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Phenotypic Variation in the Model Organism, Danio Rerio

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Phenotypic Variation in the Model Organism *Danio rerio*

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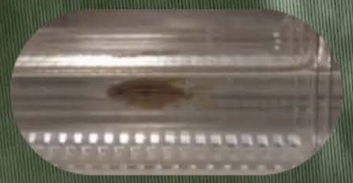
Abstract:
Model organisms are used to study evolutionarily conserved traits. Zebrafish (Danio rerio) are used as a model organism because of their high fecundity, external fertilization, and robust nature, making them highly adaptable to environmental and genetic variation. In an effort to limit data variation that lies outside of topic of interest, phenotypic measures of variation must be performed, understood, and taken into consideration for future studies. A common measurement of phenotypic variation in fish is in their maximun (Ucrit) swimming speeds. Inter and intra-strain variation in zebrafish Ucrit swimming speeds will be observed in a swim tunnel. Baseline values will be recorded from ten fish from each of two families in each of three strains: WIK, Tubigan, and AB. Environmental variation in zebrafish raised (beginning at one month of age) in tanks with various volumes and densities of fish will also be recorded from each strain. Mitochondrial density in white muscle will be compared in each strain in each condition. Diet, tank salinity, pH, temperature, and light exposure will all remain constant for all fish.



Experimental Procedure:
At 3 months old, fish are adults and will be ready for swim tunnel trials. 24 hours prior to each set of trials, the fish for next trial will be weighed and measured under light anesthetic and then placed in a holding tank and fasted. 1 hour prior to the study, 1 fish will be placed into its own holding tank for self- acclimation. 5 -10 minutes prior to trial, the fish will be placed into the swim tunnel with no current (at this time, the next fish will be placed into the self-acclimation holding tank). Water current will begin slow, at about 1BL/s, and increased every 5 minutes by 1 BL/s. The fish will naturally swim against the current. When the fish ceases to swim against the current and lags toward the screen at the other end of the tunnel, a small electric charge will be applied to the screen. The electric current will send a tiny current into the fish when it touches the screen, encouraging the fish to fight the current. When the fish touches the screen more than twice in 10 seconds, the trial will be complete (at this time, the fish will be fed and placed into a system tank for the ones that have completed the trial and the fish in the self-acclimation tank will be placed into the swim tunnel while data is notated and computed). All trials will be performed in the same manner.

Mitochondrial Density:
When all of the volume/density fish have been tested, five will be chosen from each family in each category that are the closest in size. These fish will be tested for mitochondrial density in the white muscle. Mitochondrial density will be tested both in QPCR and in pictoral captures of microscopic images taken with an electron microscope. These pictures will be manually counted for number of mitochondria in individual cells in white muscle and averaged for each fish. Statistical analyses of mitochondrial densities will be compared to Ucrit values to look for any correlation.

References:
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