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?
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.

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
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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