

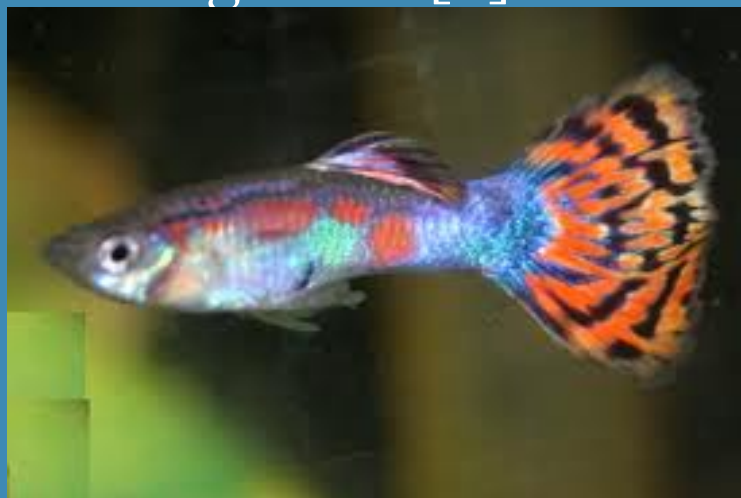
Are skin carotenoid spots an honest signal in guppy mate choice?

Momovius feat. Swesley on da beats

REED COLLEGE

BIO342

- Carotenoids are orange and yellow pigments found in guppy orange skin spots. Guppies ingest carotenoids in their diet and then express them in their skin [7].
- Dichotomous mate choice experiments have shown that female guppies prefer males with more orange coloration [2].
- Males with more carotenoids produce faster and more viable sperm, and have stronger immune systems. This suggests that carotenoids are an honest indicator of fitness in guppies [1, 4].
- Several studies have shown that the size and shape of orange spots is genetic, but the brightness of the orange spots is related to carotenoid levels in the organism [2]



Is skin pigmentation an honest indicator of liver carotenoid levels?

Can the girls tell if their boys are cheating?

Dichotomous Mate Choice Experiments & Guppy Dissections

- 20 male guppies were randomly assigned to “High” or “Low” carotenoid diets for 10 days
- Female choice was measured using 5 minute dichotomous mate choice experiments. 10 females were used, each with a different “Low Carotenoid” and “High Carotenoid” male.
- Males were photographed, and JMP was used to analyze the size of their orange spots
- Males were dissected, and their livers were analyzed using a nanodrop spectrophotometer to determine carotenoid levels at 420nm.

