STUDENT EXPERIMENT PROJECT: NUMBER OF CLOSURES OF *DIONAEA MUSCIPULA* LEAVES

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Introduction

When stimulated, a trigger hair on the leaf of *Dionaea muscipula* sends an electric signal that results in leaf closure. The details of the mechanism are not well understood. In order to learn more about this process, I studied 43 traps of fifteen *Dionaea muscipula* plants over ten weeks. My goal was to learn how many times a trap could be induced to close. I have been told that the flytraps close about 7-12 times before becoming immobile (Sandoval, pers. comm.). Similarly Schnell (2002) says that each trap can handle 8-10 "nonfeeding closures" and three to four digestion processes. I wanted to test this. Accurate information on the persistence of traps under repeated stimulation would be useful for us at the University of California, because our plants are frequently poked by the public.

Method

For this experiment, I used fifteen healthy plants (including regular clones as well as specimens of *Dionaea* 'Dentate Traps' and *Dionaea* 'Jaws'). The plants were placed in a netted environment. The plants were given sufficient time to produce new traps, and only these new and previously untriggered traps were used in the experiment. The plants were grown in an environment that was previously shown to be ideal for *Dionaea* growth (in trays in full sun—although the netting gave some shading).

The traps were stimulated to close by lightly touching the trigger hairs inside the trap two or more times with a toothpick. Only traps sufficiently widely open (i.e. with the marginal teeth not overlapping) were stimulated—for the cases where the traps were not completely open, they were passed over to give them additional time to reset. The length of each trap lobe (excluding marginal teeth) was measured with a ruler from its sides at the widest part.

Results

I found that traps could be stimulated to close on average 12.1±4.0 times. I found no significant relationship of trap closure number with trap size. Older traps often required more than two stimulations in order to react, and even then they did not always close completely (or subsequently reopen). It appears that either traps can be triggered to close a little more frequently than usually stated, or we are simply growing our plants very well!

Upon reflection, I wonder if the fact that I waited only 24 hours after the traps opened, before I re-stimulated them, may have inflated the number of times that I measured the traps can be triggered to close. Darwin (1896) noted that *Dionaea* finishes two thirds of its post-triggering "re-expansion" in 24 hours, but requires 32 hours to completely reset. Perhaps my experiment should allow more than 24 hours between triggering. As a result of triggering too early, the experiment may have generated high data values. Waiting longer between triggerings will be an interesting experiment to try next.

Testing the endurance for flytraps to go through the entire digestion process (which takes about a week) is another possible experiment.

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