

Interview with the Guest Editor – Ana-Maria Lennon-Duménil

Ana-Maria Lennon-Duménil was born in Chile and grew up in France before returning to South America to study biology at the University of Chile. For her PhD, she joined the laboratory of Marc Fellous at Institut Pasteur, Paris, France. Subsequently, Ana-Maria did her postdoctoral work with Hidde Ploegh at Harvard Medical School, Boston, USA on MHC class II antigen presentation. In 2004, she established her own research group at the Department of Immunity and Cancer at Institut Curie in Paris. Ana-Maria has been an elected EMBO member since 2018 and was awarded an INSERM national research award in the same year. Her research focuses on the coordination of cell migration and antigen presentation in dendritic cells and the contribution of cell polarity to the establishment of the immune synapse in B-lymphocytes. Ana-Maria is the Guest Editor for the 2020 Cell Biology of the Immune System Special Issue in Journal of Cell Science.

What are your research interests?

My lab is focused on the cell biology of immune cells; specifically, dendritic cells and B-lymphocytes. Dendritic cells are the sentinel of the immune system: they patrol the environment and whenever they find something they identify as dangerous, they carry it to the lymph nodes to present it to T-cells, leading to activation of the T-cells. This is the first step of any adaptive immune response. One major research axis in my lab is trying to understand the molecular basis of dendritic cell migration – we have combined research at the molecular and cellular scales to show that dendritic cells optimise their migration modes based on their functional requirements. Another axis focuses on the B-cell immune synapse. *In vivo*, B-lymphocytes acquire antigens that are immobilised at the surface of the surrounding cells, allowing the formation of an immune synapse at the contact zone. We've been trying to understand the trafficking and cytoskeleton reorganisation events that lead to the formation of this immune synapse. We have shown that B-cells polarise their centrosome and lysosomal compartment at the immune synapse and that this polarisation is crucial for them to extract, process and present antigens to T cells. So far, we have approached both axes with quantitative biology and biophysics – mostly *ex vivo* using primary cells, but lately we have moved to tissues to evaluate the impact of what we have discovered *ex vivo* on the physiology of dendritic cells and B-cells in their natural environment.

Have you made use of recent technical advances in microscopy for this?

We have recently started using intravital imaging, but its spatiotemporal resolution is not compatible with fully capturing the processes we're interested in. For example, recording membrane trafficking and the re-organisation of the cytoskeleton requires time and spatial resolutions that are incompatible with two-photon intravital imaging. Lattice-light sheet microscopy is likely to be a major step forward in that regard, but it's not yet available to a broad



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community. Therefore, a reductionist approach to test molecular hypotheses has been, and still is, essential. We're simply keen to do the next step and evaluate this *in vivo*.

As described, your research combines several research areas of cell biology. Where do you see yourself fitting in and in what direction has the field been moving in the last decade?

I feel that I am both an immunologist and a cell biologist, and I like to collaborate with physicists. It has been interesting to witness cell biology move towards biophysics and quantitative biology in the past ten years. There has been a transition from qualitative to quantitative data and from descriptive to more predictive research owing to the interaction with physicists. The emergence of the mechanobiology field has been instrumental to our understanding of how the physical properties of cells and their environment can impact on their biological properties. This transition is also apparent when you go to a big conference like the ASCB/EMBO meeting in the US – there are now many sessions on mechanobiology, matrix biology, biophysics and quantitative biology. There's also been a recent shift towards physiology. Cell biologists now ask physiologically relevant questions in the context of primary cells, tissues and model organisms.

Do you have particular examples that stood out for you from the 2019 ASCB/EMBO conference?

For example, Clare Waterman's (NIH, Bethesda) research group is now quite interested in the cell biology of immune cells, with very exciting studies on the mechanisms leading to formation of neutrophil extracellular traps. David Drubin (UC Berkeley), who is a leading figure in the endocytosis field both in yeast and

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Ana-Maria on an island in Bretagne where she enjoys spending time

mammalian cells, is now studying the mechanisms of endocytosis in primary cells and organoids and their contribution to the pathogenesis of cancer. My feeling is that the shift from basic cell biology studies classically performed in model cell lines to cell biology studies carried out in physiologically relevant biological models concerns many cell biologists today.

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Was this shift also reflected in the research manuscript submissions you received as Guest Editor for the Special Issue?

Absolutely. We received a broad range of approaches and very different types of questions and often with a very physiological approach, using *Drosophila*, zebrafish or mouse models. It was great to see the breadth of research.

Why did you accept the invitation to become a Guest Editor for Journal of Cell Science?

I saw an exceptional opportunity for cell biologists to learn more about immune cells and, conversely, how immune cells can teach cell biology a lot about diverse cellular processes and their regulation. Immune cells have emerged to be efficient in sensing their environment. These are very responsive cells that react efficiently and rapidly to a variety of stimuli; they thus provide an opportunity to understand a diversity of dynamic cell biological processes that do not take place in other cells.

What did you hope to get out of this role?

To be honest, I didn't know what to expect because of my limited previous experience as an editor. However, I very much liked the diversity of manuscripts I handled, as I said above. The research in the submitted manuscripts combined lots of different model organisms, immune cell types, approaches and fields. My priority was assessing the quality of the research and I also had to establish my time management as an editor.

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Do you feel you learned something with regards to the relationship between editors and authors in your Guest Editor role?

It has taught me how to read to the point and how to handle a paper in an efficient manner. What are the criteria that have to be met? This, in turn, also affects my future thinking as an author and group leader – there are a lot of questions you can ask yourself about your own manuscript and assessing somebody else's data. Overall, Journal of Cell Science handles the manuscript assessment process extremely well. The Editors and the Editorial Advisory Board are all excellent scientists and this is complemented by progressive publishing policies and a very well-organised in-house team.

You published a journal called Globule aimed at the broad public and school kids as well as researchers. Could you tell us more about that?

Globule is a small 'fan-zine' that is an initiative by Matthieu Piel (a PI at Institut Curie), Renaud Chabrier (an artist) and myself to communicate on cell biology. The first volume focussed on dendritic cells, and in particular, on the discoveries we had made studying these fascinating immune sentinels. It is written to be interesting to scientists as well as non-scientists. It also targets young people – it can be read to kids as a story. It's a multi-purpose project, which taught us a lot. We hope to work soon on a second issue.

When you're not a Guest Editor or doing research, what are the things you do for fun?

I'm a very social person inside and outside of the lab; I like people in general, and I like to go to movies, read books and go to the theatre to discover new characters. I would even say 'human beings' are my major hobby. I enjoy the diversity of personalities – the way people look, behave and react. This is why I like to live in Paris where I can get out of my apartment and see all kinds of people walking around. However, I also like to smell fresh air from time to time: hiking, sailing, swimming and finding shells then become my favourite activities!

Ana-Maria Lennon-Duménil 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.