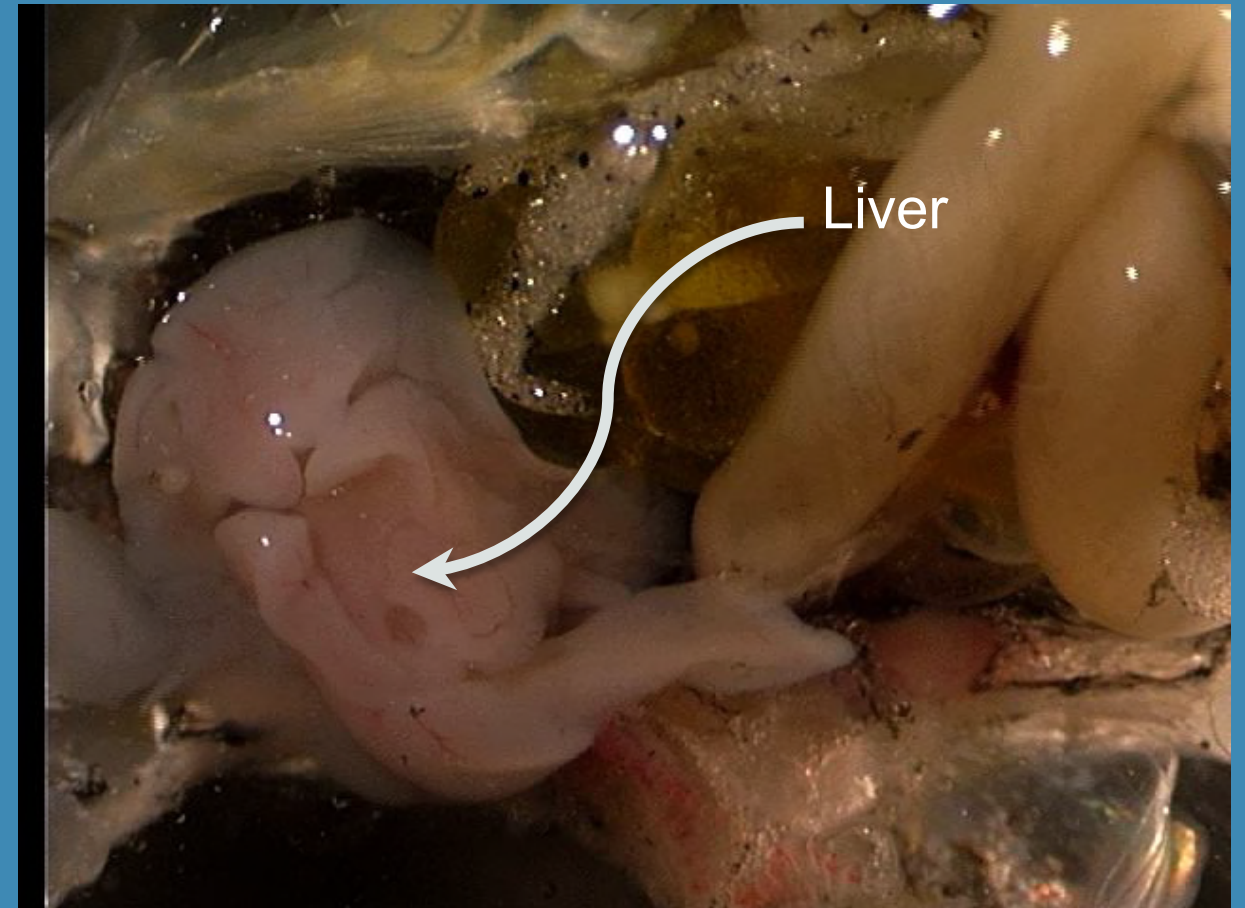


Figure 1: Guppy Liver. Photo taken with btw pro on 11/3/2010

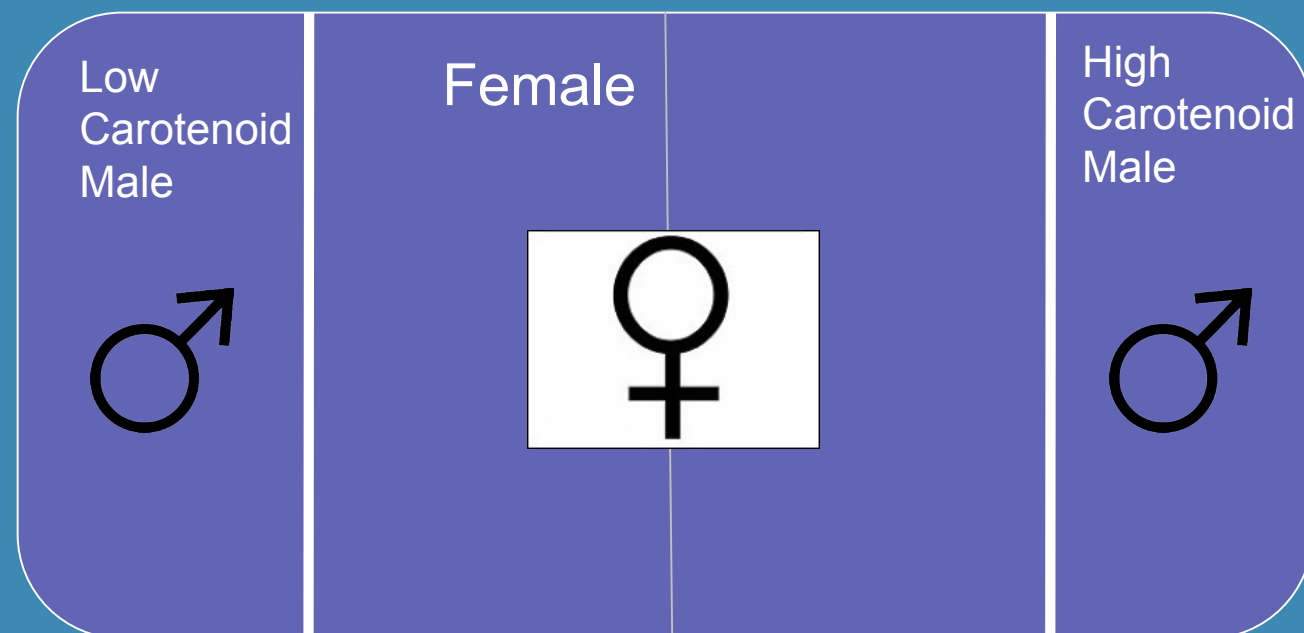


Figure 2: Mate choice tank. One central female separated from two males by clear plastic dividers

Hypothesis:
Males with higher liver carotenoid levels will be preferred by female guppies

