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FIRST PERSON

First person – Brian Hercyk

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. Brian Hercyk is first author on 'A novel interplay between GEFs orchestrates Cdc42 activity during cell polarity and cytokinesis in fission yeast', published in JCS. Brian is a Ph.D. student in the lab of Maitreyi Das at University of Tennessee-Knoxville, investigating how the cell can repurpose common regulatory patterns to control diverse signaling pathways.

Brian Hercyk

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

A central tenet in biology is that cell shape drives cell function. The process of polarized growth gives rise to the diverse shapes that cells need to function properly. One crucial question in biology is how a cell knows what region to polarize and grow from, and how to prevent growth at other sites. Polarized growth is driven through the establishment of positive feedback. My research defines how this positive feedback is initiated. The protein Cdc42 undergoes positive feedback and is required for polarized growth. We find that the proteins Gef1 and Scd1 activate Cdc42, and mutually regulate each other. Although Scd1 is a component of the positive-feedback loop, it does not act alone. Rather, it requires Gef1 to choose a polarization site and trigger the Scd1-dependent positive-feedback loop.

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

Analyzing the function of Gef1 in polarized growth was the most challenging aspect of this paper, as Gef1 cannot be easily seen at sites of polarized growth. I overcame this issue by probing its function during cell division, where it prominently localizes to the actomyosin ring and regulates the same proteins involved in cell polarity. This enabled me to make and test assumptions regarding its role in polarized growth. Another significant challenge I encountered was the odd behavior of Scd1. I originally studied the localization of this protein fused to a 3×GFP tag, which produced erroneous data because this bulky tag changed the mobility and behavior of the protein. Luckily, our lab technician Ahmad Mitoubsi was able to make two other tagged versions of this protein that behaved normally.

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

Two such results stand out. The first was my finding that correct cell shape depends on crosstalk between the Cdc42 GEFs. This was really unexpected because this type of regulation had never been observed before! The second was my finding that this crosstalk also occurs at the division site. Because cell growth and division are physiologically distinct cellular programs, I assumed Cdc42 would be regulated in a fundamentally different manner to suit each of these processes. However, instead of creating new ways to regulate Cdc42, it found a way to fit this intrinsic regulatory pattern into other processes that require Cdc42 activity (very smart cell)!

Why did you choose Journal of Cell Science for your paper?

I have always enjoyed reading papers in Journal of Cell Science. Some of the key papers in my field are published here. Moreover, this year my lab partner published a research article in the Journal of Cell Science, and we were very satisfied with the rigor of the peer-review process and the swift handling of the manuscript. Thus, our decision to submit to JCS was a no-brainer.

Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?

The mentorship of my PI, Maitreyi Das, extends far beyond the laboratory. She is truly insightful and frequently includes me in her brainstorming sessions. These sessions are part of the way she molds her students into independent scientists, by covertly making us think logically to answer her questions. Furthermore, Maitreyi is invested in the happiness and professional development of all her students. She gives me the opportunity to attend many conferences where I am able to present my research and talk with the leading scientists in my field. This has given me confidence as a scientist and has improved my communication skills. Finally, she provides us with lab snacks!

What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?

My passion for science was instilled by my grade school science teacher Mr. Sharon. However, I did not realize how much I enjoyed science until much later. After high school I decided to enter the Catholic seminary to become a priest. It was there that I realized

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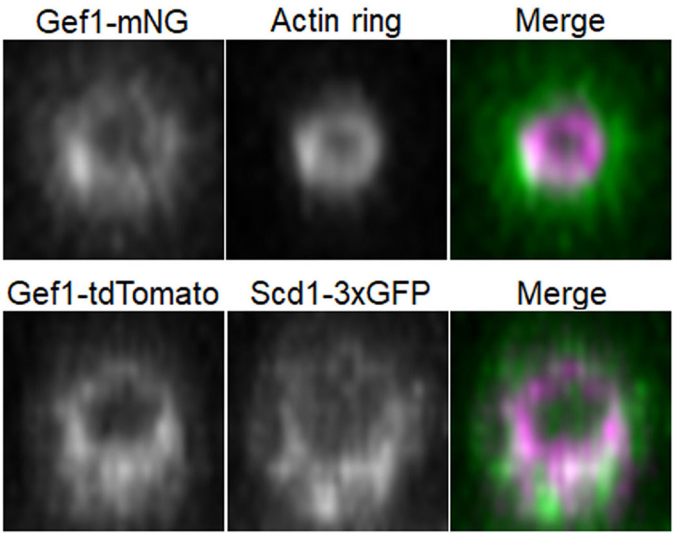

Follow the leader. First, Gef1 localizes adjacent to the actomyosin ring to activate Cdc42, thus promoting Scd1 localization to the ingressing membrane, as observed in 3D-reconstructed images of the division site in fission yeast.

I was the type of person who needs answers, and who digs deeper into a question rather than accept it on faith. While these qualities make a poor seminarian, they have served me well as a scientist.

Who are your role models in science? Why?

Oddly enough, my scientific role model is an actor! Alan Alda starred in my favorite television program, and is now a science advocate. When I watch Alan's science communication workshops or listen to his interviews, I am always captivated by his childlike joy for learning, as this is the same attitude that I try to bring to my own research. I am overly excited when I figure something out or see something cool under the microscope. The sense of discovery and joy I feel during these moments is what science is all about.

What's next for you?

I recently defended my dissertation but have not yet graduated, which leaves me with an identity crisis (Dr Hercyk or Mr Hercyk?). I want to stay in academia, and I am currently looking for post-doctoral positions. If anyone needs a cell biologist who is passionate about the regulation of signaling pathways, I would love to hear from you!

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

I am owned by two dogs. They occasionally let me go fishing, do woodworking projects or read books in the little free time I have when I am not in lab or being forced to go for a walk or scratch ears.

Any advice you would like to give graduate students beginning their PhD?

You should begin by finding the appropriate mentor for YOU. The style that works for your colleague may not be a good fit for you. I found a great PI who adopts the appropriate style for each of her students.

Read the relevant literature; as you become familiar with your topic, you will ask more insightful and testable questions. Learn how to manage your time and plan your experiments. Identify the most direct test that will disprove your hypothesis. You will save a lot of time by doing this first, rather than doing several cool and elegant experiments that ultimately fail if your hypothesis is wrong. Finally, learn when to say no. Maintaining a good work-life balance will increase your productivity in the long run.

Reference

Hercyk, B. S., Rich-Robinson, J., Mitoubsi, A. S., Harrell, M. A. and Das, M. E. (2019). A novel interplay between GEFs orchestrates Cdc42 activity during cell polarity and cytokinesis in fission yeast. *J. Cell Sci.* **132**, 236018. doi:10.1242/jcs.236018