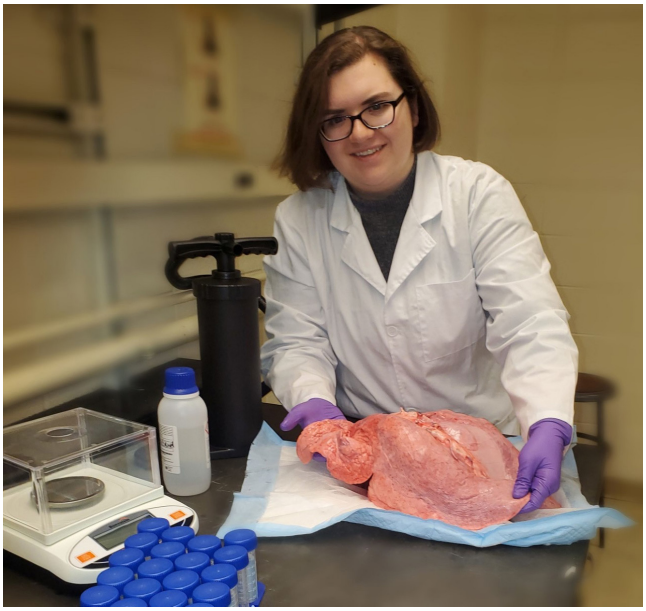


Researcher Holly Pickett makes initial visual examination of fresh pig lung tissue before placing it in preservation solution.

revealed the ability of the modified-release fixation component to prevent tissue degradation for an extended period of time, as demonstrated by the lack of microbial growth and retention of structural integrity. Furthermore, as expected, the concentration of the fixation component in solution displayed direct correlation with negative morphological effects. Further experimentation will focus on analyzing the effects of albumin, an osmotically active plasma protein, on the preservation of lung tissue samples, as well as using mechanical ventilation to measure the preservation solution's ability to retain lung tissue's elastic properties. Once developed, this preservation method can then be applied in the construction of functional anatomical models to be utilized in active learning environments to facilitate the intimate clinical connections between structure and function.

Research mentor Lisa Hilliard writes: "Holly's passion and commitment continues to drive this project's evolution and progress. Despite advancements, standard fixation yields poor portrayals of living morphology, inhibiting students' development of critical physiological understanding and diagnostic skills. Since tangible interactions with tissue models foster deep understanding and intellectual development, bridging this fixation-preservation gap is key."

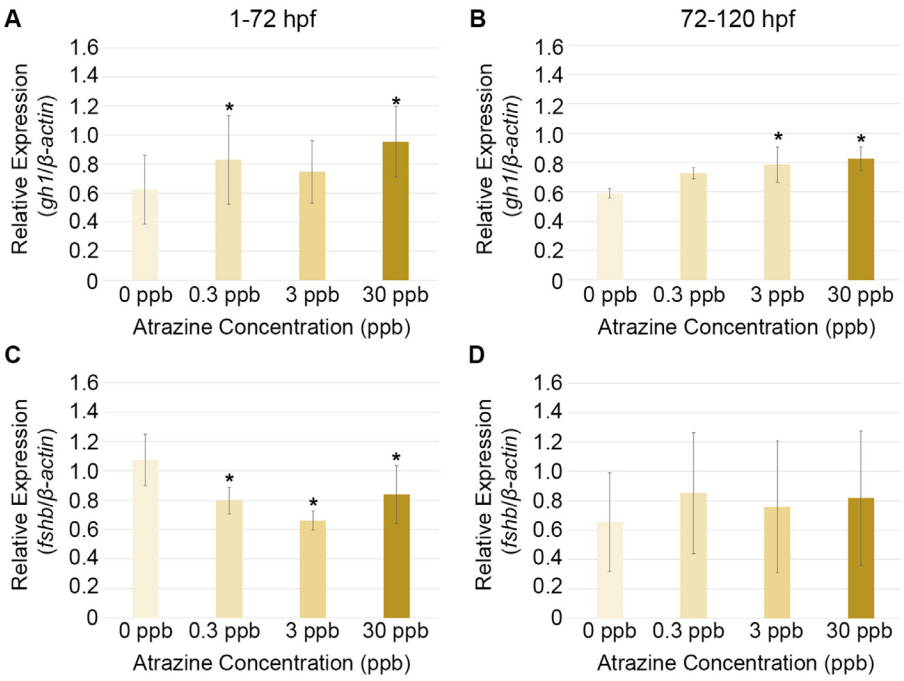
Comparing Effects of Atrazine Exposure on Neuroendocrine Molecular Targets at Two Developmental Exposure Periods in the Zebrafish

