

## CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Nomo(s)	Project Number
Isaian L.D. O'Neal	
Project Title	
Plant Electrophysiology: How Does the Stimulation of Trigger Hairs	
Objectives/Goals Abstract	
This study examined the effect of trigger hair stimulation on the generation	of action of the state of the s
relationship to trap closure in a B52 Venus Flytrap (Dionea Muscipula).	vanted to confirm that one
stimulation of a trigger hair resulted in the generation of one action potentia	Additionally, two action
potentials must reach the midrib within a certain period of time to initiate the	op closure, but different
scientists claim different durations ranging from 20 to 40 seconds and I wa	inted to narrow down that
range. Finally, I wanted to see what affect multiple, almost simultaneous, s	timulations had upon action
potential generation and trap closure.	7
Methods/Materials	
B52 Venus Flytraps were germinated from seed and grown for two years H	Each trap was connected via
electrode gel to an Arduino board with a Plant SpikerShield, which was con	nnected to a computer. Action
potentials were gathered and recorded in the Processing 2 programming lar	iguage using a plant processing
sketch. Ingger hair stimulation was controlled using a linear actuator. The	experiment was recorded with
S cameras, (one running at 240rps) in order to verify and accurate results.	
It was found that one trigger hair stimulation resulted in on action potential. However, it was discovered	
that when two stimulations occurred within 0.229 seconds of each other, only one action potential was	
generated. Additionally, it was confirmed that two action potentials within 20 seconds of each other	
closed a trap, except in the special case noted above. Traps also closed intermittently up to 42 seconds	
between action potentials, suggesting that a trap begins to lose its charge after 20 seconds, and loses its	
charge completely after 42 seconds	
Conclusions/Discussion	
For the next step, a better knowledge of calculus and chemistry would be re-	equired to investigate the
decisive moment just before tran closure, in which there occurs a myriad of chemical and physical events	
that are beyond my skill set to evaluate. However, I would like to investigate how the flytrap uses its	
properties as an electrical storage vallery. In biolechnology, this knowledge could help scientists create	
a similar battery of operate a uncrocontroller in plants. Understanding no	w all plants use electricity
electronic communication and real time feedback from crops	focuers and open new forms of
electronic communication and rear time recuback from crops.	
Summary Statement	
This stury examined the effect of trigger hair stimulation on the generation	of action potentials and their
relationship to trap glosure in a B52 Venus Flytrap.	r
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Help Received	
Doug Foster from LA Biohackers answered questions about modifying the SpikerShield circuitry and	
Timothy Marzullo from Backyard Brains answered questions about software and hardware.	