**Abstract**

The purpose of this experiment was to see if lead exposure had an effect on fathead minnow reproduction. Using 2 tanks of fathead minnows, one containing a control group and the other containing lead, the secondary sex characteristics and behaviors were viewed. The findings proved that lead exposure causes more aggressive behaviors and developmental delays. There are many environments that contain lead that could possibly cause lead poisoning. It would be important for the people living there to know the risks.

**Introduction**

Humans and other life can be exposed to lead through the air, water, soil, and even dust. In human, lead poisoning can occur, especially to children living in older houses. Lead poisoning can cause developmental delays, abdominal pain, neurological changes and irritability. The National Institute of Environmental Health services noted, “High blood lead levels greater than 15 μg/dL are associated with cardiovascular effects, nerve disorders, decreased kidney function, and fertility problems, including delayed conception and adverse effects on sperm and semen, such as lower sperm counts and motility.” (NIEHS, 2016). These effects could be long term. If lead was exposed to humans at high levels it could even be deadly. In this experiment we tested the effects of lead on the sexual behaviors of male fathead minnows. Males prepare for mating by hovering, preparing the nest, chasing the females and patrolling the area. Females then spawn fractionally, meaning that they lay eggs over different time intervals. The effects waterborne lead on reproductive behaviors of fathead minnows, “Control males displayed maximum secondary sex characteristics developments (banding, tubercle formation, head and eye darkening); Lead exposed fish displayed less” (Weber 1). We predict that the amount of secondary sex behaviors of the lead-exposed fathead minnows will decrease because lead can cause developmental delays and neurological changes.

**Methods & Materials**

1. Set up experiment by obtaining two tanks with three pairs of fathead minnows (1 male and one female)

   Note* - One of these tanks should contain minnows that were exposed to lead nitrate for the two weeks prior to this study (1 ppm)

2. Observe a set of fish (randomly assigned which fish were viewed which day) for 5 minutes (only observing 3 a day), noting their sex characteristics and behaviors

3. Record the number of Nest preps, Hovers, patrols, chases, and spawns during the five minute period.

4. Continue to observe 3 pairs of fish a day for 7 days, every other day

5. After data is collected, find the average amount of times the male behaviors were viewed in each tank.

A limitation of this experiment of sample size. If we could have had a larger sample size we could have gathered more data which we could use to make our results more reliable. This data could be beneficial to anyone who lives near a place where lead poisoning is a possibility. It would be important for them to know the risks and what could happen to them by living in that environment.

**Discussion**

This data showed that aggressive behaviors and developmental delays are a result of lead poisoning. The data supported our hypothesis. We predicted that the amount of secondary sex behaviors of the lead-exposed fathead minnows will decrease because lead can cause developmental delays and neurological changes. Although it can not be proven that neurological changes have occurred, it is possible. From the data gathered, it can be proven that the secondary male sex characteristics were viewed less often in the lead exposed tank than the control tank.

**Results**

The independent variable of this experiment was the exposure to lead while the dependent variable was the characteristics and behaviors viewed. In the first graph shown, it is clear that the secondary male sex characteristics were behaviors of the lead-exposed fathead minnows were viewed more often in the control tanks than the lead exposed tanks. In the second graph the sex behaviors (hover, nest prep, spawn) were viewed most often in the control tanks while the aggressive behaviors (chase) were viewed most often in the lead exposed tanks.

**References**