Correlation Without Significance: Liver Carotenoids Elevated

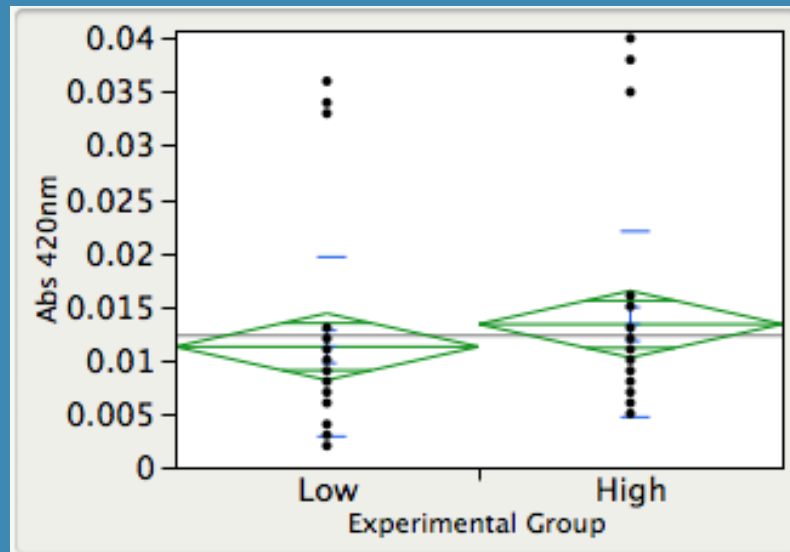


Figure 1. One-way analysis of carotenoid absorbance by carotenoid diet. Prob>F = 0.3436

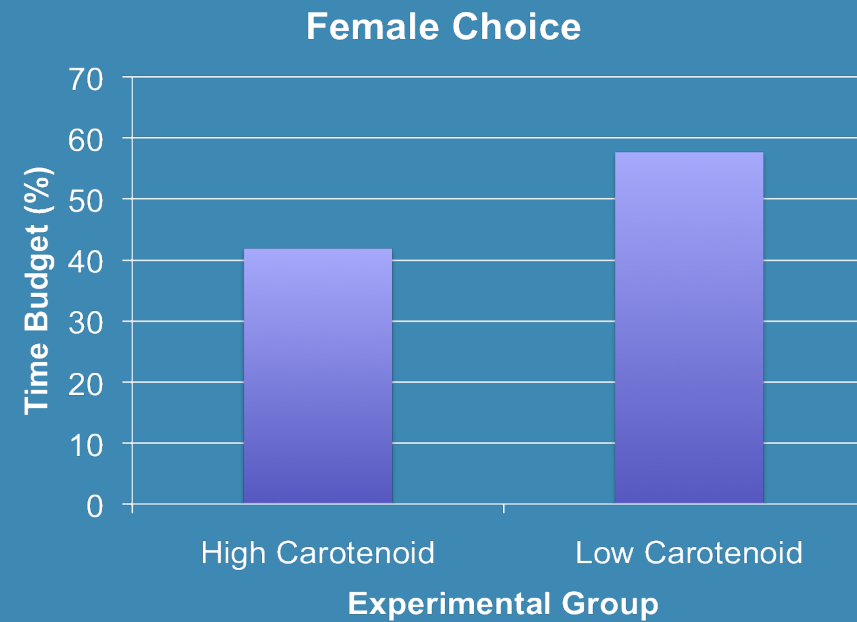


Figure 2. Female choice measured by percentage of time spent with high or low carotenoid males in dichotomous mate choice experiment.

