Aversive Conditioning and Scent Discrimination in the Green Crab (Carcinus maenas)

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In the Northwest Atlantic, green crabs have decimated shellfish and eelgrass populations since the 1800s. This resulted in a decline in the fishing industry. Green crabs use their acute sense of smell to track or locate their next meal. They also have chemoreceptors on their antennae that enable them to identify chemicals in the water and sense their environment. Green crabs can be conditioned to go against their natural behavior by a reward, or penalty. The purpose of our project was to see if we could aversively condition green crabs to avoid a scent, and still recognize the conditioned scent once it was presented with other scents. During the preconditioning, each crab was introduced to four scents five times in a random order (bunker, shrimp, clam and bluefish). The crabs then transitioned to a conditioning phase where they were only presented with one scent, followed by the introduction of a pseudo-predator which was rapidly moved around the crab to disturb it. The final phase was post-conditioning, where the crabs were introduced each of the four scents again, in random order to see if they reacted aversively to the conditioned scent while having non-aversive behaviors towards the other scents. The results showed that the crabs conditioned to the clam had the best retention rate (90% aversive reaction) while those conditioned to shrimp had the worst retention rate (70% aversive reaction). The crabs were able to reverse their innate behavior because they avoided the shellfish. Green crabs can aversively condition to and discriminate between scents. Through the use of conditioning, green crabs are able to get trained to avoid shellfish.

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):

   ☐ human participants   ☐ potentially hazardous biological agents

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2. I/we worked or used equipment in a regulated research institution or industrial setting: ☐ Yes   ■ No

3. This project is a continuation of previous research.   ☐ Yes   ■ No

4. My display board includes non-published photographs/visual depictions of humans (other than myself):   ☐ Yes   ■ No

5. This abstract describes only procedures performed by me/us, reflects my/our own independent research, and represents one year's work only   ■ Yes   ☐ No

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