The Role of Color and Contrast in Mate Choice of Guppies

I. Introduction

All organisms are subject to natural selection. There are many mechanisms of natural selection, one of which is sexual selection. Female choice is a type of sexual selection. When female choice is present, males compete for female attention. In Poecilia reticulata (the common guppy), males compete for female attention by displaying bright colors and a fancy tail. This experiment is an attempt to determine what traits female guppies prefer and respond to. A male guppy’s contrast to his environment was tested to see if the female prefers a male that is highly contrasted with its background or one that blends into its background. We also tested female color preference.

Hypothesis 1: If given a choice between a brightly colored male and a darkly colored male, the female will choose the male with the brightest color.

Hypothesis 2: If given a choice between a male that has a similar color to its background and a male that highly contrasts with its background, the female guppy will choose the male that has the highest contrast with its background.

Prediction 1: The female guppy will choose a bright male over a dark male.

Prediction 2: The female guppy will choose the male with the highest contrast with its background.

Null Hypothesis: A female guppy will choose her mate independent of its color or contrast.

II. Methods

- Used two, 7.6 liter fish tanks
- Each tank was partitioned into three equal compartments – the female was placed in the middle compartment and males were placed in the outer compartments.
- Outside factors – To prevent the fish from being distracted, each tank was covered either in plain or colored paper.
- Side Preference – Females were tested alone to see if a side preference existed without male fish.
- Using a stop watch, each trial was timed for five minutes. Female position was measured by determining which side of the middle compartment the female spent more time on.

III. Results

For figure 1:
We ran a paired T test on the color choice data. The null hypothesis is that the difference in the means of the two datasets is zero. We got a t value of 0.290, and a p value of 0.395. Our p value is not less than 0.05, therefore we cannot reject the null.

For figure 2:
We ran a paired T test on the contrast choice data. The null hypothesis is that the difference in the means of the two datasets is zero. We got a t value of 0.017 and a p value of 0.494. Our p value is not less than 0.05, therefore we cannot reject the null.

IV. Conclusions

We failed to reject our null hypothesis. Based on the experiments that we performed, guppy females, as a group, showed no statistically significant mate preference regarding color or contrast. Individual females, however, often showed a distinct preference for a specific male.

If we were to perform this experiment again, we would perform more trials. While it is possible that adding more trials would fail to change our results, it would provide more accurate results.