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FIRST PERSON

First person – Maria Lucrecia Alberdi

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. Maria Lucrecia Alberdi is first author on 'Regulation of kinesin-1 activity by the *Salmonella enterica* effectors PipB2 and SifA', published in JCS. Maria Lucrecia conducted the research described in this article while a PhD student in Stéphane Méresse's lab at the Centre d'Immunologie Marseille-Luminy, Aix-Marseille University, Marseille, France. She is now a postdoc in the lab of Gad Frankel at the Centre for Molecular Bacteriology and Infection, Imperial College London, UK, where she is investigating interactions between pathogens and their hosts during infection.

Maria Lucrecia Alberdi

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

Salmonella is a gram-negative bacterium that colonizes the gastrointestinal tract and it is one of the main causes of food-borne infections. A better understanding of the mechanism of infection used by the bacteria could lead to the development of new treatments against infection. *Salmonella* is an intracellular pathogen that replicates within the host cells, in the *Salmonella*-containing vacuole. The bacteria inject proteins (known as effectors) into the cytosol of the host cell. These effectors hijack multiple different processes, including membrane vesicular trafficking, in order to gain nutrients and membrane via a network of membrane tubes. This eases the replication of the bacteria within its host. Kinesin-1 is the major anterograde motor for transport along microtubules, and one of the targets of the effectors. Given the importance of kinesin-1 in *Salmonella*-induced changes in endo-membrane compartments, it was important to understand the molecular mechanisms and interactions leading to the regulation of the activity of this molecular motor. This work provides a better understanding of the role of kinesin-1 during infection, presents new information of the interaction between the effectors (PipB2 and SifA) and kinesin-1, and leads to a new model of regulation of motor proteins.

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

The biggest challenge in this project was to establish a method for pulling a tube from giant unilamellar vesicles. This kind of approach was quite different from the existing expertise in our laboratory, working on the molecular mechanisms of *Salmonella* effectors. There were many questions and failed attempts at the beginning of the project. Fortunately, our collaborators had extensive knowledge in the field of membrane biophysics. Thanks to their valuable advice on everything from the equipment to protocol details, they helped us to successfully establish the technique in our facilities. This is an excellent example of how inter-disciplinary collaboration between different teams can enrich research.

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

As for many other enthusiastic scientists, there were several moments of excitement during the course of this work. One of the most important moments was when I found that PipB2 activated kinesin-1, thanks to the microtubule-binding protein spin-down assay. This result contradicted our previous model of kinesin-1 regulation by the effector protein PipB2 during *Salmonella* infection. As we had had in mind a different role for PipB2, this was quite a surprising result. Another significant moment was when I observed that activated kinesin-1 bound to microtubules when it was co-expressed with PipB2 in COS-7 cells. The opportunity to observe the change in the location of kinesin-1 not only using purified proteins, but also in the cellular context, was a very rewarding moment.

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

Although I work with bacteria, I have mainly done work in cell biology, and therefore I have read many articles published in JCS. When the question of publishing our work arose, we naturally turned to this journal.

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

Stéphane was without doubt a great mentor to me and all the students that worked with him. Doing my PhD in France meant huge changes in my life since I was coming from Argentina. Stéphane

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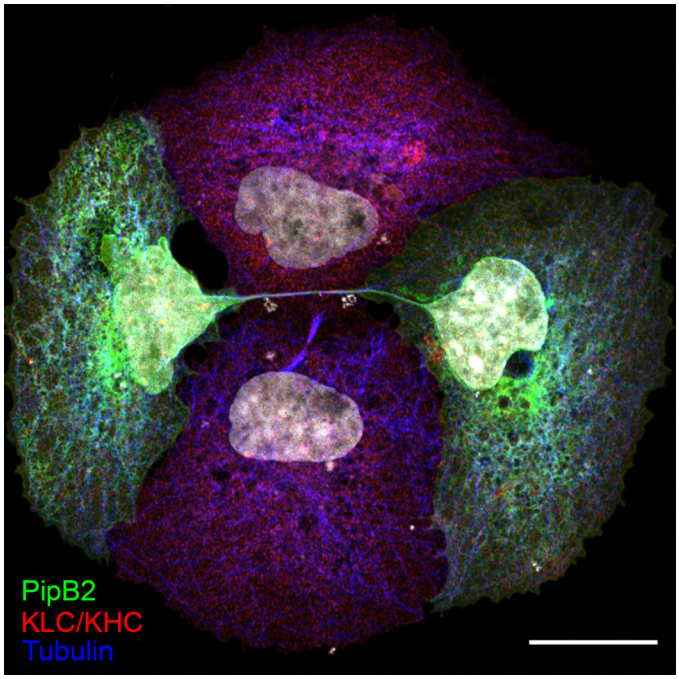

Confocal image of fixed and immunostained COS-7 cells transfected with plasmids for ectopic expression of kinesin-1 (red) and the *Salmonella* effector PipB2 (green). Tubulin cytoskeleton (blue) and nuclei (grey) are counterstained. Scale bar: 20 µm.

was of great help to cope with the transition. He has always been supportive, open to new approaches and available for discussion at any time. His continuous curiosity and scientific rigour have always inspired me.

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?

I have been always curious since I was a kid, and I had a natural interest for life sciences. When I was living in Argentina, I became fascinated by the interaction between pathogens and their hosts. As curious as I am, I always wanted to experience living abroad. For this reason, I decided to apply to a call opened by the Labex INFORM project (https://labexinform.wordpress.com). This is a multi-disciplinary program that combines physical and biological approaches for quantitative studies of biological mechanisms. I had the opportunity to pursue a PhD under the supervision of Stéphane Méresse, looking to extend my scientific knowledge to a new field in a highly enriching scientific community. Scientific research is a world that fascinates me because it allows us to ask new questions and challenges us constantly – each step we take guides us to a new path. Many of the achievements of scientific research have been translated into benefits for humanity, even in unexpected ways. The constant battle between bacteria and hosts that has been taking place since they evolved, leading to molecular mechanisms of adaptation and survival, continues to fascinate me more and more every day.

Who are your role models in science? Why?

There are many people that inspire admiration and are examples to follow. Luis Federico Leloir is one of the first names that comes to mind, receiving the Nobel Prize in Chemistry despite the limitations that can be found in developing countries. But I must admit that female scientists, such as Andrea Gamarnik or Emmanuelle Charpentier (among many others), are the ones who have inspired me the most. They are an excellent example of dedication, scientific excellence and commitment, despite the challenges that women still face today when pursuing a scientific career.

What's next for you?

I have recently started a postdoc at Imperial College London, in the laboratory of Gad Frankel. I will continue working in the area of host-pathogen interactions, studying the *Citrobacter rodentium* mouse model. This project is a great opportunity to work in a different scientific community, extend scientific collaborations and evolve as a professional by incorporating new expertise.

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

I have practised aerial silk since I was in Argentina, it is an excellent discipline that has given me great satisfaction. It has helped me with my work–life balance and gives me an adrenaline rush.

Reference

Alberdi, L., Vergnes, A., Manneville, J.-B., Tembo, D. L., Fang, Z., Zhao, Y., Schroeder, N., Dumont, A., Lagier, M., Bassereau, P. et al. (2020). Regulation of kinesin-1 activity by the *Salmonella enterica* effectors PipB2 and SifA. *J. Cell Sci.* **133**, jcs239863. doi:10.1242/jcs.239863