How would you explain the main findings of your paper in lay terms?
Most cells contain tiny cylindrical structures called centrioles. The centrioles are surrounded by a cloud of many proteins called the pericentriolar material (PCM), which grows as cells prepare to divide. Having the wrong number of centrioles or not enough PCM accumulated around them can lead to issues during cell division, particularly in cells that divide quickly, such as cancer cells.

In this paper, we used fruit fly embryos (which also divide very quickly) to study how centrioles organize the right amount of PCM around themselves. We mutated several proteins located in centrioles and found that one of them (Ana1) helps recruit a crucial regulator of cell division (Polo) to centrioles. We identified the region of Ana1 that binds to Polo, and we mutated it so that Ana1 could do all its other known functions in centrioles, except for recruiting Polo. A few centrioles with mutant Ana1 were able to inefficiently accumulate a little bit of Polo over time and maintain a small PCM, but most of them could not recruit any PCM at all. This had catastrophic effects on cell division, and the embryos failed to develop into adult flies. Additionally, we were surprised to find that in fly cells that normally have long centrioles, losing Ana1-mediated Polo recruitment resulted in much shorter centrioles, but why this happens is still a mystery.

Were there any specific challenges associated with this project? If so, how did you overcome them?
The effect of the ana1 mutations in vivo was always very clear but trying to study whether there was a direct interaction in vitro was quite challenging. Most of my PhD had been devoted to microscopy and in vivo experiments, and I had little to no experience producing and working with a recombinant protein. Canonical Polo binding requires the binding partner to be phosphorylated, so we also had to account for this in our in vitro assay. On top of that, the assay was originally set up for a different project, studying Polo binding to another protein (Spd-2). Because every protein is different, after optimizing the protocol I had to re-work it yet again for Ana1, and when I thought I almost had it, the COVID-19 pandemic hit and we couldn’t go to the lab for some time.

Luckily, I was in a really supportive environment where I could find all the help and encouragement I needed. The other key element to success was finding the right balance between perseverance (to keep going when the experiment was not working) and willingness to change (to look for alternatives instead of getting trapped in protocols that were going nowhere).

When doing the research, did you have a particular result or ‘eureka’ moment that has stuck with you?
I vividly remember injecting the mRNAs for our Polo recruiters screen and noticing that the results for Ana1 were different from all the other candidates. I opened the images on the computer and several lab members congregated in front of the screen. We were all very excited to see that Polo was completely missing from young centrosomes, and Jordan said we should expand the same approach (mutating all the potential Polo binding sites) to more proteins!

Why did you choose Journal of Cell Science for your paper?
Everyone involved in the decision holds Journal of Cell Science in great esteem. We value it as a journal that consistently publishes great quality science and implements a transparent and fair review process. We also felt that JCS could help our work reach a wide and diverse audience beyond our immediate field of centrosome biology, and we appreciate everything that The Company of Biologists does for the betterment of the biological community. On a personal note, it was very important to me to publish our work in a journal committed to Open Access practices.

Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?
Both my PhD lab and my current lab have been full of very nice people that have helped me along the way, but I will try to limit...
myself to just three, all of them postdocs. Zsofia Novak took me under her wing when I joined my PhD lab as a rotation student, and her ideas really shaped what would become my project. She is really thorough and mindful in every aspect of her science, from the way she designs experiments to her mentorship and care for others in the lab, which was a huge advantage for me when I started my PhD. Alan Wainman was a constant source of knowledge about microscopy and centrosome biology, he gave very useful feedback when preparing manuscripts for submission and was instrumental in getting this paper out, especially once I left the Raff lab to start my postdoc. Finally, in the Vincent lab, Ian McGough has gone out of his way to help me adjust to the postdoc life and my new project, and he has given me lots of valuable career advice.

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?
When I was very little my father used to joke that I was a clone of my mum “like Dolly the sheep”, and I think that is what sparked my interest in biology! Along the way I was motivated by curiosity about the world that surrounds me; and once I was able to study cells in detail, I was fascinated by the way they work. There is real beauty in processes like mitosis, and I feel so lucky every time I use a microscope. The most interesting moments have been those that challenged my expectations, such as having applications accepted when I thought they would get nowhere (and vice versa). A crucial point in my career was having rotations in the first year of my PhD, because I started it completely convinced that I would study epigenetics in embryonic stem cells and then changed to cell cycle research in fruit flies.

Who are your role models in science? Why?
During my PhD, I had in Jordan an example of a successful PI who strives to produce the best work possible but also cares about the happiness of the people that work in his lab. This has really encouraged me to continue working in academia. I would also like to highlight Saroj Saurya, who completed her PhD while working as a lab manager in the Raff lab. It was inspiring to see how she dealt with all her duties at work plus her family life, while remaining ready to assist anyone that needed help. Other scientific heroes of mine include Ada Lovelace, Rosalind Franklin and Gregor Mendel.

What’s next for you?
I am currently enjoying my postdoc in J. P. Vincent’s lab and my main focus is on my project studying Wnt signalling. I haven’t completely made up my mind about what comes next, but I would like to stay involved in science one way or another. I am also interested in the inner workings of academia, and the ways we can try to improve it.

Tell us something interesting about yourself that wouldn’t be on your CV
I love creative activities: in my spare time I write fiction, I was involved in making a couple of short films during my undergraduate time, and I will jump at the chance to mix science with painting or playdough.

What advice would you give to a fellow scientist, early-career or otherwise?
Don’t be afraid to try new things. Try to keep a healthy perspective, particularly when experiments don’t work or you are rejected. Most importantly, be appreciative of everyone that works around you, and of the great privilege that is to earn money doing something as cool as scientific research.

Reference