Effects of sex-discriminated communities on female *Astatotilapia burtoni* behavior and testosterone levels

Clara Herrera **Reed College Bio342**

How do androgen levels vary depending on external environmental conditions? I will explore the plasticity of testosterone levels using female A. burtoni communities.

Female cichlids have been shown to display male-typical behavior when placed in an all female community [1]. My goal was to observe whether this behavioral change was correlated with increased testosterone levels and whether all-female communities produced clearly dominant and subordinate females through behavior and hormone sampling.

Experimental Design

Hypothesis: Female cichlids in all-female communities will have increased testosterone levels compared those who share a tank with a male, resulting in one female becoming dominant and displaying male-typical behaviors correlated with high testosterone levels.

Week of acclimation

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Behavior Sampling

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Hormone Sampling

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Male Removal

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Behavior Sampling

↓

Hormone Sampling (for 2 weeks after male removal)

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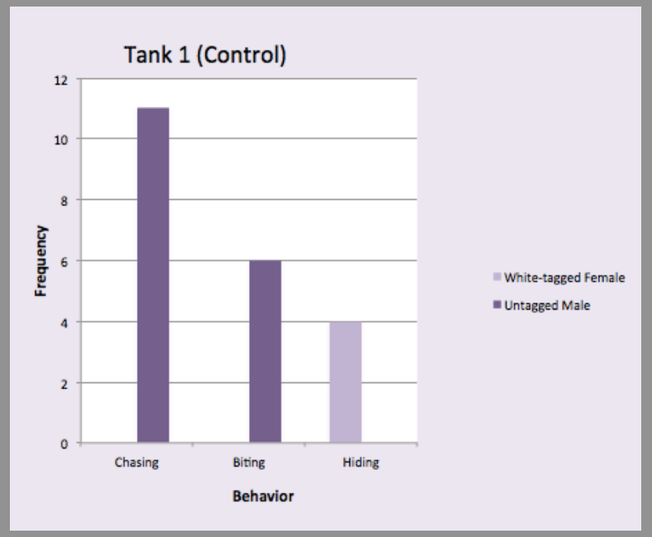
ELISA

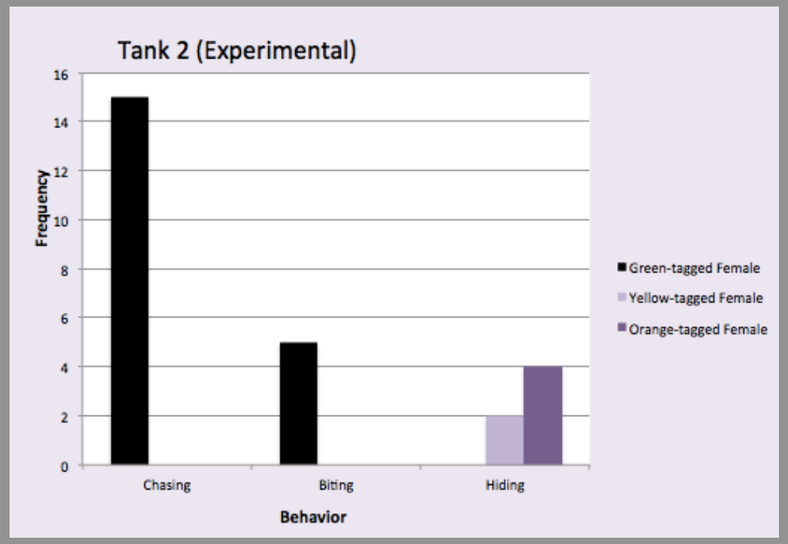
- One control and two experimental tanks were used containing 2-3 female cichlids and one male cichlid each
- Hormone and behavioral measurements conducted before and after the removal of male fish
- Behavior measurements using an ethogram for aggressive and subordinate behavior included four behaviors: chasing, hiding, biting, and eye-bar display
- Hormone measurements collected through water samples for two females from each tank
- Hormones filtered, extracted, and eluted
- Testosterone concentrations measured using an ELISA

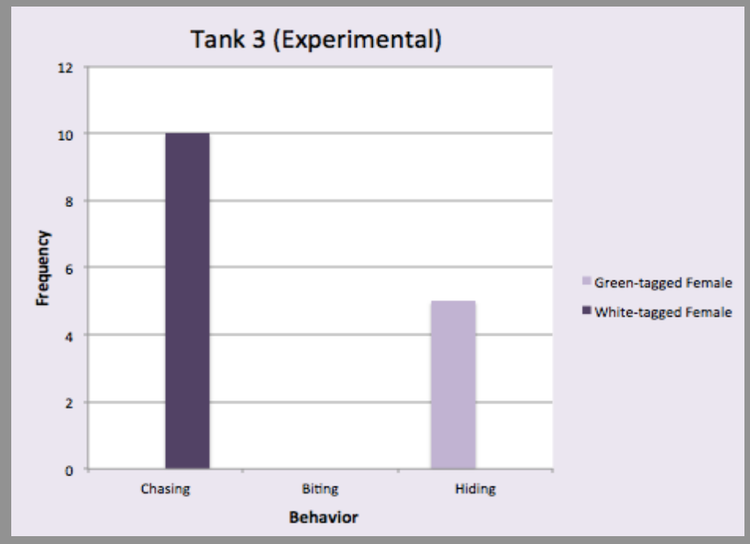
Tank Design:
Males were removed from experimental tanks after one week