Student researcher: *Jenna Swihart, Senior*

Atrazine is an herbicide commonly applied to control broadleaf and grassy weeds in agricultural regions of the United States. Although its use was banned by the European Union in 2003 because of surface and groundwater contamination risk, the U.S. EPA allows for a 3 ppb maximum contaminant level for drinking water. Atrazine is a known endocrine-disrupting chemical with the potential to cause adverse effects at the hormonal and molecular level in neuroendocrine system pathways; however, the mechanism causing dysregulation following atrazine exposure has yet to be determined. In this study, hypothalamic and pituitary molecular targets were investigated to explain a mechanism for the negative endocrine axes impacts. Selection of gene targets was based upon common neuroendocrine hormones that have been reported in literature to be dysregulated following atrazine exposure in various models. Embryos were collected from adult wild type zebrafish and randomly assigned to 0, 0.3, 3, or 30 ppb (μg/L) atrazine treatment. For one timepoint, exposure began at 1 hour post fertilization (1 hpf) and continued until the end of embryogenesis (72 hpf). Another timepoint focusing on the larval stage began atrazine exposure at 72 hpf and ended at 120 hpf. After exposure was ceased, RNA was isolated, cDNA was synthesized, and qPCR assessed one hypothalamic target (*gnrh*) and three pituitary targets (*gh1, fshb, lhb*). Using an analysis of variance (ANOVA, $\alpha = 0.05$), four to six biological replicates were statistically compared. At both timepoints *gh1* displayed alterations in relative gene expression, while *fshb* was only changed at 72 hpf. There were no changes in relative gene expression at 1–72 hpf or 72–120 hpf for *gnrh* and *lhb*.

Research advisor Jennifer Freeman writes: "Jenna's research project is evaluating if there is specificity for when certain neuroendocrine genes have altered expression during development. Her findings report gene-specific and developmental time period–specific changes, providing information on key developmental timing of molecular alterations from the atrazine exposure."

https://doi.org/10.7771/2158-4052.1648



*Expression of one hypothalamic gene (*gnrh*) and three pituitary genes (*gh1*, *fshb*, and* lhb*) was assessed following atrazine exposure in the zebrafish during two different developmental periods.* gh1 *expression was increased in the 0.3 and 30 ppb treatment groups at 72 hpf (A) and in the 3 and 30 ppb treatment groups at 120 hpf (B).* fshb *expression was decreased in all three atrazine treatment groups at 72 hpf (C), while no differences were observed at 120 hpf (D). No changes in expression were seen for* gnrh *or* lhb *at either time point (data not shown). N = 4–6 replicates (pools of 40 zebrafish). Error bars are standard deviation. *p < 0.05 compared to 0 ppb negative control treatment.*

LIBERAL ARTS

Monitoring of Caucasus Heritage Sites Facing Cultural Genocide

Student researcher: *Peyton Edelbrock, Junior*

In 2020, the Second Nagorno-Karabakh War broke out between Azerbaijan and Armenia over the disputed area of Nagorno-Karabakh. The outcome of this war included the transfer of several provinces previously under de facto Armenian control to Azerbaijani jurisdiction, including hundreds of Armenian heritage sites under a Russian-brokered ceasefire agreement.

The transfer of centuries-old heritage properties leaves them vulnerable to the Azerbaijani government's expressed threat to erase Armenia's historical presence in the region by marking their monuments as either nonexistent or reinscribing them as "Caucasian Albanian" instead of Armenian. In response to this heightened threat, the nonprofit and nonpartisan organization Caucasus Heritage Watch was created by a team of archaeologists from Cornell and Purdue Universities, including Professor Ian Lindsay of Purdue's Department of Anthropology. This project utilizes the intersection of technology and archaeology to monitor heritage sites to document the destruction happening to Armenian culture. Through the Caucasus Heritage Watch, we use high-resolution satellite imagery in a GIS (geographic information system) program called ArcGIS Pro to monitor over 270 heritage sites over an area of 12,000 kilometers in Nagorno-Karabakh. These historical sites include churches, monasteries, mosques, bridges, and cemeteries. We task satellites to take images on a seasonal cycle and assess whether a location is threatened, damaged, or destroyed. Through this project, our goal to use our discoveries to hold those seeking to destroy Armenian heritage sites within the region