CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Lindsey S. Gosselin

Project Number
S0308

Project Title
The Effects of Classical/Pavlovian Conditioning on Dionaea muscipula

Abstract

Objectives/Goals
The purpose of this experiment was to determine if conditioning, a process usually believed to require though, could be done on organisms with no cognitive ability. Conditioning, or at least Pavlovian conditioning, is simply the linking of two stimuli for an organism, so that eventually it will react the same way to both. It is possible, however that this logic linking process is actually simple chemical adaptation - organisms can adjust to differing situations, to a point.

Methods/Materials
Dionaea muscipula, as a plant, has no brain with which to perform cognitive processes. Its quick reaction to stimulating its traps made it desirable; I wanted to be able to see with some certainty what stimulus caused what reaction. I managed to locate enough plants from the same source, and I set them up in a container with all they needed to grow healthily - proper water amounts, humitity, etc. - information a garnered from earlier research.
I conditioned the experimental subjects by exposing them briefly to a high-temperature heat source for 90 seconds, then quickly activating their trigger hairs with tweezers and a cricket. Two control specimen were heated, but fed randomly, and two were not heated.
Later I tested the effects of the conditioning by exposing all of the subjects to the heat source (without stimulating the hairs afterwards) and observing the result.

Results
When the test of conditioning was performed on the plants, there seemed to be no effect. The subjects (experimental and control) did not appear to react to the heat stimulus. One specimen (#4, heated control) did close one trap, but I believe this was triggered accidentally while being moved. One observation I made, however, was that the experimental plants appeared to close more quickly, when they were stimulated later after heat exposure, than did the controls.

Conclusions/Discussion
The test of the effects of conditioning did not support the idea of conditioning being possible in organisms that cannot think. However, one detail, the quicker closing speed of the conditioned plants, wants further testing. Far more rounds of conditioning will be needed to give strong support to the idea that conditioning does not require cognitive processes. As it stands now, the idea appears to be incorrect. But the differing speeds of these plants reactions after conditioning certainly leave the possibility open.

Summary Statement
This experiment tested the concept of using Pavlovian conditioning to associate a temperature stimulus to

Help Received
My parents helped to procure the plants I needed, and pay for the materials I did not have.