Investigating the Rapid Effects of Testosterone on Olfactory Processes in *Carassius Auratus*
Emma Kane, Class of 2018

Project Summary:

I investigated the role of testosterone on olfactory processing in the common goldfish. Traditionally, steroid hormones like testosterone were believed to work genomically, by moving through cell membranes and affecting gene transcription. However, testosterone can also work rapidly by binding to membrane-bound receptors, which can cause rapid changes in behavior.

These rapid modulations likely come into play naturally in the context of mating, because it is a relatively quick process. In goldfish mating, female goldfish release the pre-ovulatory pheromone 12 hours prior to ovulation. In response, male goldfish produce a spike in testosterone. During ovulation, fem -
which increase courtship behavior in male goldfish.

Previous research suggests that these rapid increases in testosterone may affect the olfactory processing of a goldfish. Male goldfish spend significantly more time near a pump releasing large volumes of ished data, Massa, 2014). Additionally, goldfish injected with testosterone just prior to testing spent more time near the source of the pheromone than did fish injected with a vehicle.

This summer, I sought to study attractive0 G1 ET0 q0.000009 2 0 612 792 reW BT

+ FAD (p=0.87). This is unsurprising, as research conducted outside of the breeding season typically yields inconclusive results. I intend to rerun this experiment in the spring when the fish are milting and in the breeding season.

In addition to these behavioral studies, I also intend to study neural activity using immunohistochemistry. I collected brains from goldfish that were isolated and put into water with 15-keto -arginine, and an ethanol control. By staining these brains with indicators of cell activity, pERK and ps6, I will be able to detect differences in cell activity between fish treated with pheromone, amino acid, and control. This will allow me to detect the neural pathways associated with olfaction. Additionally, the brains from the behaviwit , th16(h1s1 0 0 1)23(r)-7(a16(h1)8 (d)23(i)-16(t)5(i)-.h1)8 (d)23(i)