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CELL SCIENTISTS TO WATCH

Cell scientist to watch – Serge Mostowy

Serge Mostowy earned his bachelor degree in physics and master degree in evolutionary biology from McGill University, Montreal, Canada, where he then continued for his PhD in microbiology and immunology (focusing on *Mycobacterium tuberculosis* complex genomics) at the McGill Centre for the Study of Host Resistance under the supervision of Marcel Behr. Serge moved to the Institute Pasteur, Paris, France, for post-doctoral work with Pascale Cossart on the cell biology of infection. In 2012, he established his own research group as a Wellcome Trust Research Career Development Fellow in the Department of Medicine at Imperial College and was awarded the Lister Institute of Preventative Medicine Research Prize in 2015. In 2018, Serge was appointed as Professor at the London School of Hygiene & Tropical Medicine. He is the recipient of a Wellcome Trust Senior Research Fellowship and a European Research Council Consolidator Grant. The Mostowy laboratory is working on molecular mechanisms underlying bacterial infection and the role of the cytoskeleton in cellular immunity.

Serge Mostowy

What inspired you to become a scientist?

I always enjoyed nature and had pets. In grade six when I was 10 years old, I worked with a sound engineer and won an award for proving that my budgies were communicating with each other. I have always been attracted to science. This is probably because I come from a family that supported higher education and creative thinking. I am inspired by the independence of science and the thrill of discovery.

Do you also appreciate academic research as a way to see the world and get around a little bit?

Travelling is one of my favourite aspects of the job, and international appreciation for science is key for development. As a student, I was mostly based in Montreal. Then, my PhD supervisor sent me to Stanford to learn a technique, and I remember, when I gave a lab meeting there it felt like the earth moved. It was amazing to experience the potential once you are connecting with different labs. At the beginning, I was a lab rat trying to discover amazing things; you just get hooked on that feeling of finding something out that no one else on the planet knows.

In those early days, you weren't much of a cell biologist...

Not at all! I came from a mathematical background and then, in my PhD, I dealt with many gene lists, both genomics and transcriptomics data. The 2000s was an amazing time for sequencing and, with my mathematical background, I felt I could appreciate it differently from your canonical biologist. Later, I wanted to move more towards microscopy.

What questions are your lab trying to answer just now?

I hope to be recognised for discovering new and creative ways of controlling bacterial infection. In the lab, we have two approaches: the first is to uncover novel links between the cytoskeleton and cellular immunity, since historically, investigation of the cytoskeleton has enabled key advances in both cell and infection biology. For that, we focus on the septin cytoskeleton and its precise role in cellular immunity. The second approach is to use the zebrafish model to study the cell biology of infection *in vivo*. The zebrafish has been remarkable in terms of discovering infection control mechanisms – something I didn't predict 5 years ago.

What work or publication has influenced you in the field, and how was it to switch to zebrafish as a model system?

I will forever be inspired by host–pathogen research excellence. For example, Lalita Ramakrishnan (Cambridge, UK) pioneered the zebrafish model and definitely played a role. When I was finishing my post-doc, I wanted to develop something different from my supervisor, because you hope to distinguish yourself. I wanted an animal model for translational advance, and I recognised that what we could see with zebrafish was amazing. At Pasteur, I was around some of the best cell biologists of infection, like Pascale Cossart and Philippe Sansonetti; I felt to apply that same mind-set to the zebrafish model would be exciting. I think I have been fortunate, but you also create your own luck. I wrote an internal grant at Pasteur explaining that we discovered something and wanted to study its *in vivo* relevance; for that, I wanted to learn the zebrafish model and promote my transition to independence. It was that internal grant that enabled so much because I could work with experts in the field at Pasteur, generate just enough pilot data to prove that my ideas could work and then get funded by a Wellcome Trust Fellowship, which brought me over to the UK.

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Serge skateboarding at Royal Oak skatepark, London. Video: Joey Sizzle.

You study the cytoskeletal septin proteins that are key to the understanding of host–pathogen interactions. Have septins been under-recognised in the past?

Septins have been around ever since they were discovered by Leland Hartwell (Seattle, US) in the 70s as being essential for cell division. However, since they are crucial for cell division, their role in non-dividing cells was overlooked; that is why, just now, we have been able to discover so much about how this protein family responds to infection. You are completely right – the field is exploding right now.

What challenges did you face when starting your own lab that you didn't expect?

Of course, it is a challenging thing to move from Canada to Paris and start a lab in London, but you just have to do it! It is really exciting to work in London – it's such an international research environment with enormous potential for collaborative advance. I mean, you could be purple and fit in! You spend the first year bringing to fruition some of your post-doc ideas, and proving to yourself that you can do it on your own. That is key. The main challenge is hiring people you can work well with. I pride myself in that I try to hire a motley crew – people with different personalities, different skill sets, different nationalities, because everyone can bring something different to the table. In turn, it can be difficult to manage such diverse characters and mind-sets, but that is what you need to do as a group leader.

> **"…you just get hooked on that feeling of finding something out that no one else on the planet knows"…**

How are the challenges that you're facing now different?

I have recently been recruited as a professor and the support we are getting from different granting agencies indicates that we are doing something right! What keeps me up at night nowadays is the thrill of discovery, promoting the advances of our group and making sure that people in my lab are on track. There are some fundamental questions based on observations I made as a student or post-doc that we still have not yet fully answered; for example, how to bring our discoveries to impact global health.

What is the most important advice you would give to someone about to start their own lab?

Mentorship and support can play such an important role in a science career. I think it is important that you do not worry what other people think or what other people think is exciting. It is important to listen to people, but if you want to develop your own field and be at the forefront of your own research agenda, you have to believe in yourself. Focus on what you think is exciting; in turn, recognise and accept help when it is offered.

What is your advice on establishing good collaborations?

A productive collaboration is one of the greatest pleasures in life, because you have the potential to address questions you would not normally be able to achieve on your own. Of course, being the senior author on a paper is important, but I get such satisfaction out of enabling new discoveries in domains I am not normally recognised in. You also learn how other labs, tools and approaches work – I can't stress how important I think it is to be collaborative. As an early career researcher, however, you first have to generate your own research identity so that people can recognise what you do. That is paramount. You do not want to spread yourself too thin, and the collaborations come with time.

> **"Focus on what you think is exciting; in turn, recognise and accept help when it is offered."**

How do you achieve a work–life balance when you're trying to establish yourself as an independent investigator?

The research environment always came first, for both my wife, who is a scientist, and me. It is a tricky one. When you have a partner who is also in science, it makes it perhaps easier because you understand each other, but it also makes it more difficult because her life is as crazy as mine! Things are different now, as I get older; being a dad does change things. I consider myself lucky that I work with a dedicated team now, because it is difficult for me to be in the lab 12 h a day! Science is still just as important to me, but the hours have changed a little bit.

Could you tell us an interesting fact about yourself that people wouldn't know by looking at your CV?

I've been skateboarding for over 30 years, so I guess that's something I do that is a little different. I am most happy in life when I'm breaking a skateboard every 2 or 3 weeks. So yeah, I continue to do it all the time. It is a perfect balance to science, and is going to be in the 2020 Olympics. I think if we have a discussion in 20 years, more people will be skateboarding. Look at snowboarding – it took over. I guess we will see!

Serge Mostowy was interviewed by Manuel Breuer, Features & Reviews Editor at Journal of Cell Science. This piece has been edited and condensed with approval from the interviewee.