CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Kevin D. Jordan

Project Number
S2406

Project Title
Global Impacts of Rising Aquatic Temperatures on the Survival of Carassius aurutus

Abstract

Objectives/Goals
The test provided and was based on the idea that increasing temperatures of aquatic environments affect fish's abilities to survive. To replicate their environment for the particular situation, the fish were put through series of mazes in which they were motivated by a food stimulus at the end of the maze. The survivability of the fish was monitored to see the time it took to complete each maze with the designated temperature in relation with tests that have proven and validated the idea that aquatic temperatures will be increasing by three degrees Celsius over the next fifty years.

Methods/Materials
To analyze the data and incorporate the extensive research, five goldfish fish were at first conditioned with a classical conditioning process. They each lived in a contol tank where the temperature remained the same 21 degrees Celsius over the course of the test. They were then conditioned in the test tank without mazes to retrieve their food stimulus at the opposite end. After a week#s time, the fish were then placed through the testing mazes for three trials, with the temperatures increasing by three degrees Celsius, up to 30 degrees. Over the course of two weeks, the fish were tested in the mazes at the varying temperatures.

Results
Consistently through the course of the test, the fish proved to perform better and complete the mazes when the temperatures were higher. Conversely, when the temperatures were near the control group of 21 degrees Celsius, the fish moved significantly slower. The fish proved to possess the ability to be conditioned to understanding the presence of a stimulus, and also benefit from increased temperatures in their environment. The increased temperature speeds up the activity of the fish and their instinctual ability for survival.

Conclusions/Discussion
Overall, the goldfish respond to the increased temperatures by increasing speed of movements and effectiveness in judgment. Each fish went through the mazes at greater speeds when the temperatures were higher because they have a sensitive physiology that makes them highly vulnerable to their surroundings. The gills are sensitive to the water, and any change in the environment upsets the homeostasis. Therefore, to create balance, the fish increase movement and action to offset the increased temperatures. This response to a stimulus therefore shows favorable characteristics to a point where they can withstand the greater temperatures.

Summary Statement
The test demonstrates the global effects of rising temperatures in bodies of water on the ability of goldfish to obtain food and survive.

Help Received