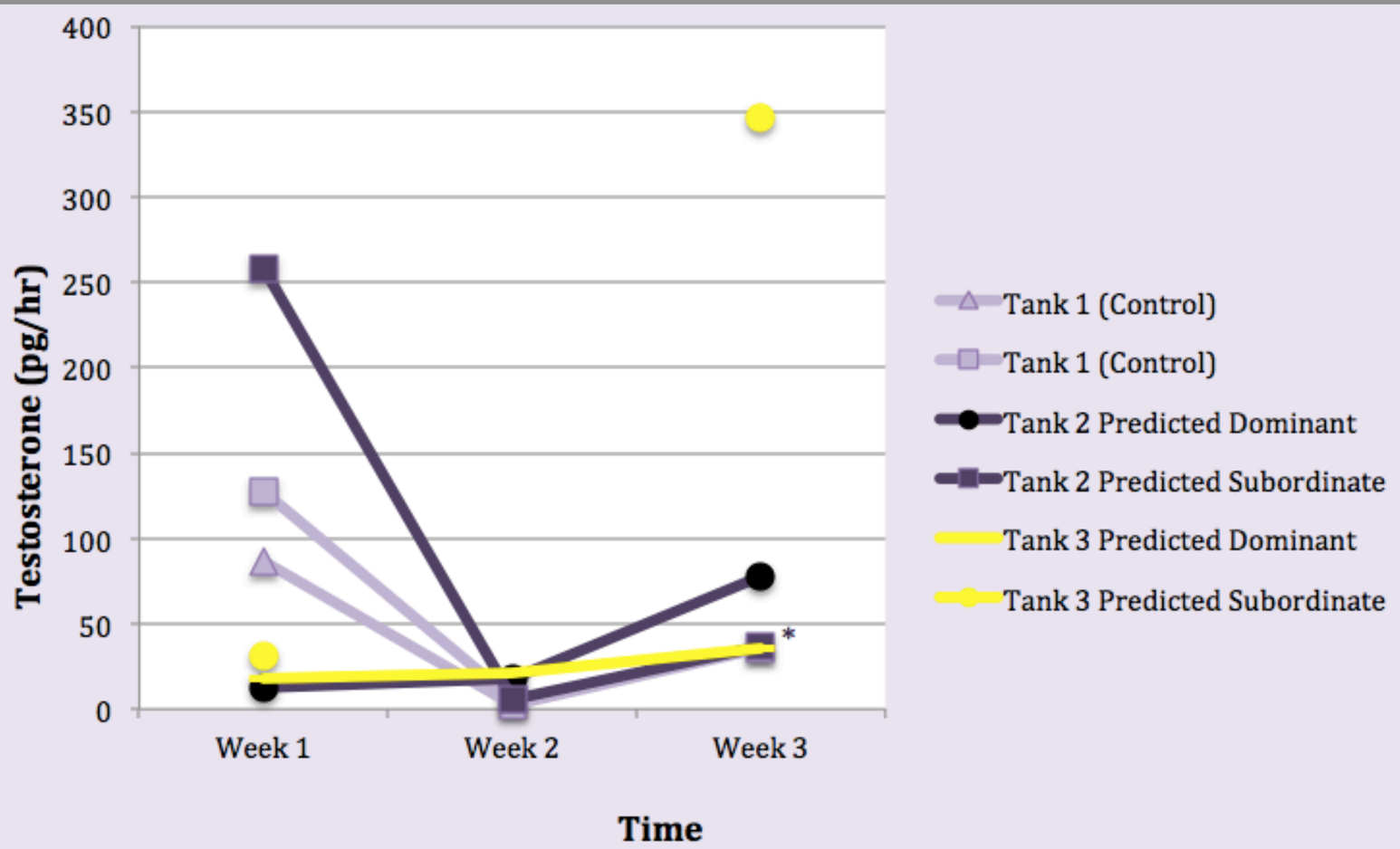
	Tank 1 (Control)	Tank 2 (Experimental)	Tank 3 (Experimental)
Week 1	♂♀ ♀ ♀	♂♀ ♀ ♀	♂♀ ♀
Week 2	♂♀ ♀ ♀	♀ ♀ ♀	♀ ♀
Week 3	♂♀ ♀ ♀	♀ ♀ ♀	♀ ♀

Behavior Measurements showed experimental tanks had clearly aggressive females









Cichlids in all-female tanks had higher testosterone levels on average

Tank 1: Females had similar testosterone levels
Tank 2: Predicted dominant female had higher testosterone levels than predicted subordinate female
Tank 3:
Predicted subordinate female had higher testosterone levels than predicted dominant female

Conclusions

Androgen levels in A. burtoni females are correlated with their social environment and sex-discriminated environments may induce dominance in some individuals

Future Directions:

- ❖ Further similar experiments with larger sample sizes and larger female communities
- ❖ Observe effect of different tank population sizes on testosterone levels and aggressions
- ❖ Look at correlated hormones

References:

(1) Renn, Suzy C.p., Eleanor J. Fraser, Nadia Aubin-Horth, Brian C. Trainor, and Hans A. Hofmann. "Females of an African Cichlid Fish Display Male-typical Social Dominance Behavior and Elevated Androgens in the Absence of Males." Hormones and Behavior 61.4 (2012): 496-503.

(2) A. burtoni imagehttps://www.aqua-fish.net/imgs/fish/haplochromis-burtoni.jpg

Acknowledgements:

Thank you to Suzy Renn and the biology stockroom for their guidance.