

Effect of Oxygen Levels on Survival of Large Eye Chub



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Introduction

Large Eye Chubs are freshwater fish frequently inhabiting small bodies of water in the southeastern United States. Small bodies of water are sensitive to rapid changes in oxygen levels. If fish are transferred from a high to low concentration of oxygen, they may suffer Hypoxia: this is low oxygen content in the organism. Oxygen is required in aerobic organisms for respiration and generation of energy required for metabolic processes. "It is important in a wide range of biological processes, such as animal hibernation and cell survival, and is particularly relevant in many diseases. The sensitivity of cells and organisms to hypoxic injury varies widely, but the molecular basis for this variation is not completely understood (Anderson, Mao, Scott and Crowder)."

Hypotheses

1. A rapid and extreme change in oxygen levels will cause high mortality.
2. The fish will change colors and adapt to the environmental change.

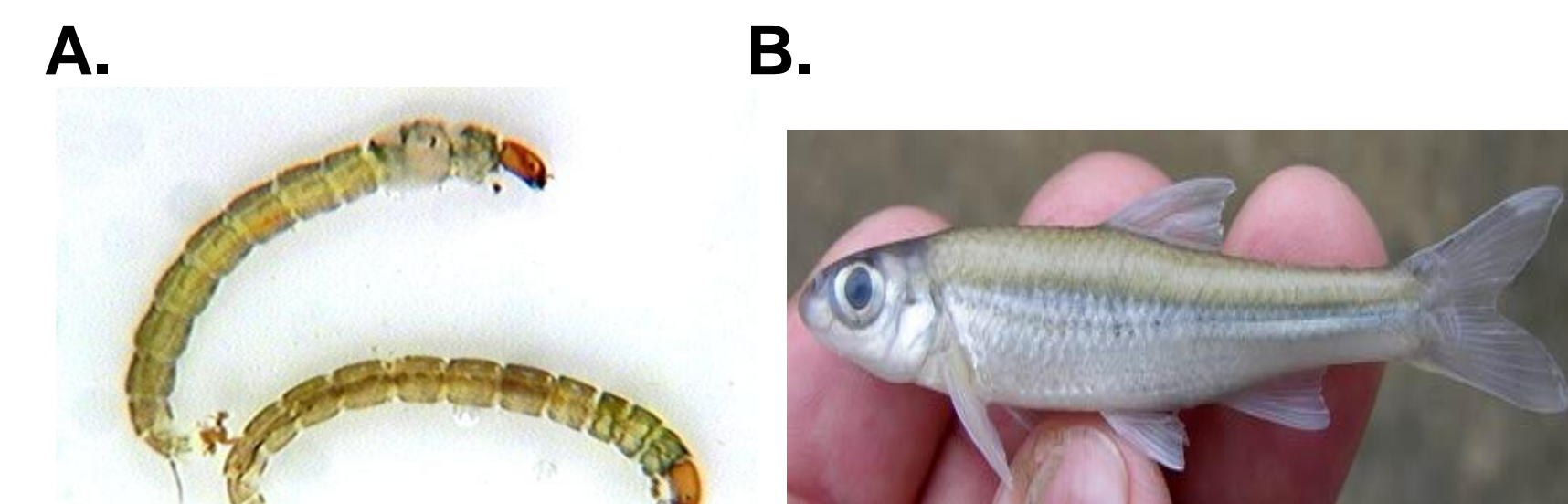


Figure 1. A. Chironomidae Larvae (Midge Larvae)
B. Large Eye Chub was collected at a creek at ECSU.

Objectives/Method

- High oxygen and low oxygen saturated creek water were prepared.
- 20 fish were collected and divided between nine dishes and divided in three groups (Control, High Oxygen, and Low Oxygen saturations)
- The fish were examined 3 times a day for 2 days.
- The vitality was determined by examination of vital signs.



Discussion

Midge larvae were the initial subject of this experiment. During sampling, gathering a sufficient number of the larvae was challenging. Therefore, as an alternative, Large Eye Chubs (fish) were collected because they were in abundant supply at the location. Shown in Figure 1, are both the larvae and the fish. The fish that were intended to be our side project became the main project objective. The purpose of this experiment was to determine effect of oxygen saturation in water on vitality of Large Eye Chubs. The data shown in figure 2 indicates that fish mortality was higher in low oxygen water. Observation during the experiment also showed that older fish were far more susceptible to stress induced mortality. This could be due to a high metabolic oxygen requirement for mature fish. The surviving fish seemed to have adapted to the low oxygen condition by producing more hemoglobin, causing them to turn red over time, Fig. 3. In conclusion, we have shown that the older Large Eye Chubs are susceptible to low oxygen induced death, and the young seemed to survive by expressing more hemoglobin for effective oxygen uptake in low oxygen conditions.

