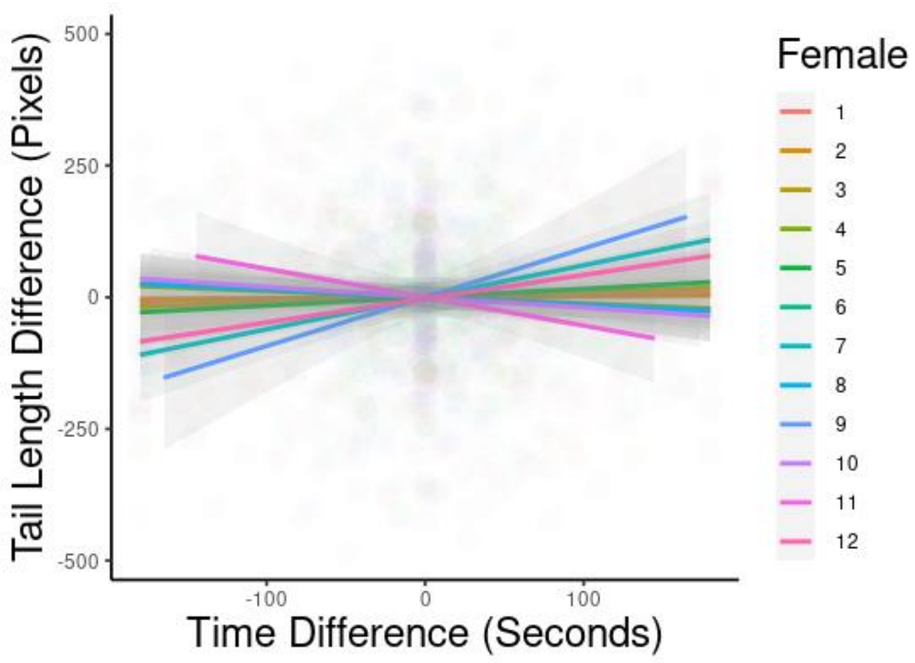


Fig 1: The difference in time each female spends with a paired male based on the difference in tail length between the pairs. Each female has a unique preference.

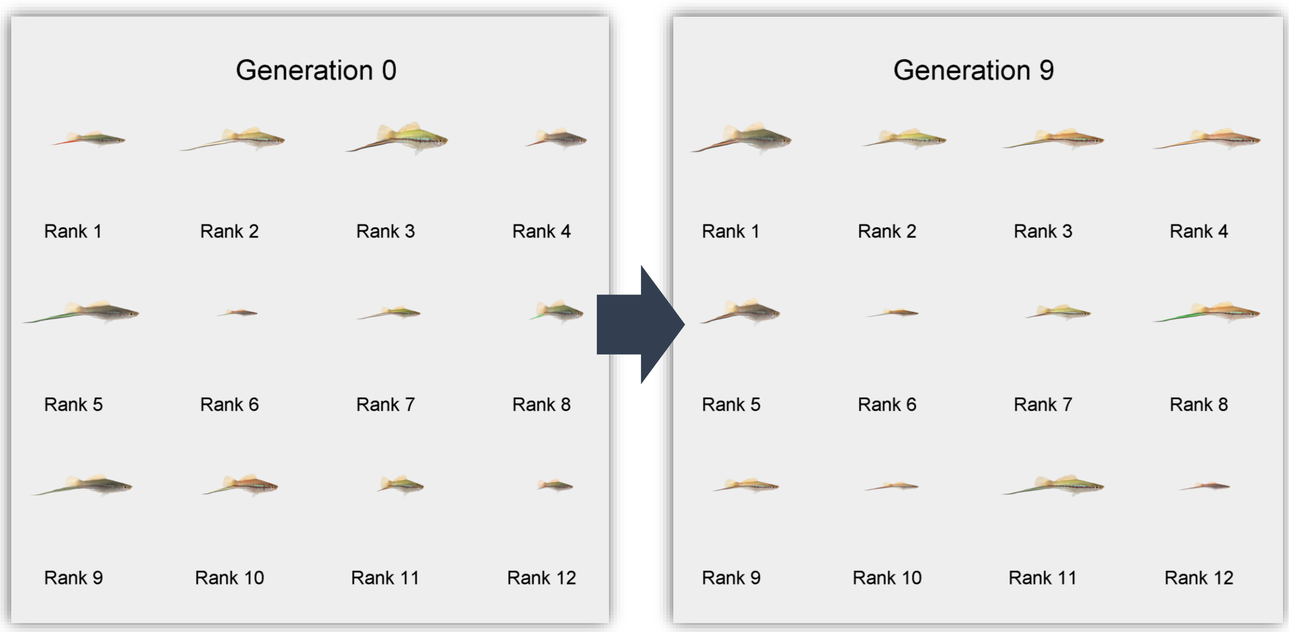


Fig 2: First and final generations of male stimuli for one female fish.

- **No overall male trait found which the whole female population selected for**.
- Each individual female selected for her own **unique combination of male traits** (Figs 1&2).
- **Not due to genetic drift**, as females preferred their evolved males from the final generation over the males they rejected in the first round (p=0.009).

4 Conclusions

- *Find*er can be used as a **tool to test for preferences** of both individuals and whole populations in an unconstrained trait space.
- In our swordtails, there was **no overall population-level selection on one male trait**, with females having **unique preferences**.
- This highlights how **varied behavioural traits can be**, with implications for the **repeatability of behavioural studies**.