

FIRST PERSON

First Person – Patrick Cunningham

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Patrick Cunningham is the first author on 'Neurodegeneration and locomotor dysfunction in *Drosophila scarlet* mutants', published in Journal of Cell Science. Patrick is a PhD student in the lab of Daniel T. Babcock at Lehigh University, Bethlehem, PA, investigating the loss of dopaminergic neurons in *Drosophila* in a model for Parkinson's disease.

How would you explain the main findings of your paper in lay terms?

Parkinson's disease (PD) is characterized by the progressive loss of dopaminergic (DA) neurons, which leads to impairment in movement coordination. Identification of genes that underlie the loss of these neurons is important to understand how the disease functions. We found that the fruit fly mutant *scarlet*, commonly associated with a bright red eye color, showed progressive DA neuron loss that was accompanied by impaired movement coordination. A mutation causes errors in the protein that is associated with a specific gene; in other words, the *scarlet* mutant has a dysfunctional Scarlet protein. In order to understand what role the Scarlet protein has in the loss of DA neurons, we added the protein to a known model of PD. The addition of the Scarlet protein showed a neuroprotective function by preventing the loss of DA neurons and maintaining movement coordination.

Were there any specific challenges associated with this project? If so, how did you overcome them?

I took up the project when I had decided to stay in the lab after my four-month rotation project during my first year of graduate school. I had never worked with fruit flies before joining the lab, so a lot of the terminology, genetic manipulations and techniques were still somewhat new and I was still trying to master various aspects of the lab. I had to dig into the literature and work extensively with my mentor in order to learn the history of *scarlet* and how to effectively use the fruit fly as a model organism.

When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?

When I was looking at the rescue experiment to see if Scarlet was neuroprotective in a Parkinson's disease model I counted the dopaminergic neurons, and, in brain after brain, I saw that they survived. This was amazing to observe, because the experiment demonstrated that Scarlet was sufficient in preventing dopaminergic neuron loss, suggesting a neuroprotective function. Showing the neuroprotective property of Scarlet really stuck with me, because it was my first experience that what we do in lab can be directly applied to a disease.

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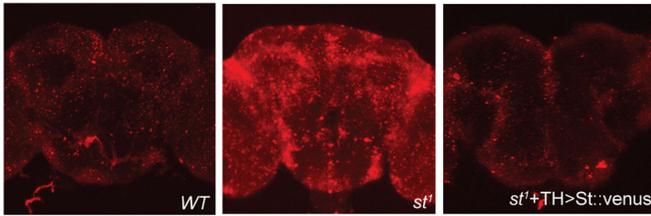
Have you had any significant mentors, and how have they helped you?

My undergrad mentor, Benedict Kolber, is responsible for me being in the field of biology. I went to Duquesne University with the intention of getting a pharmacy degree, but during my third year in the program I realized it wasn't the career for me. I always wanted to do research with the degree anyway, so I started to contact various faculty members. Dr Kolber was the one who made me feel comfortable making this big life decision. I changed programs, and soon after he offered me a position in his lab for my last year of undergrad. Through his mentorship, he taught me various aspects in the field of neuroscience, and helped me every step of the way in applying to graduate school. Now I am at Lehigh University and I have another fantastic mentor, Daniel Babcock, who has helped me progress in my graduate development, and has really made me see and understand science in multiple ways. Under his supervision, I am going to continue to grow as an independent scientist throughout my graduate career.

"The best advice I can give is to do at least two rotations before you pick your lab."

What's the most important piece of advice you would give first-year PhD students?

The best advice I can give is to do at least two rotations before you pick your lab. The mentor-student relationship is incredibly important in PhD school, since you'll be working with this person for 5+ years. You may love the research topics, but maybe the lab dynamic or how you interact with your mentor just isn't for you. The only way to know this is if you do a second rotation to try out a different lab dynamic. Perhaps that one feels more comfortable to you, perhaps not, but you'll only know if you try.



Drosophila brains stained with 2',7'-dichlorofluorescein (H2DCF) dye in order to measure reactive oxygen species (ROS) production. From left to right: wild-type, *scarlet* mutant, and *scarlet* mutant with the addition of the Scarlet protein

Tell us something interesting about yourself that wouldn't be on your CV

My favorite hobby is playing 'Magic: the Gathering' card games. I play the game extensively, and enjoy going to high-end tournaments to improve my skills. My absolute favorite card deck is 'modern Jund'.

Reference

Cunningham, P. C., Waldeck, K., Ganetzky, B. and Babcock, D. T. (2018). Neurodegeneration and locomotor dysfunction in *Drosophila* scarlet mutants. *J. Cell Sci.* **131**, jcs216697.