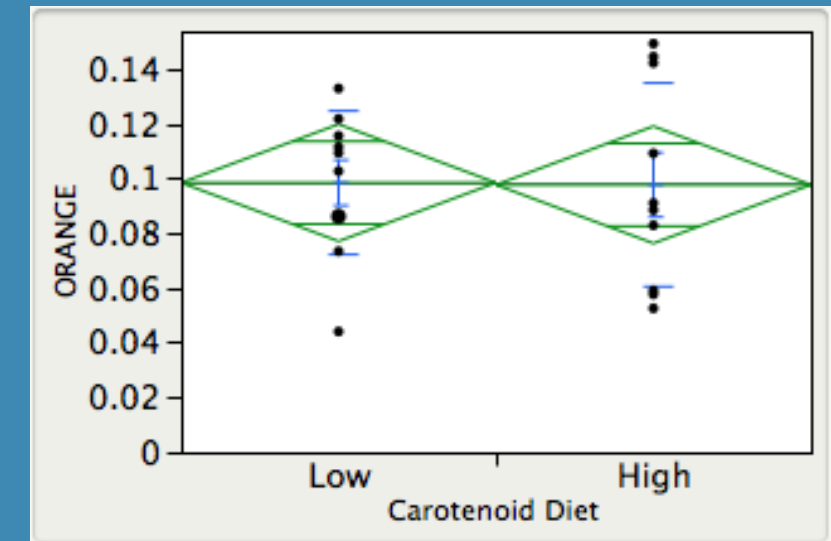


Figure 3. One-way analysis of skin pigment by carotenoid diet. Prob>F = 0.9587

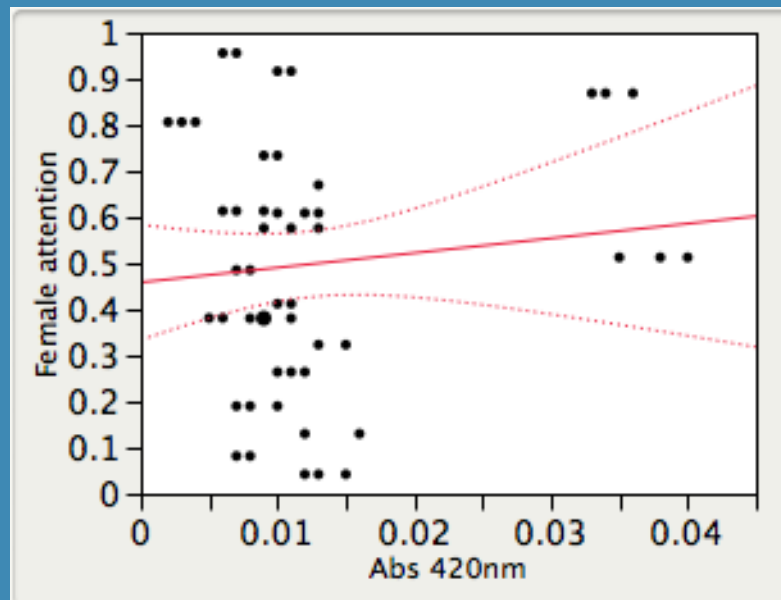


Figure 4. Bivariate plot of proportion of time attended by female in dichotomous mate choice trials by liver carotenoid absorbance. Alpha = 0.005



Cannot Draw Conclusions

Further Investigation Required...

- High and low carotenoid males showed no significant difference in size of orange skin spots. This was to be expected due to evidence that skin pigmentation is genetic.
- There was a correlation between carotenoid diet and liver carotenoid levels, but data was not significant.
- Females did not show significant choice between high and low carotenoid males.
- In the future, male guppies should be kept on carotenoid diets for longer than 10 days.

Female guppies seemed unable to accurately identify more fit males based on carotenoid levels, but further investigation is needed to confirm results.

Selected Bibliography

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