Acknowledgements

We would like to say thank you to the watershed watch for giving us this opportunity, to our mentor for being so helpful and patient with us, and to Jeff for helping us with the testing of the water.

References

Anderson LL, Mao X, Scott BA, Crowder CM. Survival from hypoxia in *C. elegans* by inactivation of aminoacyl-tRNA synthetases. 30 Jan 2009 web.9 Aug 2009.
<http://www.ncbi.nlm.nih.gov/pubmed/19179530?ordinalpos=3&itool=EntrezSystem2.PEntrez.Pubmed.ResultsPanel.Pubmed.DefaultReportPanel.Pubmed_RVDocSum>

Results

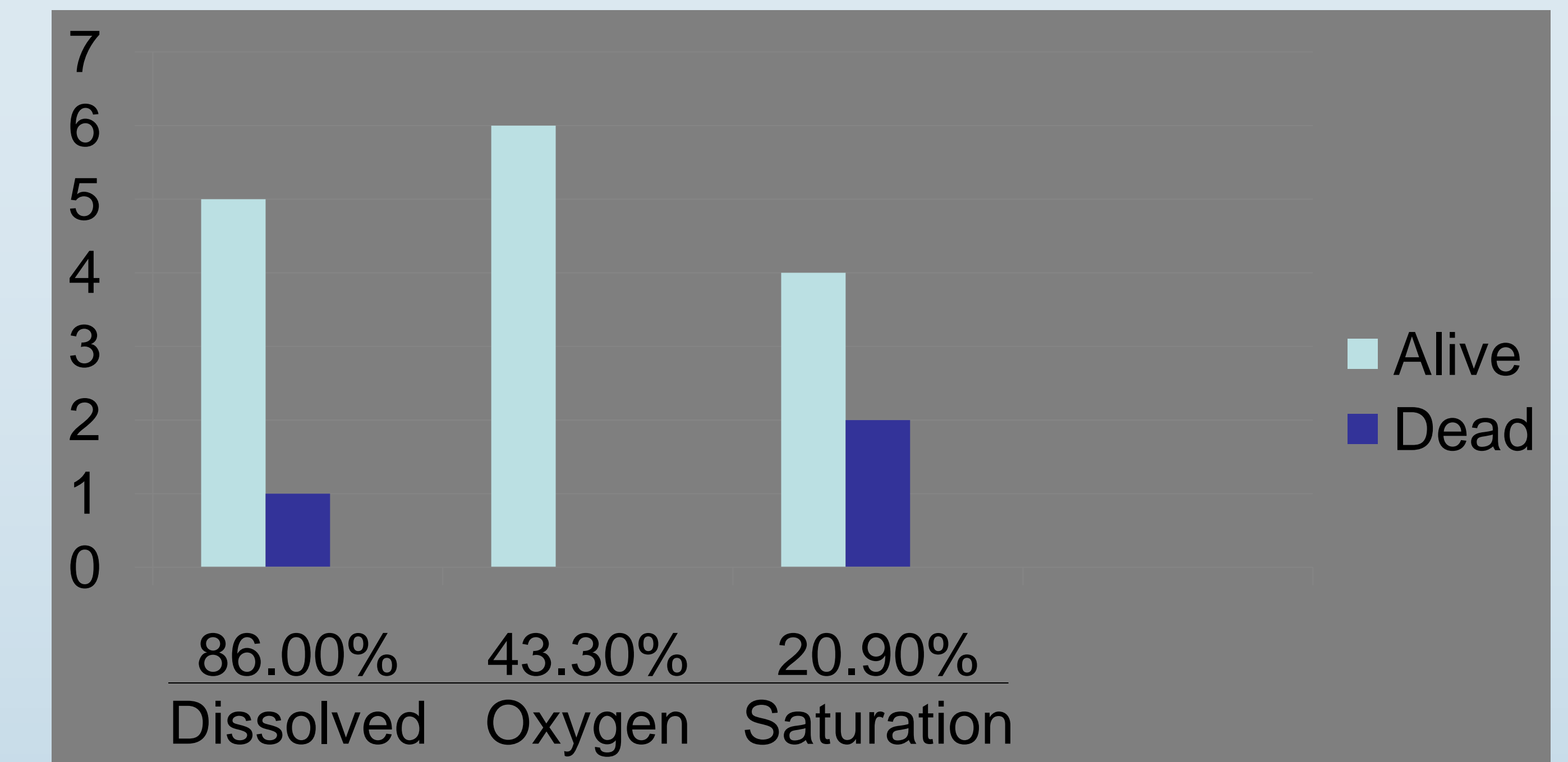


Figure 2.



Figure 3.

Low

High

Oxygen Saturation