Warren J. Baker Endowment
for Excellence in Project-Based Learning
Robert D. Koob Endowment *for Student Success*

FINAL REPORT

Final reports will be published on the Cal Poly Digital Commons website (http://digitalcommons.calpoly.edu).

I. Project Title

Effects of Food Consumption on Neurogenesis in juvenile *Python Regius*

II. Project Completion Date

December 2016

III. Student(s), Department(s), and Major(s)

(1) Stacy Habroun
(2) Biology Department
(3) Master of Science Candidate, Biology

IV. Faculty Advisor and Department

Christy Strand, Biological Sciences

V. Cooperating Industry, Agency, Non-Profit, or University Organization(s)

California Polytechnic State University, San Luis Obispo

VI. Executive Summary

Neurogenesis is an important and vastly unexplored area in reptiles. While the ability to generate new brain cells in the adult mammalian brain is limited, reptiles are able to regenerate large populations of neuronal cells. What makes pythons a particularly interesting subject in this field is their characteristic specific dynamic action (SDA) response after food intake with an increase in metabolic rate in order to process the meal. Further, they exhibit impressive plasticity in their digestive and cardiovascular physiology due to the sheer magnitude of the increase in organ growth that occurs after a meal to allow digestion and to absorb and assimilate nutrients from it. While this systemic growth in response to food consumption is well documented, what is happening in the brain is currently unexplored. For this study, juvenile male ball pythons (*Python regius)* were used to test the hypothesis that postprandial neurogenesis is associated with food consumption. We used the thymidine analog 5-bromo-12'-deoxyuridine to quantify and compare cell proliferation in the brain of fasted snakes and at two and six days after a meal: during and after the SDA response, respectively. In all groups the retrobulbar and olfactory regions had the highest numbers of proliferating cells, consistent with other reptile species. Throughout the telencephalon, cell proliferation was significantly greater in the six-day group, with no difference between the two-day group and controls. Most postprandial systemic plasticity occurs within a day or two after a meal and decreases after digestion, however, the brain displays the opposite result, with a surge of

cell proliferation after most of the digestion and absorption is complete. Our results support our hypothesis and indicate that food consumption does affect neurogenesis, increasing cell proliferation at specific time points after a meal.

VII. Major Accomplishments

(1) In large thanks to this generous grant, I was able to have the funds to complete my project for my Master's thesis and am working on my future graduate defense presentation. This project was my first independent research endeavor where I was able to design my own project, carry out an experiment, and obtain exciting results in an area that I am interested in.

(2) I am in the process of writing a paper for publication based on this project, where I can share my research to others in this same area so that further study in this area can be understood and continued in the future.

(3) I will be presenting my findings at my first international research conference in Canada in June: the 18th International Congress for Comparative Endocrinology, where I will be sharing my results with a wider scientific audience in my field.

VIII. Expenditure of Funds

This grant has been to used to help in the purchase of research supplies and solutions as well as towards conference travel funds for my project. I used much of these funds to purchase the reagents needed for the immunohistochemistry work done on the python brain tissue collected. I also used these funds to purchase out-of-state travel items towards the conference I will be attending in June, including the meeting registration and airfare.

IX. Impact on Student Learning

This project is the first research that I have carried out and completed independently and at the graduate level. I have been able to design and complete my first graduate experiment, collect and interpret data, and analyze my own results as an M.S. student. I will also soon be presenting this information at an international conference. This conference will be the first opportunity for me to present my results to other experts in this field. This particular conference is unique and important because it is a joint meeting between multiple societies, including the International Symposium on Reptile Endocrinology and Neurobiology, the North American Society for Comparative Endocrinology, and the International Congress of Comparative Endocrinology. This will give me the opportunity to not only communicate my research to others in my field, but also to learn from other students and advisors who may be able to give me insight into future projects surrounding this research. Furthermore, through the data collection from my project, I can open an opportunity for undergraduates to build on this project by using resources from my research to expand on their own future project. Overall, this project has allowed me to learn many different lab techniques as well as organizational and planning tasks necessary in scientific research that I will need for a future in this field, whether it be academic or in industry.